

POSSE  
HERRERA  
RUIZ

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 14-121257- -00000-0000

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Tra. 11 PATENTEIYII Eve: 378 FASENACIONALI  
Act. 411 PRESENTACION Folios: 240 241



**Industria y Comercio**  
SUPERINTENDENCIA

DELEGATURA DE NUEVAS CREACIONES

SOLICITUD  
FASE NACIONAL -PCT

21. EXPEDIENTE No. \_\_\_\_\_

54. TITULO: COMBINACIONES DE PRINCIPIOS ACTIVOS  
QUE TIENEN PROPIEDADES INSECTICIDAS Y ACARICIDAS

51. CLASIFICACION INTERNACIONAL:

A01N 43/653 (2006.01), A01N 43/36 (2006.01), A01N 43/56 (2006.01),  
A01N 43/88 (2006.01), A01N 43/90 (2006.01), A01N 47/02 (2006.01),  
A01N 47/34 (2006.01), A01N 47/40 (2006.01), A01N 51/00 (2006.01),  
A01N 53/00 (2006.01), A01N 57/12 (2006.01), A01N 57/16 (2006.01),  
A01N 63/00 (2006.01), A01N 63/04 (2006.01), A01P 7/00 (2006.01).

71. SOLICITANTE:

BAYER INTELLECTUAL PROPERTY GMBH

DOMICILIO:

Alfred Nobel Strasse 10, Monheim ALEMANIA

74. APODERADO: HELENA CAMARGO WILLIAMSON

22. BOGOTÁ D.C., JUNIO 05 DE 2014



Industria y Comercio  
SUPERINTENDENCIA

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e radicación

DIRECCIÓN DE NUEVAS CREACIONES  
SOLICITUD FASE NACIONAL –PCT

|                                                                                                                                                                                                                                                                                                                                                 |                                                                                               |                                                                                                            |                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| 1                                                                                                                                                                                                                                                                                                                                               | TIPO DE SOLICITUD                                                                             | <input checked="" type="checkbox"/> Patente de invención<br><input checked="" type="checkbox"/> Capítulo I | <input type="checkbox"/> Patente de Modelo de Utilidad<br><input type="checkbox"/> Capítulo II |
| 2                                                                                                                                                                                                                                                                                                                                               | DATOS SOLICITUD INTERNACIONAL PCT (86)                                                        |                                                                                                            |                                                                                                |
| Solicitud Internacional No.                                                                                                                                                                                                                                                                                                                     |                                                                                               | PCT/EP2012/075255                                                                                          | Fecha 12/12/2012                                                                               |
| Publicación Internacional No.                                                                                                                                                                                                                                                                                                                   |                                                                                               | WO 2013/087709 A1                                                                                          | Fecha 20/06/2013                                                                               |
| 3                                                                                                                                                                                                                                                                                                                                               | TÍTULO DE LA INVENCIÓN (200 caracteres o espacios máximos)                                    |                                                                                                            |                                                                                                |
| COMBINACIONES DE PRINCIPIOS ACTIVOS QUE TIENEN PROPIEDADES INSECTICIDAS Y ACARICIDAS                                                                                                                                                                                                                                                            |                                                                                               |                                                                                                            |                                                                                                |
| 4                                                                                                                                                                                                                                                                                                                                               | CLASIFICACIÓN INTERNACIONAL (CIP)                                                             |                                                                                                            |                                                                                                |
| A01N 43/653 (2006.01), A01N 43/36 (2006.01), A01N 43/56 (2006.01), A01N 43/88 (2006.01), A01N 43/90 (2006.01),<br>A01N 47/02 (2006.01), A01N 47/34 (2006.01), A01N 47/40 (2006.01), A01N 51/00 (2006.01), A01N 53/00 (2006.01),<br>A01N 57/12 (2006.01), A01N 57/16 (2006.01), A01N 63/00 (2006.01), A01N 63/04 (2006.01), A01P 7/00 (2006.01). |                                                                                               |                                                                                                            |                                                                                                |
| SOLICITANTE (S) Esta persona también es inventor. Para datos adicionales utilizar hoja de información complementaria                                                                                                                                                                                                                            |                                                                                               |                                                                                                            |                                                                                                |
| APELLIDOS O RAZÓN SOCIAL                                                                                                                                                                                                                                                                                                                        |                                                                                               | NOMBRE                                                                                                     | IDENTIFICACIÓN                                                                                 |
| BAYER INTELLECTUAL PROPERTY GMBH                                                                                                                                                                                                                                                                                                                |                                                                                               |                                                                                                            |                                                                                                |
| 6                                                                                                                                                                                                                                                                                                                                               | DATOS DEL SOLICITANTE                                                                         |                                                                                                            |                                                                                                |
| DIRECCIÓN                                                                                                                                                                                                                                                                                                                                       |                                                                                               | No. TELÉFONO                                                                                               |                                                                                                |
| CIUDAD                                                                                                                                                                                                                                                                                                                                          |                                                                                               | CORREO ELECTRÓNICO                                                                                         |                                                                                                |
| DEPARTAMENTO/ESTADO                                                                                                                                                                                                                                                                                                                             |                                                                                               | NACIONALIDAD O                                                                                             |                                                                                                |
| PAÍS DE RESIDENCIA                                                                                                                                                                                                                                                                                                                              |                                                                                               | LUGAR DE CONSTITUCIÓN                                                                                      |                                                                                                |
| Alfred Nobel Strasse 10,                                                                                                                                                                                                                                                                                                                        |                                                                                               |                                                                                                            |                                                                                                |
| Monheim                                                                                                                                                                                                                                                                                                                                         |                                                                                               |                                                                                                            |                                                                                                |
| ALEMANIA                                                                                                                                                                                                                                                                                                                                        |                                                                                               | ALEMANIA                                                                                                   |                                                                                                |
| 7                                                                                                                                                                                                                                                                                                                                               | INVENTOR (ES) Para datos adicionales utilizar hoja de información complementaria              |                                                                                                            |                                                                                                |
| APELLIDOS                                                                                                                                                                                                                                                                                                                                       |                                                                                               | NOMBRES                                                                                                    | NACIONALIDAD                                                                                   |
| 1. HUNGENBERG                                                                                                                                                                                                                                                                                                                                   |                                                                                               | 1. Heike                                                                                                   | 1. Alemania                                                                                    |
| 2. PITTA                                                                                                                                                                                                                                                                                                                                        |                                                                                               | 2. Leonardo                                                                                                | 2. Alemania                                                                                    |
| DIRECCIÓN DE CORREO ELECTRÓNICO:                                                                                                                                                                                                                                                                                                                |                                                                                               |                                                                                                            |                                                                                                |
| 8                                                                                                                                                                                                                                                                                                                                               | DATOS INVENTOR (ES)                                                                           |                                                                                                            |                                                                                                |
| PAÍS RESIDENCIA                                                                                                                                                                                                                                                                                                                                 | DEPARTAMENTO/ESTADO                                                                           | CIUDAD                                                                                                     | DIRECCIÓN                                                                                      |
| 1. Alemania                                                                                                                                                                                                                                                                                                                                     |                                                                                               | 1. Langenfeld                                                                                              | 1. Grünwaldstr. 39b, 40764                                                                     |
| 2. Alemania                                                                                                                                                                                                                                                                                                                                     |                                                                                               | 2. Leverkusen                                                                                              | 2. Kocher Str. 10, 51371                                                                       |
| OTRO(S) SOLICITANTE(S) Y/O (OTRO(S)) INVENTOR(ES)                                                                                                                                                                                                                                                                                               |                                                                                               |                                                                                                            |                                                                                                |
| <input type="checkbox"/> Los demás solicitantes y/o (demás) inventores se indican en una hoja a continuación.                                                                                                                                                                                                                                   |                                                                                               |                                                                                                            |                                                                                                |
| 9                                                                                                                                                                                                                                                                                                                                               | <input type="checkbox"/> REPRESENTANTE LEGAL <input checked="" type="checkbox"/> APODERADO    |                                                                                                            |                                                                                                |
| APELLIDOS                                                                                                                                                                                                                                                                                                                                       |                                                                                               | NOMBRES                                                                                                    | IDENTIFICACIÓN                                                                                 |
| CAMARGO WILLIAMSON                                                                                                                                                                                                                                                                                                                              |                                                                                               | HELENA                                                                                                     | C.C 35.455.268 de Bogota T.P 76985                                                             |
| DIRECCIÓN                                                                                                                                                                                                                                                                                                                                       |                                                                                               | No. TELÉFONO                                                                                               |                                                                                                |
| CIUDAD                                                                                                                                                                                                                                                                                                                                          |                                                                                               | CORREO ELECTRÓNICO                                                                                         |                                                                                                |
| PAÍS                                                                                                                                                                                                                                                                                                                                            |                                                                                               | No. RADICACIÓN DE PROTOCOLO DE PODER GENERAL                                                               |                                                                                                |
| CARRERA 7 N° 71 – 52, TORRE A, PISO 5                                                                                                                                                                                                                                                                                                           |                                                                                               | 3257300                                                                                                    |                                                                                                |
| BOGOTÁ                                                                                                                                                                                                                                                                                                                                          |                                                                                               | helenacamargo@phrlegal.com                                                                                 |                                                                                                |
| COLOMBIA                                                                                                                                                                                                                                                                                                                                        |                                                                                               | PODER PROT. 13 102341                                                                                      |                                                                                                |
| 10                                                                                                                                                                                                                                                                                                                                              | DECLARACIONES DE PRIORIDAD <input checked="" type="checkbox"/> SI <input type="checkbox"/> NO |                                                                                                            |                                                                                                |
| (33) PAÍS DE ORIGEN                                                                                                                                                                                                                                                                                                                             |                                                                                               | CÓDIGO PAÍS                                                                                                | (31) NÚMERO                                                                                    |
| COMUNIDAD EUROPEA                                                                                                                                                                                                                                                                                                                               |                                                                                               |                                                                                                            | 11193829.6                                                                                     |
|                                                                                                                                                                                                                                                                                                                                                 |                                                                                               |                                                                                                            | (32) FECHA (AAAA/MM/DD)                                                                        |
|                                                                                                                                                                                                                                                                                                                                                 |                                                                                               |                                                                                                            | 15/12/2011                                                                                     |

☐ SI      ☒ NO

## 12 DECLARACIÓN SOBRE USO DE CONOCIMIENTOS TRADICIONALES

☐ SI      ☒ NO

|    |                    |
|----|--------------------|
| 13 | REDUCCIÓN DE TASAS |
|----|--------------------|

☐ SI      ☒ NOMicro, pequeñas y medianas empresas ☐Universidades públicas o privadas ☐Entidades sin ánimo de lucro ☐

**Debe aportar los documentos que se indican en el numeral 17 de anexos**

14 AUTORIZACIÓN DE NOTIFICACIÓN EN LÍNEA ☒ SI ☐ NO

|    |                                        |    |       |
|----|----------------------------------------|----|-------|
| 15 | COMPROBANTE DE PAGO O PAGO ELECTRÓNICO | Nº | Fecha |
|----|----------------------------------------|----|-------|

**16 FIRMA DEL SOLICITANTE, DEL APODERADO O DEL REPRESENTANTE LEGAL**  
*Junto a cada firma, indicar el nombre del firmante y su calidad (si tal calidad no es obvia al leer el petitorio)*

HELENA CAMARGO WILLIAMSON

|    |        |
|----|--------|
| 17 | ANEXOS |
|----|--------|

1. ☒ Descripción N° de folios:
2. ☒ Reivindicaciones N° Reivindicaciones:
3. ☒ Dibujos y/o figuras N° folios:
4. ☒ Resumen.
5. ☐ Certificado de depósito de material biológico si fuera el caso.
6. ☐ Listado de secuencias de nucleótidos y/o aminoácidos en forma digital si fuera el caso.
7. ☒ Arte final 12 x 12.
8. ☐ Anexo formato digital.

9. ☒ Poderes, si fuera el caso, **PODER PROT 13 102341**

10. ☐ Documento que legalmente pruebe la cesión del inventor al solicitante o a su causante.

11. ☐ Copia del contrato de acceso de recursos genéticos o productos derivados, certificado o número de registro, si fuera el caso.

12. ☐ Copia de la licencia o autorización de Conocimientos Tradicionales, certificado o número de registro, si fuera el caso.

13. **Reducción de tasas**

**Micro, pequeñas o medianas empresas**

☐ Copia simple de la declaración de renta del año inmediatamente anterior, o en su defecto prueba documental idónea.

☐ Documento de constancia de cumplimiento con lo establecido en la ley 905 de 2004.

**Universidades públicas o privadas**

☐ Copia acto de reconocimiento institucional emitido por el Ministerio de Educación

**Entidades sin ánimo de lucro**

☐ Copia de registro vigente en Cámara de comercio.

☐ Hoja de información complementaria.

☐ Otros, especificar

14. ☒ Comprobante de pago de la tasa de presentación de la solicitud.

15. ☐ Comprobante de pago por reivindicación de prioridad.

16. ☐ Comprobante de pago de la tasa por concepto de excedente de palabras en la publicación.

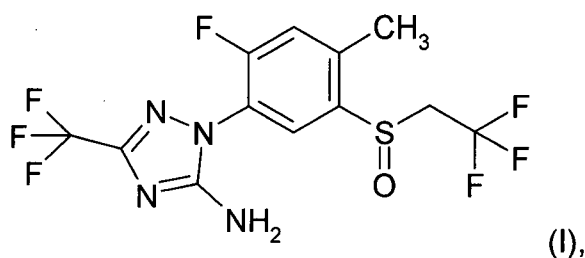
17. ☒ Comprobante de pago por reivindicación adicional a 10.

**Combinaciones de principios activos que tienen propiedades insecticidas y acaricidas**

La presente invención se refiere a combinaciones de principios activos que comprenden un compuesto de la fórmula (I) en combinación con otros principios  
5 con actividad insecticida o agentes de combate biológico y son muy adecuadas para combatir plagas animales tales como insectos y/o ácaridos no deseados e, indirectamente, mejoran el crecimiento de las plantas. La presente invención también se refiere al uso de un compuesto de la fórmula (I) en combinación con otros principios con actividad insecticida o agentes de combate biológico para  
10 reducir el daño general de plantas y partes de plantas y pérdidas en frutos recolectados u hortalizas recolectadas causados por insectos, nematodos y fitopatógenos.

El compuesto de la fórmula (I) es conocido por los documentos WO 1999/055668 y WO 2006/043635) y se ha descrito su actividad insecticida. Los principios activos  
15 que se especifican en la presente descripción por su "denominación común" son conocidos, por ejemplo, por "The Pesticide Manual" 14<sup>a</sup> Ed., British Crop Protection Council 2006, y el sitio de Internet <http://www.alanwood.net/pesticidas>. Sin embargo, la eficacia acaricida y/o insecticida y/o el espectro de actividad y/o la compatibilidad con las plantas de los compuestos conocidos, en particular con  
20 respecto a las plantas de cultivo, no siempre son adecuados.

Ahora se ha encontrado que las combinaciones de principios activos que comprenden un compuesto de la fórmula (I)



y uno o más insecticidas y/o acaricidas y/o agentes de combate biológico adicionales del grupo (II), seleccionados entre

(1) Inhibidores de acetilcolinesterasa (AChE), por ejemplo

carbamatos, por ejemplo, alanicarb (II-1-1), aldicarb (II-1-2), bendiocarb (II-1-3),

5 benfuracarb (II-1-4), butoxicarboxim (II-1-5), carbarilo (II-1-6), carbofurano (II-1-7),

carbosulfan (II-1-8), etiofencarb (II-1-9), fenobucarb (II-1-10), furatiocarb (II-1-11),

isoprocarb (II-1-12), metomilo (II-1-13), metolcarb (II-1-14), oxamilo (II-1-15),

pirimicarb (II-1-16), propoxur (II-1-17), tiodicarb (II-1-18) y XMC (II-1-19); u

organofosfatos, por ejemplo acefato (II-1-20), azinfos-etilo (II-1-21), azinfos-metilo

10 (II-1-22), cloretoxifos (II-1-23), clorfenvinfos (II-1-24), clorpirifos (II-1-25), clorpirifos-

metilo (II-1-26), cianofos (II-1-27), diazinona (II-1-28), diclorvos/DDVP (II-1-29),

dimetoato (II-1-30), dimetilvinfos (II-1-31), disulfoton (II-1-32), EPN (II-1-46), etion (II-

1-33), etoprofos (II-1-34), fenamifos (II-1-35), fenitrothion (II-1-36), fention (II-1-37),

fostiazato (II-1-38), isofenfos (II-1-39), O-(metoxiaminotio-fosforil)salicilato de

15 isopropilo (II-1-40), isoxation (II-1-41), malation (II-1-42), metidation (II-1-43),

monocrotofos (II-1-44), naled (II-1-45), oxidemeton-metilo (II-1-46), fentoato (II-1-

47), fosalonga (II-1-48), fosmet (II-1-49), pirimifos-metilo (II-1-50), profenofos (II-1-51),

protiofos (II-1-52), piraclofos (II-1-53), piridafention (II-1-54), quinalfos (II-1-55),

tetraclovinfos (II-1-56), tiometon (II-1-57), triclorfon (II-1-58) y vamidotion (II-1-59);

20 (2) Antagonistas de los canales de cloruro accionados por GABA, por ejemplo

ciclodieno organoclorados, por ejemplo clordano (II-2-1) y endosulfan (II-2-2); o

fenilpirazoles (fiproles), por ejemplo fipronilo (II-2-3) ;

(3) Moduladores de los canales de sodio/ bloqueadores de los canales de sodio dependientes de la tensión, por ejemplo

- piretroides, por ejemplo acrinatrina (II-3-1), aletrina (II-3-2), d-cis-trans aletrina (II-3-3), d-trans aletrina (II-3-4), bifentrina (II-3-5), cicloprotrina (II-3-6), ciflutrina (II-3-7), beta-ciflutrina (II-3-8), cihalotrina (II-3-9), lambda-cihalotrina (II-3-10), gamma-cihalotrina (II-3-11), cipermetrina (II-3-12), alfa-cipermetrina (II-3-13), beta-cipermetrina (II-3-14), theta-cipermetrina (II-3-15), zeta-cipermetrina (II-3-16), deltametrina (II-3-17), etofenprox (II-3-18), fenpropatrina (II-3-19), fenvalerato (II-3-20), flucitrinato (II-3-21), tau-fluvalinato (II-3-22), kadetrina (II-3-23), permetrina (II-3-24), fenotrina [isómero (1R)-trans] (II-3-25), piretrina (piretrum) (II-3-26), resmetrina (II-3-27), silafluofeno (II-3-28), teflutrina (II-3-29), tetrametrina (II-3-30), tetrametrina [isómeros (1R)] (II-3-31) y tralometrina (II-3-32), o DDT (II-3-33) o metoxiclor (II-3-34);
- (4) Agonistas de los receptores nicotínicos de acetilcolina (nAChR), por ejemplo neonicotinoides, por ejemplo acetamiprid (II-4-1), clotianidina (II-4-2), dinotefuran (II-4-3), imidacloprid (II-4-4), nitenpiram (II-4-5), tiacloprid (II-4-6) y tiametoxam (II-4-7);
- o nicotina (II-4-8);
- (5) Activadores alostéricos de los receptores nicotínicos de acetilcolina (nAChR), por ejemplo espinosinas, por ejemplo espinetoram (II-5-1) y espinosad (II-5-2);
- (6) Activadores de los canales de cloruro, por ejemplo avermectinas/milbemicinas, por ejemplo abamectina (II-6-1), benzoato de emamectina (II-6-2), lepimectina (II-6-3) y milbemectina (II-6-4);
- (7) Imitadores de hormonas juveniles, por ejemplo análogos de hormonas juveniles, por ejemplo y metopreno (II-7-1); o fenoxicarb (II-7-2) o piriproxifeno (II-7-3);

- (8) Surtido de inhibidores no específicos (múltiples sitios), por ejemplo haluros de alquilo, por ejemplo bromuro de metilo (II-8-1) y otros haluros de alquilo; o cloropicrina (II-8-2) o fluoruro de sulfurilo (II-8-3) o borax (II-8-4) o antimoniltartrato de potasio (II-8-5);
- (9) Bloqueadores de alimentación de homópteros selectivos, por ejemplo pimetrozina (II-9-1);
- (10) Inhibidores del crecimiento de ácaros, por ejemplo clofentezina (II-10-1), hexitiazox (II-10-2) y diflovidazina (II-10-3); o etoxazol (II-10-4)
- (11) Disruptores microbianos de la membrana digestiva de insectos, por ejemplo *Bacillus thuringiensis* subespecie israelensis (II-11-1), *Bacillus sphaericus* (II-11-2), *Bacillus thuringiensis* subespecie aizawai (II-11-3), *Bacillus thuringiensis* subespecie kurstaki (II-11-4), *Bacillus thuringiensis* subespecie tenebrionis (II-11-5) y proteínas vegetales BT: Cry1Ab, Cry1Ac, Cry1Fa, Cry2Ab, mCry3A, Cry3Ab, Cry3Bb, Cry34/35Ab1 (II-11-6);
- (12) Inhibidores de ATP-sintasa mitocondrial, por ejemplo diafentiuron (II-12-1); o acaricidas de organoestaño, por ejemplo azociclotina (II-12-2), cihexatina (II-12-3) y óxido de fenbutatina (II-12-4); o propargita (II-12-5) o tetradifon (II-12-6);
- (13) Desacopladores de la fosforilación oxidativa mediante interrupción del gradiente de protones, por ejemplo clorfenapir (II-13-1), DNOC (II-13-2) y sulfluramida (II-13-3);
- (14) Bloqueadores del canal del receptor de acetilcolina nicotínico (nAChR), por ejemplo bensultap (II-14-1), clorhidrato de cartap (II-14-2) y tiociclam (II-14-3);

- (15) Inhibidores de la biosíntesis de quinina, tipo 0, por ejemplo clorfluazuron (II-15-1), diflubenzuron (II-15-2), flucicloxuron (II-15-3), flufenoxuron (II-15-4), hexaflumuron (II-15-5), lufenuron (II-15-6), teflubenzuron (II-15-7) y triflumuron (II-15-8);
- 5 (16) Inhibidores de biosíntesis de quitina, de tipo 1, por ejemplo buprofezina (II-16-1);
- (17) Disruptores de muda, por ejemplo ciromazina (II-17-1);
- (18) Agonistas de receptor de octopamina, por ejemplo amitraz (II-18-1);
- 10 (19) Inhibidores del transporte de electrones en el complejo III mitocondrial, por ejemplo hidrametilnona (II-19-1) o acequinocilo (II-19-2) o fluacipirim (II-19-3);
- (20) Inhibidores del transporte de electrones en el complejo I mitocondrial, por ejemplo
- acaricidas METI, por ejemplo fenpiroximato (II-20-1), pirimidifeno (II-20-2), piridabeno (II-20-3), tebufenpirad (II-20-4) y tolfenpirad (II-20-5); o
- 15 rotenona (Derris) (II-20-6);
- (21) Bloqueadores de canales de sodio dependientes de voltaje, por ejemplo indoxacarb (II-21-1);
- (22) Inhibidores de acetil CoA carboxilasa, por ejemplo
- derivados de ácido tetrónico y tetrámico, por ejemplo espirodiclofeno (II-22-1);
- 20 (23) Inhibidores del transporte de electrones en el complejo IV mitocondrial, por ejemplo
- fosfinas, por ejemplo fosfuro de aluminio (II-23-1), fosfuro de calcio (II-23-2), fosfina (II-23-3) y fosfuro de cinc (II-23-4); o
- cianuro (II-23-5).
- 25 (24) Moduladores del receptor de rianodina, por ejemplo

diamidas, por ejemplo clorantraniliprol (II-24-1);

otros principios activos con modo de acción desconocido o indeterminado, por ejemplo amidoflumet (II-25-1), azadiractina (II-25-2), benclotiaz (II-25-3), benzoximato (II-25-4), bifenazato (II-25-5), bromopropilato (II-25-6),

5 quinometionato (II-25-7), criolita (II-25-8), ciantraniliprol (ciazipir) (II-25-9), dicofol (II-25-10), diflovidazina (II-25-11), fluensulfona (II-25-12), flufiprol (II-25-13), fluopiram (II-25-14), fufenozida (II-25-15), imidacloz (II-25-16), iprodiona (II-25-17), meperflutrina (II-25-18), pirifluquinazona (II-25-19), tetrametilflutrina (II-25-20) y yodometano (II-25-21); otros productos basados en *Bacillus firmus* (incluida,

10 pero sin limitación, la cepa CNCM I-1582, tal como, por ejemplo, VOTiVO™, BioNem) (II-25-22) *Bacillus subtilis* GB03 (II-25-23) y QST 713 (II-25-24), *Bacillus subtilis* var. *amyloliquefaciens* FZB24 (II-25-25) y *Bacillus amyloliquefaciens* FZB 42 (II-25-26), *Bacillus thuringiensis* subespecies *aizawai* (II-25-27), *kurstaki* (II-25-28), *tenebrionis* (II-25-29) e *israelensis* (II-25-30), *Bacillus sphaericus*,

15 *Acinetobacter* sp., *Pasteuria penetrans*, *Streptomyces venezuelae*, *Metarhizium anisopliae* F52 (II-25-31), *Metschnikowia fructicola* (II-25-32), *Paecilomyces lilacinus* cepa 251 (II-25-33), *Paecilomyces fumosoroseus* (II-25-34), *Nomuraea rileyi* (II-25-35), *Hirsutella thompsoni*, *Beauveria bassiana*, *Beauveria brongniartii*, *Lagenidium giganteum*, *Myrothecium verrucaria*, *Tsukamurella paurometabola*,

20 granulovirus de *Cydia pomonella* (II-25-36), granulovirus de *Adoxophyes orana*, nucleopoliedrovirus de *Helicoverpa armigera*, nucleopoliedrovirus de *Spodoptera exigua*, nucleopoliedrovirus de *Spodoptera littoralis*, nucleopoliedrovirus de *Spodoptera litura*, nucleopoliedrovirus de *Neodiprion abietis*, nucleopoliedrovirus de *Neodiprion sertifer*, *Verticillium lecanii*, piretrum (II-25-37), proteína harpin (II-

25 25-38), timol (II-25-39), quitina, extracto de *Quillaja saponaria*, *Bacillus pumilus*

cepa GB34 y cepa QST2808

o uno de los compuestos activos conocidos siguientes: 3-bromo-N-{2-bromo-4-cloro-6-[(1-ciclopropiletil)carbamoil]fenil}-1-(3-cloropiridin-2-il)-1H-pirazol-5-carboxamida (II-25-40) (conocida por el documento WO2005/077934), 4-[(6-bromopiridin-3-il)metil](2-fluoroetil)amino}furan-2(5H)-ona (II-25-41) (conocida por el documento WO2007/115644), 4-[(6-fluoropiridin-3-il)metil](2,2-difluoroetil)amino}furan-2(5H)-ona (II-25-42) (conocida por el documento WO2007/115644), 4-[(2-cloro-1,3-tiazol-5-il)metil](2-fluoroetil)amino}furan-2(5H)-ona (II-25-43) (conocida por el documento WO2007/115644), 4-[(6-cloropiridin-3-il)metil](2-fluoroetil)amino}furan-2(5H)-ona (II-25-44) (conocida por el documento WO2007/115644), flupiradifurona (II-25-45), 4-[(6-cloro-5-fluoropiridin-3-il)metil](metil)amino}furan-2(5H)-ona (II-25-46) (conocida por el documento WO2007/115643), 4-[(5,6-dicloropiridin-3-il)metil](2-fluoroetil)amino}furan-2(5H)-ona (II-25-47) (conocida por el documento WO2007/115646), 4-[(6-cloro-5-fluoropiridin-3-il)metil](ciclopropil)amino}furan-2(5H)-ona (II-25-48) (conocida por el documento WO2007/115643), 4-[(6-cloropiridin-3-il)metil](ciclopropil)amino}furan-2(5H)-ona (II-25-49) (conocida por el documento EP-A-0 539 588), 4-[(6-cloropiridin-3-il)metil](metil)amino}furan-2(5H)-ona (II-25-50) (conocida por el documento EP-A-0 539 588), {[1-(6-cloropiridin-3-il)etil](metil)óxido- $\lambda^4$ -sulfanilideno}cianamida (II-25-51) (conocida por el documento WO2007/149134) y sus diastereómeros {[1-(6-cloropiridin-3-il)etil](metil)óxido- $\lambda^4$ -sulfanilideno}cianamida (A) (II-25-52) y {[1-(6-cloropiridin-3-il)etil](metil)óxido- $\lambda^4$ -sulfanilideno}cianamida (B) (II-25-53) (también conocidas por el documento WO2007/149134), así como sulfoxaflor (II-25-54) y sus diastereómeros [(R)-metil(óxido){1-(6-(trifluorometil)piridin-3-il)etil}- $\lambda^4$ -sulfanilideno]cianamida (A1)

- (II-25-55) y [(S)-metil(óxido){(1S)-1-[6-(trifluorometil)piridin-3-il]etil}-λ<sup>4</sup>-sulfanilideno]cianamida (A2) (II-25-56), denominado grupo de diastereómeros A (conocidos por los documentos WO2010/074747, WO2010/074751), [(R)-metil(óxido){(1S)-1-[6-(trifluorometil)piridin-3-il]etil}-λ<sup>4</sup>-sulfanilideno]cianamida (B1)
- 5 (II-25-57) y [(S)-metil(óxido){(1R)-1-[6-(trifluorometil)piridin-3-il]etil}-λ<sup>4</sup>-sulfanilideno]cianamida (B2) (II-25-58), denominado grupo de diastereómeros B (también conocidos por los documentos WO2010/074747, WO2010/074751) y 11-(4-cloro-2,6-dimetilfenil)-12-hidroxi-1,4-dioxa-9-azadiespiro[4.2.4.2]tetradec-11-en-10-ona (II-25-59) (conocida por el documento WO2006/089633), 3-(4'-fluoro-2,4-
- 10 dimetilbifenil-3-il)-4-hidroxi-8-oxa-1-azaespiro[4.5]dec-3-en-2-ona (II-25-60) (conocida por el documento WO2008/067911), 1-{2-fluoro-4-metil-5-[(2,2,2-trifluoroetil)sulfinil]fenil}-3-(trifluorometil)-1H-1,2,4-triazol-5-amina (II-25-61) (conocida por el documento WO2006/043635), ciclopropanocarboxilato de [(3S,4aR,12R,12aS,12bS)-3-[(ciclopropilcarbonil)oxi]-6,12-dihidroxi-4,12b-dimetil-
- 15 11-oxo-9-(piridin-3-il)-1,3,4,4a,5,6,6a,12,12a,12b-decahidro-2H,11H-benzo[f]pirano[4,3-b]cromen-4-il]metilo (II-25-62) (conocido por el documento WO2008/066153), 2-ciano-3-(difluorometoxi)-N,N-dimetilbencenosulfonamida (II-25-63) (conocida por el documento WO2006/056433), 2-ciano-3-(difluorometoxi)-N-metilbencenosulfonamida (II-25-64) (conocida por el documento
- 20 WO2006/100288), 2-ciano-3-(difluorometoxi)-N-etilbencenosulfonamida (II-25-65) (conocida por el documento WO2005/035486), 1,1-dióxido de 4-(difluorometoxi)-N-etil-N-metil-1,2-benzotiazol-3-amina (II-25-66) (conocido por el documento WO2007/057407), N-[1-(2,3-dimetilfenil)-2-(3,5-dimetilfenil)etil]-4,5-dihidro-1,3-tiazol-2-amina (II-25-67) (conocida por el documento WO2008/104503), {1'-[(2E)-3-
- 25 (4-clorofenil)prop-2-en-1-il]-5-fluoro-espiro[indol-3,4'-piperidin]-1(2H)-il}(2-

cloropiridin-4-il)metanona (II-25-68) (conocida por el documento WO2003/106457),  
3-(2,5-dimetilfenil)-4-hidroxi-8-metoxi-1,8-diazaespiro[4.5]dec-3-en-2-ona (II-25-69)  
(conocida por el documento WO2009/049851), carbonato de 3-(2,5-dimetilfenil)-8-  
metoxi-2-oxo-1,8-diazaespiro[4.5]dec-3-en-4-ilo y etilo (II-25-50) (conocido por el  
5 documento WO2009/049851), 4-(but-2-in-1-ilo)-6-(3,5-dimetilpiperidin-1-il)-5-  
fluoropirimidina (II-25-71) (conocida por el documento WO2004/099160),  
(2,2,3,3,4,4,5,5-octafluoropentil)(3,3,3-trifluoropropil)malononitrilo (II-25-72)  
(conocido por el documento WO2005/063094), (2,2,3,3,4,4,5,5-  
octafluoropentil)(3,3,4,4,4-pentafluorobutil)malononitrilo (II-25-73) (conocido por el  
10 documento WO2005/063094), 8-[2-(ciclopropilmetoxi)-4-(trifluorometil)fenoxi]-3-[6-  
(trifluorometil)piridazin-3-il]-3-azabicyclo[3.2.1]octano (II-25-74) (conocido por el  
documento WO2007/040280), flometoquina (II-25-75), PF1364 (Nº CAS 1204776-  
60-2) (II-25-76) (conocido por el documento JP2010/018586), 5-[5-(3,5-  
diclorofenil)-5-(trifluorometil)-4,5-dihidro-1,2-oxazol-3-il]-2-(1H-1,2,4-triazol-1-  
15 il)benzonitrilo (II-25-77) (conocido por el documento WO2007/075459), 5-[5-(2-  
cloropiridin-4-il)-5-(trifluorometil)-4,5-dihidro-1,2-oxazol-3-il]-2-(1H-1,2,4-triazol-1-  
il)benzonitrilo (II-25-78) (conocido por el documento WO2007/075459), 4-[5-(3,5-  
diclorofenil)-5-(trifluorometil)-4,5-dihidro-1,2-oxazol-3-il]-2-metil-N-{2-oxo-2-[(2,2,2-  
trifluoroetil)amino]etil}benzamida (II-25-79) (conocido por el documento  
20 WO2005/085216), 4-{[(6-cloropiridin-3-il)metil](ciclopropil)amino}-1,3-oxazol-2(5H)-  
ona (II-25-80), 4-{[(6-cloropiridin-3-il)metil](2,2-difluoroetil)amino}-1,3-oxazol-2(5H)-  
ona (II-25-81), 4-{[(6-cloropiridin-3-il)metil](etil)amino}-1,3-oxazol-2(5H)-ona (II-25-  
82), 4-{[(6-cloropiridin-3-il)metil](metil)amino}-1,3-oxazol-2(5H)-ona (II-25-83)  
(todos conocidos por el documento WO2010/005692), NNI-0711 (piflubumida) (II-  
25 25-84) (conocida por el documento WO2002/096882), 1-acetil-N-[4-(1,1,1,3,3,3-

hexafluoro-2-metoxipropan-2-il)-3-isobutilfenil]-N-isobutiril-3,5-dimetil-1H-pirazol-4-carboxamida (II-25-85) (conocida por el documento WO2002/096882), 2-[2-([3-bromo-1-(3-cloropiridin-2-il)-1H-pirazol-5-il]carbonil)amino)-5-cloro-3-metilbenzoil]-2-metilhidrazincarboxilato de metilo (II-25-86) (conocido por el documento

5 WO2005/085216), 2-[2-([3-bromo-1-(3-cloropiridin-2-il)-1H-pirazol-5-il]carbonil)amino)-5-ciano-3-metilbenzoil]-2-etilhidrazincarboxilato de metilo (II-25-87) (conocido por el documento WO2005/085216), 2-[2-([3-bromo-1-(3-cloropiridin-2-il)-1H-pirazol-5-il]carbonil)amino)-5-ciano-3-metilbenzoil]-2-metilhidrazincarboxilato de metilo (II-25-88) (conocido por el documento

10 WO2005/085216), 2-[3,5-dibromo-2-([3-bromo-1-(3-cloropiridin-2-il)-1H-pirazol-5-il]carbonil)amino)benzoil]-1,2-dietilhidrazincarboxilato de metilo (II-25-89) (conocido por el documento WO2005/085216), 2-[3,5-dibromo-2-([3-bromo-1-(3-cloropiridin-2-il)-1H-pirazol-5-il]carbonil)amino)benzoil]-2-etilhidrazincarboxilato de metilo (II-25-90) (conocido por el documento WO2005/085216),

15 (5RS,7RS;5RS,7SR)-1-(6-cloro-3-piridilmetil)-1,2,3,5,6,7-hexahidro-7-metil-8-nitro-5-propoxiimidazo[1,2-a]piridina (II-25-91) (conocida por el documento WO2007/101369), 2-[6-[2-(5-fluoropiridin-3-il)-1,3-tiazol-5-il]piridin-2-il]pirimidina (II-25-92) (conocida por el documento WO2010/006713), 2-[6-[2-(piridin-3-il)-1,3-tiazol-5-il]piridin-2-il]pirimidina (II-25-93) (conocida por el documento

20 WO2010/006713), 1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-[[5-(trifluorometil)-1H-tetrazol-1-il]metil]-1H-pirazol-5-carboxamida (II-25-94) (conocida por el documento WO2010/069502), 1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-[[5-(trifluorometil)-2H-tetrazol-2-il]metil]-1H-pirazol-5-carboxamida (II-25-95) (conocida por el documento WO2010/069502), N-[2-

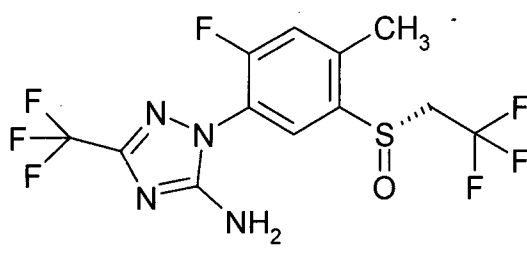
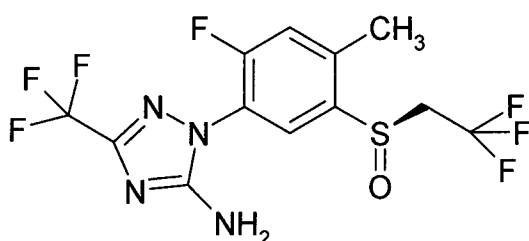
25 (terc-butilcarbamoil)-4-ciano-6-metilfenil]-1-(3-cloropiridin-2-il)-3-[[5-(trifluorometil)-

1H-tetrazol-1-il]metil}-1H-pirazol-5-carboxamida (II-25-96) (conocida por el documento WO2010/069502), N-[2-(terc-butilcarbamoil)-4-ciano-6-metilfenil]-1-(3-cloropiridin-2-il)-3-[[5-(trifluorometil)-2H-tetrazol-2-il]metil]-1H-pirazol-5-carboxamida (II-25-97) (conocida por el documento WO2010/069502), (1E)-N-[(6-cloropiridin-3-il)metil]-N'-ciano-N-(2,2-difluoroetil)etanimidamida (II-25-98) (conocida por el documento WO2008/009360), N-[2-(5-amino-1,3,4-tiadiazol-2-il)-4-cloro-6-metilfenil]-3-bromo-1-(3-cloropiridin-2-il)-1H-pirazol-5-carboxamida (II-25-99) (conocida por el documento CN102057925) y 2-[3,5-dibromo-2-([3-bromo-1-(3-cloropiridin-2-il)-1H-pirazol-5-il]carbonil)amino]benzoil]-2-etil-1-metilhidrazincarboxilato de metilo (II-25-100) (conocido por el documento WO2011/049233), afidopiropen (II-25-101) (conocido por el documento WO2008/066153), heptaflutrina (II-25-102) (conocida por el documento WO2010/043122), piriminostrobin (II-25-103) (conocida por el documento WO2010/139271), flufenoxistrobin (II-25-103) (conocida por el documento WO2007/000098), 3-cloro-N<sup>2</sup>-(2-cianopropan-2-il)-N<sup>1</sup>-[4-(1,1,1,2,3,3,3-heptafluoropropan-2-il)-2-metilfenil]ftalamida (II-25-104) (conocida por el documento WO2012/034472) u otros agentes de combate biológico seleccionados de entre bacterias, en particular bacterias formadoras de esporas, hongos o levaduras, protozoos, virus, opcionalmente en presencia de inoculantes, son muy adecuados para combatir plagas animales tales como insectos y/o acaricidas e indirectamente mejoran la salud de las plantas. Además, los compuestos de la fórmula (I) en combinación con otros principios con actividad insecticida o agentes de combate biológico para reducir el daño general de plantas y partes de plantas y pérdidas en frutos recolectados u hortalizas recolectadas

causados por insectos, nematodos y fitopatógenos.

Los principios activos del grupo (II) se asignan, según la clasificación IRAC, a diferentes clases y grupos según su mecanismo de acción.

- Si, en el contexto de la presente descripción, se usa la forma corta de la denominación común de un principio activo, esta engloba en cada caso todos los derivados habituales, tales como los ésteres y sales e isómeros, especialmente isómeros ópticos, especialmente la forma o formas comerciales. Si un éster o a una sal se denominan con la denominación común, esta en cada caso también se refiere a todos los otros derivados habituales, tales como otros ésteres y sales, los ácidos libres y los compuestos neutros e isómeros, especialmente isómeros ópticos, en especial la forma o formas comerciales. Las denominaciones de los compuestos químicos mencionadas se refieren al menos a uno de los compuestos englobados por la denominación común, con frecuencia a un compuesto preferente.
- El compuesto de la fórmula (I) tiene un grupo sulfóxido quiral, de modo que forma dos enantiómeros que tienen configuración R o S en el azufre:



- En la síntesis a partir de materiales de partida aquirales, los dos enantiómeros se forman en cantidades iguales, de modo que hay presencia de un racemato. La

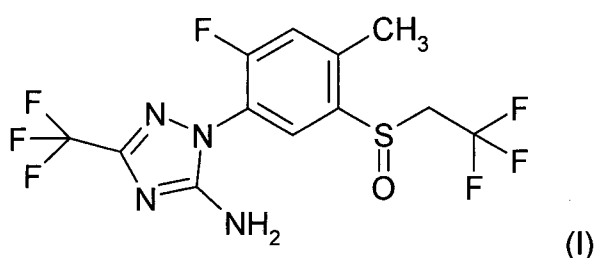
separación del racemato conocida por la literatura (véanse los documentos WO 1999/055668 y WO 2006/043635) en los enantiómeros individuales puede llevarse a cabo mediante HPLC preparativa en una fase estacionaria quiral. La separación puede tener lugar, por ejemplo, en una columna Daical Chiralpak AD-H 250 mm x 30 mm usando una fase móvil de n-heptano/etanol/metanol 60:20:20 (v/v/v), un caudal de 30 ml/min y detección UV a 220 nm. Los dos enantiómeros pueden caracterizarse después mediante procedimientos conocidos por la literatura, por ejemplo mediante análisis estructural por rayos X o determinando la rotación óptica.

10 En consecuencia, la presente invención proporciona combinaciones de compuestos activos novedosas que comprenden el racemato o el enantiómero R o S del compuesto de la fórmula (I) y al menos otro compuesto con actividad insecticida del grupo (II).

Sorprendentemente, la actividad insecticida y/o acaricida de las combinaciones de principios activos de la invención es muy superior al total de las actividades de los principios activos individuales. Existe un efecto sinérgico verdadero no previsto y no solo actividad complementaria.

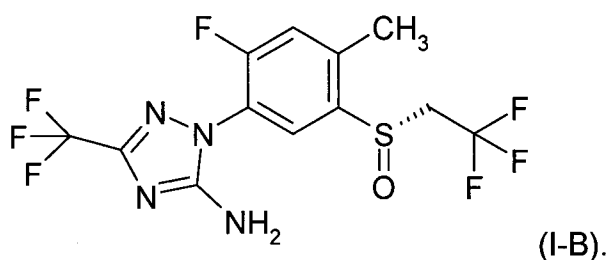
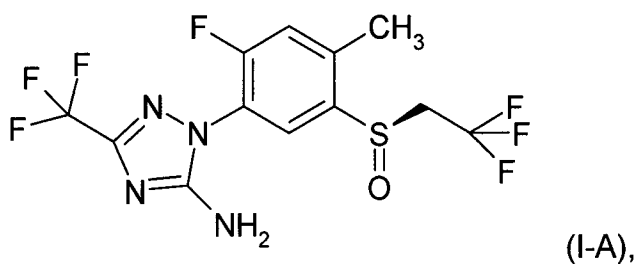
Las combinaciones preferentes comprenden uno de los compuestos de la fórmula (I) tal como se especifica a continuación y al menos un principio activo preferente seleccionado del grupo (II).

Un compuesto preferente es el racemato de la fórmula (I)



Asimismo, son preferentes los enantiómeros R o S respectivos de las fórmulas (1-

A),(I-B):



Los asociados de mezcla preferentes del grupo (II) son los siguientes

5 seleccionados de entre

- abamectina, acefato, acequinocilo, acetamiprid, acrinatrina, aldicarb, alfa-cipermetrina, amitraz, azadiractina, azinfos-metilo, benfuracarb, beta-ciflutrina, bifenazato, bifentrina, bensultap (nereistoxina), buprofezina, carbarilo, carbofuran, carbosulfan, clorhidrato de cartap, clorantraniliprol (rinazipir), clorfenapir,
- 10 clorfluazuron, cloropicrina, clorpirifos, clotianidina, ciantraniliprol (ciazipir), ciflutrina, cihalotrina, cipermetrina, ciromazina, deltametrina, diafentiuuron, diazinona, dicloropropeno, diclorfos, dicofol, diflubenzuron, dimetoato, dinotefuran, disulfoton, (benzoato de) emamectina, endosulfan, etoprofos, etofenprox, etoxazol, fenamifos, óxido de fenbutatina, fenitrothion, fenobucarb, fenoxicarb, fenpropatrina,
- 15 fenpiroximato, fenvalerato, fipronilo, fluacripirim, fluensulfona, flufenoxuron, flupiradifurona, fostiazato, gamma-cihalotrina, hexitiazox, hexaflumuron, imidacloprid, imidacloprid, indoxacarb, lambda-cihalotrina, lepimectina, lufenuron, malation, metaldehído, metidation, metomilo, milbemectina, monocrotofos, nitenpiram, oxamilo, permetrina, pirimicarb, profenofos, propargita, pimetozina,
- 20 pirafluprol, piretrina, piridaben, pirifluquinazona, pirimetanilo, pirimidifeno, piriprol,

- piriproxifeno, quinalfos, resmetrina, espinetoram, espinosad, espirodiclofeno, sulfoxaflor, tau-fluvalinato, tebufenpirad, teflubenzuron, teflutrina, tiaclopid, tiametoxam, tiodicarb, triclorfon, triflumuron; zeta-cipermetrina, 1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-[[5-(trifluorometil)-1H-tetrazol-1-il]metil]-1H-pirazol-5-carboxamida/ 1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-[[5-(trifluorometil)-2H-tetrazol-2-il]metil]-1H-pirazol-5-carboxamida, 2-{6-[2-(5-fluoropiridin-3-il)-1,3-tiazol-5-il]piridin-2-il}pirimidina, 2-{6-[2-(piridin-3-il)-1,3-tiazol-5-il]piridin-2-il}pirimidina, (1E)-N-[(6-cloropiridin-3-il)metil]-N'-ciano-N-(2,2-difluoroetil)etanimidamida, Bacillus firmus I-1582, Bacillus subtilis GB03 y QST 713, Bacillus subtilis var. amyloliquefaciens FZB24 y Bacillus amyloliquefaciens FZB 42, Bacillus thuringiensis subespecies aizawai, kurstaki, tenebrionis e israelensis, Metarhizium anisopliae F52, Metschnikowia fructicola, Paecilomyces lilacinus cepa 251, Paecilomyces fumosoroseus, Nomuraea rileyi, granulovirus de Cydia pomonella, piretrum, proteína harpin y timol, Bacillus pumilus cepa GB34 y cepa QST2808.
- Son más preferentes combinaciones que comprenden un compuesto preferente de la fórmula (I) y al menos un principio activo más preferente del grupo (I), seleccionado de entre
- abamectina, acetamiprid, acrinatrina, alfa-cipermetrina, beta-ciflutrina, bifentrina, buprofezina, flupiradifurona, clorfenapir, clorpirifos, clotianidina, ciantraniliprol, ciflutrina, cipermetrina, deltametrina, diafentiuron, dinotefuran, (benzoato de) emamectina, fenpiroximato, fipronilo, fluensulfona, gamma-cihalotrina, imidaclopid, indoxacarb, L-cihalotrina, milbemectina, nitenpiram, pirfluquinazona, pimetrozina, clorantraniliprol, espinetoram, espinosad, espirodiclofeno, sulfoxaflor, tebufenpirad, teflutrina, tiaclopid, tiametoxam, tiodicarb, triflumuron; 1-(3-

cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-[[5-(trifluorometil)-1H-tetrazol-1-il]metil]-1H-pirazol-5-carboxamida/ 1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-[[5-(trifluorometil)-2H-tetrazol-2-il]metil]-1H-pirazol-5-carboxamida, 2-{6-[2-(5-fluoropiridin-3-il)-1,3-tiazol-5-il]piridin-2-il}pirimidina, 2-{6-[2-(piridin-3-il)-1,3-tiazol-5-il]piridin-2-il}pirimidina, (1E)-N-[(6-cloropiridin-3-il)metil]-N'-ciano-N-(2,2-difluoroetil)etanimidamida, Bacillus firmus I-1582, Bacillus subtilis GB03 y QST 713, Bacillus subtilis var. amyloliquefaciens FZB24 y Bacillus amyloliquefaciens FZB 42, Bacillus thuringiensis subespecies aizawai, kurstaki, tenebrionis e israelensis, Metarhizium anisopliae F52, Paecilomyces lilacinus cepa 251, Nomuraea rileyi, Bacillus pumilus cepa GB34 y cepa QST2808.

Son aún más preferentes combinaciones que comprenden un compuesto preferente de la fórmula (I) y al menos un principio activo aún más preferente del grupo (I), seleccionado de entre abamectina, acetamiprid, acrinatrina, beta-ciflutrina, bifentrina, buprofezina, flupiradifurona, clorfenapir, clorpirifos, clotianidina, ciantraniliprol, ciflutrina, deltametrina, diafentiuron, dinotefuran, (benzoato de) emamectina, fenpiroximato, fipronilo, fluensulfona, imidacloprid, indoxacarb, L-cihalotrina, milbemectina, nitenpiram, pirifluquinazona, pimetrozina, clorantraniliprol, espinetoram, espinosad, espirodiclofeno, sulfoxaflor, tebufenpirad, tiacloprid, tiametoxam, tiodicarb, triflumuron; 1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-[[5-(trifluorometil)-1H-tetrazol-1-il]metil]-1H-pirazol-5-carboxamida/ 1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-[[5-(trifluorometil)-2H-tetrazol-2-il]metil]-1H-pirazol-5-carboxamida, 2-{6-[2-(5-fluoropiridin-3-il)-1,3-tiazol-5-il]piridin-2-il}pirimidina, 2-{6-[2-(piridin-3-il)-1,3-tiazol-5-il]piridin-2-il}pirimidina, (1E)-N-[(6-cloropiridin-3-il)metil]-N'-ciano-N-(2,2-difluoroetil)etanimidamida, Bacillus firmus I-

1582, *Bacillus subtilis* GB03 y QST 713, *Bacillus subtilis* var. *amyloliquefaciens* FZB24 y *Bacillus amyloliquefaciens* FZB 42, *Bacillus thuringiensis* subespecies *aizawai*, *kurstaki*, *tenebrionis* e *israelensis*, *Metarhizium anisopliae* F52, *Paecilomyces lilacinus* cepa 251, *Nomuraea rileyi*, *Bacillus pumilus* cepa GB34 y  
5 cepa QST2808.

Son especialmente preferentes combinaciones que comprenden el compuesto (I) y exactamente un principio activo del grupo II en las relaciones de mezcla especificadas en la Tabla 1.

10 Son especialmente preferentes combinaciones que comprenden el compuesto (I-A) y exactamente un principio activo del grupo II en las relaciones de mezcla especificadas en la Tabla 1.

Son especialmente preferentes combinaciones que comprenden el compuesto (I-B) y exactamente un principio activo del grupo II en las relaciones de mezcla especificadas en la Tabla 1.

15 Las combinaciones de principios activos pueden comprender también, adicionalmente, otros componentes de mezcla con actividad fungicida, acaricida o insecticida.

Cuando los principios activos están presentes en relaciones en peso particulares en las combinaciones de principios activos de la invención, se manifiesta el efecto  
20 mejorado. No obstante, las relaciones en peso de los principios activos en las combinaciones de principios activos pueden variar dentro de un intervalo relativamente amplio. En general, las combinaciones de la invención comprenden un principio activo de la fórmula (I) con un asociado de mezcla del grupo (II) en una relación 625:1 a 1:625; mientras que para combinaciones de la invención que  
25 comprenden el principio activo de la fórmula (I) y un agente de combate biológico

seleccionado del grupo (II), la relación es típicamente de 100:1 a 1:2000. Relaciones de mezcla preferentes y más preferentes se especifican en la Tabla 1 siguiente.

Las relaciones de mezcla se basan en relaciones en peso. La relación debería entenderse como el principio activo de la fórmula (I):asociado de mezcla del grupo (II) a principio activo de la fórmula (I):asociado de mezcla del grupo (II).

| Nº  | Asociado de mezcla                             | Relación de mezcla preferente | Relación de mezcla más preferente | La relación de mezcla más preferente |
|-----|------------------------------------------------|-------------------------------|-----------------------------------|--------------------------------------|
| 1.  | Abamectina                                     | 625:1 a 1:625                 | 125:1 a 1:125                     | 25:1 a 1:25                          |
| 2.  | Acefato                                        | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 3.  | Acequinocilo                                   | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 4.  | Acetamiprid                                    | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 5.  | Acrinatrina                                    | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 6.  | Aldicarb                                       | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 7.  | alfa-Cipermetrina                              | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 8.  | Amitraz                                        | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 9.  | Azinfos-metilo                                 | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 10. | Bacillus subtilis var. amyloliquefaciens FZB24 | 100:1 a 1:1000                | 50:1 a 1:500                      | 5:1 a 1:100                          |
| 11. | Bacillus amyloliquefaciens FZB42               | 100:1 a 1:5000                | 50:1 a 1:2500                     | 5:1 a 1:100                          |
| 12. | Bacillus firmus I-1582                         | 100:1 a 1:1000                | 50:1 a 1:500                      | 5:1 a 1:100                          |
| 13. | Bacillus subtilis GB03                         | 100:1 a 1:1000                | 50:1 a 1:500                      | 5:1 a 1:100                          |

| Nº  | Asociado de mezcla                 | Relación de mezcla preferente | Relación de mezcla más preferente | La relación de mezcla más preferente |
|-----|------------------------------------|-------------------------------|-----------------------------------|--------------------------------------|
| 14. | Bacillus subtilis QST 713          | 100:1 a 1:1000                | 50:1 a 1:500                      | 5:1 a 1:100                          |
| 15. | Bacillus thuringiensis aizawai     | 100:1 a 1:2500                | 50:1 a 1:1250                     | 5:1 a 1:100                          |
| 16. | Bacillus thuringiensis israelensis | 100:1 a 1:1000                | 50:1 a 1:500                      | 5:1 a 1:100                          |
| 17. | Bacillus thuringiensis kurstaki    | 100:1 a 1:1000                | 50:1 a 1:500                      | 5:1 a 1:100                          |
| 18. | Bacillus thuringiensis tenebrionis | 100:1 a 1:1000                | 50:1 a 1:500                      | 5:1 a 1:100                          |
| 19. | Benfuracarb                        | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 20. | beta-Ciflutrina                    | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 21. | Bifenazato                         | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 22. | Bifentrina                         | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 23. | Bensultap (Nereistoxina)           | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 24. | Buprofezina                        | 625:1 a 1:625                 | 125:1 a 1:125                     | 25:1 a 1:25                          |
| 25. | Carbarilo                          | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 26. | Carbofuran                         | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 27. | Carbosulfan                        | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 28. | Clorhidrato de Cartap              | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |

| Nº  | Asociado de mezcla               | Relación de mezcla preferente | Relación de mezcla más preferente | La relación de mezcla más preferente |
|-----|----------------------------------|-------------------------------|-----------------------------------|--------------------------------------|
| 29. | Clorantraniliprol<br>(Rinaxipir) | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 30. | Clorfenapir                      | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 31. | Cloropicrina                     | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 32. | Clorpirifos                      | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 33. | Clotianidina                     | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 34. | Ciantraniliprol (Ciazipir)       | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 35. | Ciflutrina                       | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 36. | Cihalotrina                      | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 37. | Cipermetrina                     | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 38. | Ciromazina                       | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 39. | Deltametrina                     | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 40. | Diafentiuron                     | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 41. | Diazinon                         | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 42. | Dicloropropeno                   | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 43. | Diclorvos                        | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 44. | Dicofol                          | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 45. | Diflubenzuron                    | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 46. | Dimetoato                        | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 47. | Dinotefuran                      | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |

| Nº  | Asociado de mezcla       | Relación de mezcla preferente | Relación de mezcla más preferente | La relación de mezcla más preferente |
|-----|--------------------------|-------------------------------|-----------------------------------|--------------------------------------|
| 48. | Disulfoton               | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 49. | (benzoato de) Emamectina | 625:1 a 1:625                 | 125:1 a 1:125                     | 25:1 a 1:25                          |
| 50. | Endosulfan               | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 51. | Etoprofos                | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 52. | Etofenprox               | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 53. | Etoxazol                 | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 54. | Fenamifos                | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 55. | Óxido de Fenbutatina     | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 56. | Fenitrothion             | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 57. | Fenobucarb               | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 58. | Fenoxicarb               | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 59. | Fenpropatrina            | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 60. | Fenpiroximato            | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 61. | Fenvalerato              | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 62. | Fipronilo                | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 63. | Fluacripirim             | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 64. | Fluensulfona             | 625:1 a 1:625                 | 500:1 a 1:500                     | 100:1 a 1:100                        |
| 65. | Flufenoxuron             | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 66. | Flupiradifurona          | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |

| Nº  | Asociado de mezcla | Relación de mezcla preferente | Relación de mezcla más preferente | La relación de mezcla más preferente |
|-----|--------------------|-------------------------------|-----------------------------------|--------------------------------------|
| 67. | Fostiazato         | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 68. | gamma-Cihalotrina  | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 69. | Hexitiazox         | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 70. | Imidacloprid       | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 71. | Imidacloprid       | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 72. | Indoxacarb         | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 73. | Lambda-Cihalotrina | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 74. | Lepimectina        | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 75. | Lufenuron          | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 76. | Malation           | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 77. | Metaldehído        | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 78. | Metidathion        | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 79. | Metomilo           | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 80. | Milbemectina       | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 81. | Monocrotofos       | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 82. | Nitenpiram         | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 83. | Oxamilo            | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 84. | Permetrina         | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 85. | Pirimicarb         | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 86. | Profenofos         | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |

| Nº   | Asociado de mezcla | Relación de mezcla preferente | Relación de mezcla más preferente | La relación de mezcla más preferente |
|------|--------------------|-------------------------------|-----------------------------------|--------------------------------------|
| 87.  | Propargita         | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 88.  | Pimetrozina        | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 99.  | Pirafluprol        | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 90.  | Piretrina          | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 91.  | Piridaben          | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 92.  | Pirifluquinazona   | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 93.  | Pirimetanilo       | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 94.  | Pirimidifeno       | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 95.  | Piriprol           | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 96.  | Piriproxifeno      | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 97.  | Quinalfos          | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 98.  | Resmetrina         | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 99.  | Espinetoram        | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 100. | Espinosad          | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 101. | Espirodiclofeno    | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 102. | Sulfoxaflor        | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 103. | Tau-Fluvalinato    | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 104. | Tebufenpirad       | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 105. | Teflubenzuron      | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 106. | Teflutrina         | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |

| Nº   | Asociado de mezcla                                                                                                                                                                                                                                                                                  | Relación de mezcla preferente | Relación de mezcla más preferente | La relación de mezcla más preferente |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----------------------------------|--------------------------------------|
| 107. | Tiacloprid                                                                                                                                                                                                                                                                                          | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 108. | Tiametoxam                                                                                                                                                                                                                                                                                          | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 109. | Tiodicarb                                                                                                                                                                                                                                                                                           | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 110. | Triclorfon                                                                                                                                                                                                                                                                                          | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 111. | Triflumuron                                                                                                                                                                                                                                                                                         | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 112. | Zeta-Cipermetrina                                                                                                                                                                                                                                                                                   | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 113. | 1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-<br>{{5-(trifluorometil)-1H-tetrazol-1-il]metil}-1H-pirazol-5-carboxamida/<br>1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-<br>{{5-(trifluorometil)-2H-tetrazol-2-il]metil}-1H-pirazol-5-carboxamida | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 114. | 2-{6-[2-(5-fluoropiridin-3-il)-1,3-tiazol-5-il]piridin-2-il}pirimidina                                                                                                                                                                                                                              | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |

| Nº   | Asociado de mezcla                                                             | Relación de mezcla preferente | Relación de mezcla más preferente | La relación de mezcla más preferente |
|------|--------------------------------------------------------------------------------|-------------------------------|-----------------------------------|--------------------------------------|
| 115. | 2-{6-[2-(piridin-3-il)-1,3-tiazol-5-il]piridin-2-il}pirimidina                 | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 116. | Metarhizium anisopliae F52                                                     | 100:1 a 1:2000                | 50:1 a 1:1000                     | 25:1 a 1:200                         |
| 117  | Metschnikowia fructicola                                                       | 100:1 a 1:2000                | 50:1 a 1:1000                     | 25:1 a 1:200                         |
| 118. | Paecilomyces lilacinus 251                                                     | 100:1 a 1:2000                | 50:1 a 1:1000                     | 25:1 a 1:200                         |
| 119. | Azadiractina                                                                   | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 120. | Piretrum                                                                       | 625:1 a 1:625                 | 125:1 a 1:125                     | 25:1 a 1:25                          |
| 121. | (1E)-N-[(6-cloropiridin-3-il)metil]-N'-ciano-N-(2,2-difluoroetil)etanimidamida | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 122  | Proteína harpin                                                                | 125:1 a 1:125                 | 25:1 a 1:25                       | 5:1 a 1:5                            |
| 123  | Virus de la granulosis de Cydia pomonella (CpGV)                               | 100:1 a 1:2000                | 50:1 a 1:1000                     | 25:1 a 1:200                         |
| 124  | Timol                                                                          | 625:1 a 1:625                 | 125:1 a 1:125                     | 25:1 a 1:25                          |

| Nº  | Asociado de mezcla            | Relación de mezcla preferente | Relación de mezcla más preferente | La relación de mezcla más preferente |
|-----|-------------------------------|-------------------------------|-----------------------------------|--------------------------------------|
|     |                               |                               | 1:125                             |                                      |
| 125 | Bacillus pumilus cepa QST2808 | 100 : 1 a 1 : 2500            | 50 : 1 a 1 : 1250                 | 25 : 1 a 1 : 500                     |

Las combinaciones de principios activos según la invención, en combinación con una buena tolerancia por las plantas y toxicidad aceptable para animales de sangre caliente y siendo bien toleradas por el medio ambiente, son adecuadas para proteger plantas y órganos de plantas, para aumentar el rendimiento de las cosechas, para mejorar la calidad del producto cosechado y para combatir plagas animales, en particular insectos, arácnidos, helmintos, nematodos y moluscos que se encuentran en agricultura, en horticultura, en la cría de animales, en bosques, en jardines e instalaciones de recreo, en la protección de productos almacenados y de materiales y en el sector de la higiene. Pueden usarse preferentemente como agentes fitoprotectores. Son activos contra especies normalmente sensibles y resistentes y contra todos o algunos estadios de desarrollo. Las plagas mencionadas anteriormente incluyen:

plagas del filo de los artrópodos, especialmente de la clase de los arácnidos, por ejemplo, Acarus spp., Aceria sheldoni, Aculops spp., Aculus spp., Amblyomma spp., Amphitetranychus viennensis, Argas spp., Boophilus spp., Brevipalpus spp., Bryobia graminum, Bryobia praetiosa, Centruroides spp., Chorioptes spp., Dermanyssus gallinae, Dermatophagoides pteronyssinus, Dermatophagoides

- farinae, Dermacentor spp., Eotetranychus spp., Epitrimerus pyri, Eutetranychus spp., Eriophyes spp., Glycyphagus domesticus, Halotydeus destructor, Hemitarsonemus spp., Hyalomma spp., Ixodes spp., Latrodectus spp., Loxosceles spp., Metatetranychus spp., Neutrombicula autumnalis, Nuphersa spp.,
- 5 Oligonychus spp., Ornithodorus spp., Ornithonyssus spp., Panonychus spp., Phyllocoptruta oleivora, Polyphagotarsonemus latus, Psoroptes spp., Rhipicephalus spp., Rhizoglyphus spp., Sarcoptes spp., Scorpio maurus, Steneotarsonemus spp., Steneotarsonemus spinki, Tarsonemus spp., Tetranychus spp., Trombicula alfreddugesi, Vaejovis spp., Vasates lycopersici;
- 10 de la clase de los quilópodos, por ejemplo, Geophilus spp., Scutigera spp.  
del orden o de la clase de los colémbolos, por ejemplo, Onychiurus armatus.  
de la clase de los diplópodos, por ejemplo, Blaniulus guttulatus;  
de la clase de los insectos, por ejemplo del orden de los blatodeos, por ejemplo, Blattella asahinai, Blattella germanica, Blatta orientalis, Leucophaea maderae,
- 15 Panchlora spp., Parcoblatta spp., Periplaneta spp., Supella longipalpa;  
del orden de los coleópteros, por ejemplo, Acalymma vittatum, Acanthoscelides obtectus, Adoretus spp., Agelastica alni, Agriotes spp., Alphitobius diaperinus, Amphimallon solstitialis, Anobium punctatum, Anoplophora spp., Anthonomus spp., Anthrenus spp., Apion spp., Apogonia spp., Atomaria spp., Attagenus spp.,
- 20 Bruchidius obtectus, Bruchus spp., Cassida spp., Cerotoma trifurcata, Ceutorrhynchus spp., Chaetocnema spp., Cleonus mendicus, Conoderus spp., Cosmopolites spp., Costelytra zealandica, Ctenicera spp., Curculio spp., Cryptolestes ferrugineus, Cryptorhynchus lapathi, Cylindrocopturus spp., Dermestes spp., Diabrotica spp., Dichocrocis spp., Dicladispa armigera,
- 25 Diloboderus spp., Epilachna spp., Epitrix spp., Faustinus spp., Gibbium psylloides,

- Gnathocerus cornutus, Hellula undalis, Heteronychus arator, Heteronyx spp.,  
 Hylamorphia elegans, Hylotrupes bajulus, Hypera postica, Hypomeces squamosus,  
 Hypothenemus spp., Lachnosterna consanguinea, Lasioderma serricorne,  
 Latheticus oryzae, Lathridius spp., Lema spp., Leptinotarsa decemlineata,  
 5 Leucoptera spp., Lissorhoptrus oryzophilus, Lixus spp., Luperodes spp., Lyctus  
 spp., Megascelis spp., Melanotus spp., Meligethes aeneus, Melolontha spp.,  
 Migdolus spp., Monochamus spp., Naupactus xanthographus, Necrobia spp.,  
 Niptus hololeucus, Oryctes rhinoceros, Oryzaephilus surinamensis, Oryzaphagus  
 oryzae, Otiorrhynchus spp., Oxycetonia jucunda, Phaedon cochleariae,  
 10 Phyllophaga spp., Phyllophaga helleri, Phyllotreta spp., Popillia japonica,  
 Premnotrypes spp., Prostephanus truncatus, Psylliodes spp., Ptinus spp.,  
 Rhizobius ventralis, Rhizopertha dominica, Sitophilus spp., Sitophilus oryzae,  
 Sphenophorus spp., Stegobium paniceum, Sternechus spp., Symphyletes spp.,  
 Tanymecus spp., Tenebrio molitor, Tenebrioides mauretanicus, Tribolium spp.,  
 15 Trogoderma spp., Tychius spp., Xylotrechus spp., Zabrus spp.;
- del orden de los dípteros, por ejemplo, Aedes spp., Agromyza spp., Anastrepha  
 spp., Anopheles spp., Asphondylia spp., Bactrocera spp., Bibio hortulanus,  
 Calliphora erythrocephala, Calliphora vicina, Ceratitis capitata, Chironomus spp.,  
 Chrysomyia spp., Chrysops spp., Chrysozona pluvialis, Cochliomyia spp.,  
 20 Contarinia spp., Cordylobia anthropophaga, Cricotopus sylvestris, Culex spp.,  
 Culicoides spp., Culiseta spp., Cuterebra spp., Dacus oleae, Dasyneura spp., Delia  
 spp., Dermatobia hominis, Drosophila spp., Echinocnemus spp., Fannia spp.,  
 Gasterophilus spp., Glossina spp., Haematopota spp., Hydrellia spp., Hydrellia  
 griseola, Hylemya spp., Hippobosca spp., Hypoderma spp., Liriomyza spp., Lucilia  
 25 spp., Lutzomyia spp., Mansonia spp., Musca spp., Oestrus spp., Oscinella frit,

- Paratanytarsus spp., Paralauterborniella subcincta, Pegomyia spp., Phlebotomus spp., Phorbia spp., Phormia spp., Piophila casei, Prodiplosis spp., Psila rosae, Rhagoletis spp., Sarcophaga spp., Simulium spp., Stomoxys spp., Tabanus spp., Tetanops spp., Tipula spp.;
- 5 del orden de los heterópteros, por ejemplo, Anasa tristis, Antestiopsis spp., Boisea spp., Blissus spp., Calocoris spp., Campylomma livida, Cavelerius spp., Cimex spp., Collaria spp., Creontiades dilutus, Dasynus piperis, Dichelops furcatus, Diconocoris hewetti, Dysdercus spp., Euschistus spp., Eurygaster spp., Heliopeltis spp., Horcias nobilellus, Leptocorisa spp., Leptocorisa varicornis, Leptoglossus
- 10 phyllopus, Lygus spp., Macropes excavatus, Miridae, Monalonion atratum, Nezara spp., Oebalus spp., Pentomidae, Piesma quadrata, Piezodorus spp., Psallus spp., Pseudacysta perseae, Rhodnius spp., Sahlbergella singularis, Scaptocoris castanea, Scotinophora spp., Stephanitis nashi, Tibraca spp., Triatoma spp.;
- del orden de los homópteros, por ejemplo, Acizzia acaciaebaileyanae, Acizzia
- 15 dodonaeae, Acizzia uncatoides, Acrida turrita, Acyrthosipon spp., Acrogonia spp., Aeneolamia spp., Agonosцена spp., Aleyrodes proletella, Aleurolobus barodensis, Aleurothrixus floccosus, Allocaridara malayensis, Amrasca spp., Anuraphis cardui, Aonidiella spp., Aphanostigma piri, Aphis spp., Arboridia apicalis, Aryanilla spp., Aspidiella spp., Aspidiotus spp., Atanus spp., Aulacorthum solani, Bemisia tabaci,
- 20 Blastopsylla occidentalis, Boreioglycaspis melaleucaae, Brachycaudus helichrysi, Brachycolus spp., Brevicoryne brassicae, Cacopsylla spp., Calligypona marginata, Carneiocephala fulgida, Ceratovacuna lanigera, Cercopidae, Ceroplastes spp., Chaetosiphon fragaefolii, Chionaspis tegalensis, Chlorita onukii, Chondracris rosea, Chromaphis juglandicola, Chrysomphalus ficus, Cicadulina mbila,
- 25 Coccothylus halli, Coccus spp., Cryptomyzus ribis, Cryptoneossa spp.,

- Ctenarytaina spp., Dalbulus spp., Dialeurodes citri, Diaphorina citri, Diaspis spp., Drosicha spp., Dysaphis spp., Dysmicoccus spp., Empoasca spp., Eriosoma spp., Erythroneura spp., Eucalyptolyma spp., Euphyllura spp., Euscelis bilobatus, Ferrisia spp., Geococcus coffeae, Glycaspis spp., Heteropsylla cubana,
- 5 Heteropsylla spinulosa, Homalodisca coagulata, Hyalopterus arundinis, Icerya spp., Idiocerus spp., Idioscopus spp., Laodelphax striatellus, Lecanium spp., Lepidosaphes spp., Lipaphis erysimi, Macrosiphum spp., Macrosteles facifrons, Mahanarva spp., Melanaphis sacchari, Metcalfiella spp., Metopolophium dirhodum, Monellia costalis, Monelliopsis pecanis, Myzus spp., Nasonovia ribisnigri,
- 10 Nephotettix spp., Nettigoniclla spectra, Nilaparvata lugens, Oncometopia spp., Orthezia praelonga, Oxya chinensis, Pachypsylla spp., Parabemisia myricae, Paratrioza spp., Parlatoria spp., Pemphigus spp., Peregrinus maidis, Phenacoccus spp., Phloeomyzus passerinii, Phorodon humuli, Phylloxera spp., Pinnaspis aspidistrae, Planococcus spp., Prosopidopsylla flava, Protopulvinaria pyriformis,
- 15 Pseudaulacaspis pentagona, Pseudococcus spp., Psyllopsis spp., Psylla spp., Pteromalus spp., Pyrilla spp., Quadraspidiotus spp., Quesada gigas, Rastrococcus spp., Rhopalosiphum spp., Saissetia spp., Scaphoideus titanus, Schizaphis graminum, Selenaspidus articulatus, Sogata spp., Sogatella furcifera, Sogatodes spp., Stictocephala festina, Siphoninus phillyreae, Tenalaphara malayensis,
- 20 Tetragonocephala spp., Tinocallis caryaefoliae, Tomaspis spp., Toxoptera spp., Trialeurodes vaporariorum, Trioza spp., Typhlocyba spp., Unaspis spp., Viteus vitifolii, Zyginia spp.;
- del orden de los himenópteros, por ejemplo; Acromyrmex spp., Athalia spp., Atta spp., Diprion spp., Hoplocampa spp., Lasius spp., Monomorium pharaonis, Sirex
- 25 spp., Solenopsis invicta, Tapinoma spp., Urocerus spp., Vespa spp., Xeris spp.;

del orden de los isópodos, por ejemplo, *Armadillidium vulgare*, *Oniscus asellus*, *Porcellio scaber*.

del orden de los isópteros, por ejemplo, *Coptotermes* spp., *Cornitermes cumulans*, *Cryptotermes* spp., *Incisitermes* spp., *Microtermes obesi*, *Odontotermes* spp.,

5 *Reticulitermes* spp.

del orden de los lepidópteros, por ejemplo, *Achroia grisella*, *Acronicta major*, *Adoxophyes* spp., *Aedia leucomelas*, *Agrotis* spp., *Alabama* spp., *Amyelois transitella*, *Anarsia* spp., *Anticarsia* spp., *Argyroplote* spp., *Barathra brassicae*, *Borbo cinnara*, *Bucculatrix thurberiella*, *Bupalus piniarius*, *Busseola* spp., *Cacoecia*

- 10 spp., *Caloptilia theivora*, *Capua reticulana*, *Carpocapsa pomonella*, *Carposina niponensis*, *Cheimatobia brumata*, *Chilo* spp., *Choristoneura* spp., *Clysia ambiguella*, *Cnaphalocerus* spp., *Cnaphalocrocis medinalis*, *Cnephasia* spp., *Conopomorpha* spp., *Conotrachelus* spp., *Copitarsia* spp., *Cydia* spp., *Dalaca* noctuides, *Diaphania* spp., *Diatraea saccharalis*, *Earias* spp., *Ecdytolopha*
- 15 *aurantium*, *Elasmopalpus lignosellus*, *Eldana saccharina*, *Ephestia* spp., *Epinotia* spp., *Epiphyas postvittana*, *Etiella* spp., *Eulia* spp., *Eupoecilia ambiguella*, *Euproctis* spp., *Euxoa* spp., *Feltia* spp., *Galleria mellonella*, *Gracillaria* spp., *Grapholitha* spp., *Hedylepta* spp., *Helicoverpa* spp., *Heliothis* spp., *Hofmannophila pseudospretella*, *Homoeosoma* spp., *Homona* spp., *Hyponomeuta padella*,
- 20 *Kakivoria flavofasciata*, *Laphygma* spp., *Laspeyresia molesta*, *Leucinodes orbonalis*, *Leucoptera* spp., *Lithocolletis* spp., *Lithophane antennata*, *Lobesia* spp., *Loxagrotis albicosta*, *Lymantria* spp., *Lyonetia* spp., *Malacosoma neustria*, *Maruca testulalis*, *Mamestra brassicae*, *Melanitis leda*, *Mocis* spp., *Monopis obviella*, *Mythimna separata*, *Nemapogon cloacellus*, *Nymphula* spp., *Oiketicus* spp., *Oria*
- 25 spp., *Orthaga* spp., *Ostrinia* spp., *Oulema oryzae*, *Panolis flammea*, *Parnara* spp.,

- Pectinophora spp., Perileucoptera spp., Phthorimaea spp., Phyllocnistis citrella, Phyllonorycter spp., Pieris spp., Platynota stultana, Plodia interpunctella, Plusia spp., Plutella xylostella, Prays spp., Prodenia spp., Protoparce spp., Pseudaletia spp., Pseudaletia unipuncta, Pseudoplusia includens, Pyrausta nubilalis,
- 5 Rachiplusia nu, Schoenobius spp., Scirpophaga spp., Scirpophaga innotata, Scotia segetum, Sesamia spp., Sesamia inferens, Sparganothis spp., Spodoptera spp., Spodoptera praefica, Stathmopoda spp., Stomopteryx subsecivella, Synanthedon spp., Tecia solanivora, Thermesia gemmatilis, Tinea cloacella, Tinea pellionella, Tineola bisselliella, Tortrix spp., Trichophaga tapetzella, Trichoplusia spp.,
- 10 Tryporyza incertulas, Tuta absoluta, Virachola spp.;
- del orden de los ortópteros o Saltatoria, por ejemplo, Acheta domesticus, Dichroplus spp., Gryllotalpa spp., Hieroglyphus spp., Locusta spp., Melanoplus spp., Schistocerca gregaria;
- del orden de los fitiráteros, por ejemplo, Damalinia spp., Haematopinus spp.,
- 15 Linognathus spp., Pediculus spp., Ptius pubis, Trichodectes spp.
- del orden de los psocópteros, por ejemplo, Lepinatus spp., Liposcelis spp.
- del orden de los sifonáteros, por ejemplo, Ceratophyllus spp., Ctenocephalides spp., Pulex irritans, Tunga penetrans, Xenopsylla cheopsis;
- del orden de los tisanópteros, por ejemplo, Anaphothrips obscurus, Baliothrips
- 20 biformis, Drepanothrips reuteri, Enneothrips flavens, Frankliniella spp., Heliothrips spp., Hercinothrips femoralis, Rhipiphorothrips cruentatus, Scirtothrips spp., Taeniothrips cardamoni, Thrips spp.;
- del orden de los zigentomos (=tisanuros), por ejemplo, Ctenolepisma spp., Lepisma saccharina, Lepismodes inquilinus, Thermobia domestica;
- 25 de la clase de los sínfilos, por ejemplo, Scutigera spp.;

plagas del filo de los moluscos, especialmente de la clase de los bivalvos, por ejemplo, *Dreissena* spp., y de la clase de los gasterópodos, por ejemplo, *Arion* spp., *Biomphalaria* spp., *Bulinus* spp., *Deroceras* spp., *Galba* spp., *Lymnaea* spp., *Oncomelania* spp., *Pomacea* spp., *Succinea* spp.;

- 5 plagas animales del filo de los platelmintos y nematodos, por ejemplo, *Ancylostoma duodenale*, *Ancylostoma ceylanicum*, *Ancylostoma braziliensis*, *Ancylostoma* spp., *Ascaris* spp., *Brugia malayi*, *Brugia timori*, *Bunostomum* spp., *Chabertia* spp., *Clonorchis* spp., *Cooperia* spp., *Dicrocoelium* spp., *Dictyocaulus filaria*, *Diphylobothrium latum*, *Dracunculus medinensis*, *Echinococcus granulosus*,  
10 *Echinococcus multilocularis*, *Enterobius vermicularis*, *Faciola* spp., *Haemonchus* spp., *Heterakis* spp., *Hymenolepis nana*, *Hyostrogylus* spp., *Loa Loa*, *Nematodirus* spp., *Oesophagostomum* spp., *Opisthorchis* spp., *Onchocerca volvulus*, *Ostertagia* spp., *Paragonimus* spp., *Schistosomen* spp., *Strongyloides fuelleborni*, *Strongyloides stercoralis*, *Strongyloides* spp., *Taenia saginata*, *Taenia solium*, *Trichinella spiralis*, *Trichinella nativa*, *Trichinella britovi*, *Trichinella nelsoni*,  
15 *Trichinella pseudopsiralis*, *Trichostrongylus* spp., *Trichuris trichuria*, *Wuchereria bancrofti*;

- plagas fitoparasitarias de filo de los nematodos, por ejemplo, *Aphelenchoides* spp., *Bursaphelenchus* spp., *Ditylenchus* spp., *Globodera* spp., *Heterodera* spp.,  
20 *Longidorus* spp., *Meloidogyne* spp., *Pratylenchus* spp., *Radopholus* spp., *Trichodorus* spp., *Tylenchulus* spp., *Xiphinema* spp., *Helicotylenchus* spp., *Tylenchorhynchus* spp., *Scutellonema* spp., *Paratrichodorus* spp., *Meloinema* spp., *Paraphelenchus* spp., *Aglenchus* spp., *Belonolaimus* spp., *Nacobbus* spp., *Rotylenchulus* spp., *Rotylenchus* spp., *Neotylenchus* spp., *Paraphelenchus* spp.,  
25 *Dolichodorus* spp., *Hoplolaimus* spp., *Punctodera* spp., *Criconemella* spp.,

Quinisulcius spp., Hemicycliophora spp., Anguina spp., Subanguina spp., Hemicriconemoides spp., Psilenchus spp., Pseudohalenchus spp., Criconemoides spp., Cacopaurus spp.

También es posible combatir organismos del subfilo de los protozoos, especialmente del orden de los coccidios, tales como Eimeria spp.

Las combinaciones de principios activos pueden convertirse en las formulaciones habituales tales como soluciones, emulsiones, polvos humectables, suspensiones, polvos, agentes de espolvoreo, pastas, polvos solubles, gránulos, concentrados de suspoemulsión, productos naturales impregnados con principio activo, sustancias sintéticas impregnadas con principio activo y también microencapsulaciones en sustancias poliméricas.

Estas formulaciones se producen de forma conocida, por ejemplo mezclando los compuestos activos con diluyentes, es decir disolventes líquidos, y/o vehículos sólidos, usando opcionalmente tensioactivos, es decir emulsionantes y/o dispersantes y/o agentes de formación de espuma.

Si el diluyente que se usa es agua, también es posible usar, por ejemplo, disolventes orgánicos como disolventes auxiliares. Los disolventes líquidos útiles incluyen esencialmente: compuestos aromáticos, tales como xileno, tolueno o alquilnaftalenos, compuestos aromáticos clorados o hidrocarburos alifáticos clorados, tales como clorobencenos, cloroetilenos o cloruro de metileno, hidrocarburos alifáticos, tales como ciclohexano o parafinas, por ejemplo fracciones de aceite mineral, aceites minerales y vegetales, alcoholes tales como butanol o glicol y también sus éteres y ésteres, cetonas tales como acetona, metiletilcetona, metilisobutilcetona o ciclohexanona, disolventes muy polares, tales como dimetilformamida y dimetilsulfóxido, y también agua.

Los vehículos sólidos útiles incluyen:

- por ejemplo sales de amonio y minerales naturales molidos tales como caolines, arcillas, talco, creta, cuarzo, atapulgita, montmorillonita o tierra de diatomeas, y minerales sintéticos molidos tales como sílice finamente dividida, alumina y
- 5 silicatos; vehículos sólidos adecuados para gránulos son, por ejemplo, rocas naturales machacadas y fraccionadas, tales como calcita, mármol, piedra pómez, sepiolita, dolomita y gránulos sintéticos de harinas inorgánicas y orgánicas, y gránulos de material orgánico tal como serrín, cáscaras de coco, mazorcas de maíz y tallos de tabaco; emulsionantes y/o formadores de espuma adecuados
- 10 son, por ejemplo, emulsionantes no iónicos y aniónicos, tales como ésteres de ácidos grasos de polioxietileno, éteres de alcoholes grasos de polioxietileno, por ejemplo alquilarilpoliglicoléteres, sulfonatos de alquilo, sulfatos de alquilo, sulfonatos de arilo e hidrolizados de proteínas; dispersantes adecuados son, por ejemplo, líquidos de desecho de lignosulfito y metilcelulosa.
- 15 En las formulaciones es posible usar adhesivos tales como carboximetilcelulosa, polímeros naturales y sintéticos en forma de polvos, gránulos o látices, tales como goma arábica, poli(alcohol vinílico) y poli(acetato de vinilo), o si no fosfolípidos naturales, tales como cefalinas y lecitinas y fosfolípidos sintéticos. Otros aditivos pueden ser aceites minerales y vegetales.
- 20 Es posible usar colorantes tales como pigmentos inorgánicos, por ejemplo óxido de hierro, óxido de titanio y azul de Prusia, y colorantes orgánicos, tales como colorantes de alizarina, colorantes azoicos y colorantes de ftalocianina metálica y oligonutrientes tales como sales de hierro, de manganeso, de boro, de cobre, de cobalto, de molibdeno y de cinc.
- 25 Las formulaciones contienen generalmente entre el 0,1 y el 95 % en peso de

principio activo, preferentemente entre el 0,5 y el 90 %.

Las combinaciones de principios activos de la invención pueden estar presentes en formulaciones comercialmente disponibles y en las formas de uso, preparadas a partir de estas formulaciones, como mezcla con otros principios activos, tales como insecticidas, atrayentes, esterilizantes, bactericidas, acaricidas, nematocidas, fungicidas, reguladores del crecimiento o herbicidas. Los insecticidas incluyen, por ejemplo, ésteres fosfóricos, carbamatos, ésteres carboxílicos, hidrocarburos clorados, fenilureas y sustancias producidas por microorganismos, etc.

También es posible una mezcla con otros principios activos conocidos, tales como herbicidas, o con fertilizantes y reguladores del crecimiento.

Cuando se usan como insecticidas, las combinaciones de principios activos según la invención también pueden estar presentes en sus formulaciones disponibles comercialmente y en las formas de uso, preparadas a partir de estas formulaciones, en forma de una mezcla sinérgica. Los sinérgicos son compuestos que potencian la acción de los principios activos, sin que sea necesario que el sinérgico sea activo por sí mismo.

El contenido de principio activo de las formas de uso preparadas a partir de las formulaciones disponibles comercialmente puede variar dentro de márgenes muy amplios. La concentración de principio activo de las formas de uso puede ser del 0,0000001 al 95 % en peso de principio activo, preferentemente entre el 0,0001 y el 1 % en peso.

Los compuestos se aplican de una forma habitual apropiada para las formas de uso.

Todas las plantas y partes de plantas pueden tratarse según la invención. En el presente documento, se entiende que plantas significa todas las plantas y

poblaciones de plantas, tales como plantas silvestres deseadas y no deseadas o plantas de cultivo (incluidas las plantas de cultivo de origen natural). Las plantas de cultivo pueden ser plantas que pueden obtenerse mediante procedimientos de cultivo y optimización convencionales o mediante procedimientos biotecnológicos y de ingeniería genética o mediante combinaciones de estos procedimientos, incluidas las plantas transgénicas e incluidas las variedades de plantas que pueden estar o no protegidas por los derechos de obtentor. Partes de plantas se entiende que significa todas las partes y órganos de las plantas que se encuentran por encima y por debajo del suelo, tales como brotes, hojas, flores y raíces, cuyos ejemplos incluyen hojas, acículas, tallos, troncos, flores, cuerpos fructíferos, frutos, semillas, raíces, tubérculos y rizomas. Las partes de las plantas también incluyen el material recolectado y el material de propagación vegetativa y por generación, por ejemplo plantones, tubérculos, rizomas, esquejes y semillas.

El tratamiento de la invención de las plantas y partes de plantas con las combinaciones de principios activos se realiza directamente o dejándolas actuar sobre sus alrededores, hábitat o espacio de almacenamiento mediante los procedimientos de tratamiento habituales, por ejemplo, mediante inmersión, pulverización, evaporación, vertido, nebulización, dispersión, embadurnado, y, en el caso de material de reproducción, especialmente en el caso de semillas, también mediante aplicación de una o más capas.

Como ya se ha mencionado anteriormente, es posible tratar todas las plantas y sus partes según la invención. En una realización preferente, se tratan especies de plantas silvestres y variedades de plantas de cultivo, o aquellas que se han obtenido mediante procedimientos de reproducción biológicos convencionales, tales como entrecruzamiento o fusión con protoplastos, y también sus partes. En

una realización preferente adicional, se tratan plantas transgénicas y variedades de plantas de cultivo obtenidas mediante procedimientos de ingeniería genética, si fuera apropiado en combinación con procedimientos convencionales (organismos genéticamente modificados) y sus partes. Los términos "partes", "partes de plantas" y "partes de la planta" se han explicado anteriormente.

Más preferentemente, se tratan según la invención las plantas de las variedades de plantas de cultivo que estén en cada caso disponibles comercialmente o en uso.

Dependiendo de las especies de plantas o de las variedades de plantas, su ubicación y condiciones de crecimiento (suelos, clima, periodo de vegetación, dieta), el tratamiento de la invención puede provocar, también, efectos superaditivos ("sinérgicos"). Por ejemplo, las posibilidades incluyen tasas de aplicación reducidas y/o una ampliación del espectro de actividad y/o un aumento de la actividad de los compuestos y composiciones que se usan según la invención, mejor crecimiento de la planta, mayor tolerancia a temperaturas altas o bajas, mayor tolerancia a la sequía o a niveles de salinidad en agua o suelo, mayor rendimiento de floración, mayor facilidad de recolección, maduración acelerada, mayores rendimientos de cosecha, mayor calidad y/o un mayor valor nutricional de los productos recolectados, mayor duración en almacenamiento y/o mejor procesabilidad de los productos recolectados, que exceden los efectos que normalmente deben esperarse.

Las plantas o variedades de plantas de cultivo transgénicas (aquellas obtenidas mediante ingeniería genética) que se tratan con preferencia según la invención incluyen todas las plantas que, mediante la modificación genética, recibieron material genético que confiere propiedades útiles ("rasgos") particularmente

ventajosas a estas plantas. Ejemplos de dichas propiedades son mejor crecimiento de la planta, mayor tolerancia a temperaturas altas o bajas, mayor tolerancia a la sequía o a niveles de salinidad del agua o del suelo, mayor rendimiento de floración, mayor facilidad de recolección, maduración acelerada, mayores rendimientos de la cosecha, calidad más alta y/o un mayor valor nutricional de los productos recolectados, mayor duración en almacenamiento y/o mejor procesabilidad de los productos recolectados. Ejemplos adicionales y particularmente enfatizados de dichas propiedades son una mejor defensa de las plantas contra plagas animales y microbianas, tales como contra insectos, ácaros, hongos fitopatógenos, bacterias y/o virus, y también mayor tolerancia de las plantas a determinados principios con actividad herbicida. Ejemplos de plantas transgénicas que pueden mencionarse son las plantas de cultivo importantes, tales como cereales (trigo, arroz), maíz, soja, patatas, algodón, colza y también plantas frutales (con frutas como manzanas, peras, cítricos y uvas) y se enfatiza particularmente al maíz, soja, patatas, algodón y colza. Los "rasgos" sobre los que se enfatiza son, en particular, una mayor defensa de las plantas frente a insectos gracias a toxinas formadas en las plantas, en particular las formadas en las plantas mediante el material genético procedente de *Bacillus thuringiensis* (por ejemplo, por medio de los genes CryIA(a), CryIA(b), CryIA(c), CryIIA, CryIIIA, CryIIIB2, Cry9c, Cry2Ab, Cry3Bb y CryIF, y también de sus combinaciones) (que se denominan a continuación "plantas Bt") Los rasgos que se destacan adicionalmente de forma particular son la mayor tolerancia de las plantas a determinados principios con actividad herbicida, por ejemplo imidazolinonas, sulfonilureas, glifosato o fosfinotricina (por ejemplo el gen "PAT"). Los genes que confieren los rasgos deseados en cuestión también pueden estar presentes en

combinación entre sí en las plantas transgénicas. Los ejemplos de “plantas Bt” incluyen variedades de maíz, variedades de algodón, variedades de soja y variedades de patatas que se comercializan con las denominaciones comerciales YIELD GARD® (por ejemplo maíz, algodón, soja), KnockOut® (por ejemplo maíz),  
5 StarLink® (por ejemplo maíz), Bollgard® (algodón), Nucotn® (algodón) y NewLeaf® (patata). Los ejemplos de plantas tolerantes a herbicidas incluyen variedades de maíz, variedades de algodón y variedades de soja que se venden con las denominaciones comerciales Roundup Ready® (tolerancia a glifosato, por ejemplo maíz, algodón, semillas de soja), Liberty Link® (tolerancia a fosfinotricina,  
10 por ejemplo colza), IMI® (tolerancia a imidazolinonas) y STS® (tolerancia a sulfonilureas, por ejemplo maíz). Las plantas resistentes a herbicidas (plantas reproducidas de forma convencional para conferirles tolerancia a herbicida) incluyen también las variedades que se venden con la denominación Clearfield® (por ejemplo maíz). Por supuesto, estas afirmaciones también se aplican a las  
15 variedades de plantas de cultivo que tienen estos rasgos genéticos o rasgos genéticos que todavía deben desarrollarse y que se desarrollarán y/o comercializarán en el futuro.

Las plantas que se enumeran pueden tratarse según la invención de una forma particularmente ventajosa con la mezcla de los compuestos activos según la  
20 invención. Los intervalos preferentes mencionados anteriormente para las mezclas también son aplicables al tratamiento de estas plantas. Se otorga énfasis particular al tratamiento de plantas con las mezclas que se mencionan específicamente en el presente texto.

El uso de un compuesto de fórmula (I) y al menos un agente de combate biológico  
25 seleccionado de entre bacterias, en particular bacterias formadoras de esporas,

hongos o levaduras, protozoos, virus y nematodos entomopatógenos y opcionalmente un inoculante, como una combinación, es particularmente adecuado para el tratamiento de semillas. Una gran parte del daño a las plantas de cultivo causado por plagas agrícolas perjudiciales y/o enfermedades de plantas se desencadena por una infección de la semilla durante su almacenamiento o después de la siembra, así como durante y después de la germinación de la planta. Esta fase es particularmente crítica, ya que las raíces y los brotes de la planta en crecimiento son particularmente sensibles, e incluso el daño más pequeño puede tener como consecuencia una planta débil (planta enfermiza), un rendimiento de cosecha reducido e incluso la muerte de la planta.

La lucha contra plagas y/o fitopatógenos mediante el tratamiento de semillas de plantas se conoce desde hace mucho tiempo y es objeto de continuas mejoras. No obstante, el tratamiento de semillas conlleva una serie de problemas que no siempre pueden resolverse de un modo satisfactorio. Así, es deseable desarrollar procedimientos para proteger la semilla y la planta en germinación que prescindan de la aplicación tradicional de agentes protectores de cultivos después de la siembra o después de la emergencia de las plantas o que al menos reduzcan de modo considerable la aplicación adicional. Es deseable, además, optimizar la cantidad de productos agroquímicos que se va a usar de tal modo que se proporcione la máxima protección para las semillas y las plantas en germinación frente al ataque de plagas agrícolas, pero sin dañar la planta en sí con el compuesto activo que se use. En particular, los procedimientos para el tratamiento de semillas deben tener en cuenta las propiedades insecticidas intrínsecas de las plantas para lograr una protección óptima de las semillas y de las plantas en germinación usando un mínimo de composiciones de productos agroquímicos.

Como se ha mencionado ya anteriormente, el compuesto de fórmula (I) y el agente de combate biológico seleccionado de entre bacterias, en particular bacterias formadoras de esporas, hongos o levaduras, protozoos, virus y nematodos entomopatógenos y opcionalmente un inoculante pueden usarse según la  
5 invención como una formulación individual o como una formulación combinada. Dichas formulaciones pueden incluir coadyuvantes, disolventes, vehículos, tensioactivos y/o diluyentes agrícolamente adecuados.

Según la invención los agentes de combate biológico que se resumen con el término "bacterias" incluyen bacterias formadoras de esporas, bacterias  
10 colonizadoras de la raíz o bacterias útiles como biofungicidas. Ejemplos de dichas bacterias que se pueden usar según la invención son:

(1.1) *Bacillus agri*, (1.2) *Bacillus aizawai*, (1.3) *Bacillus albolactis*, (1.4) *Bacillus amyloliquefaciens*, en particular la cepa IN937a o la cepa FZB42 (DSM 23117) (producto conocido como RhizoVital®) o la cepa B3 o var  
15 *amyloliquefaciens* D747, (1.5) *Bacillus cereus*, en particular esporas de *Bacillus cereus* cepa CNCM I-1562 (véase el documento US 6.406.690), (1.6) *Bacillus coagulans*, (1.7) *Bacillus endoparasiticus*, (1.8) *Bacillus endorhythmos*, (1.9) *Bacillus azotoformans*, (1.10) *Bacillus kurstaki*, (1.11) *Bacillus lacticola*, (1.12) *Bacillus lactimorbus*, (1.13) *Bacillus lactis*, (1.14) *Bacillus laterosporus*, (1.15) *Bacillus lentimorbus*, (1.16) *Bacillus licheniformis*,  
20 (1.17) *Bacillus medusa*, (1.18) *Bacillus megaterium*, (1.19) *Bacillus metiens*, (1.20) *Bacillus natto*, (1.21) *Bacillus nigrificans*, (1.22) *Bacillus popillae*, (1.23) *Bacillus pumilus*, en particular la cepa GB34 (ATCC700814) (productos conocidos como Yield Shield®) y la cepa QST2808 (NRRL-B-30087)  
25 (productos conocidos como Sonata QST 2808®, Ballad) o la cepa BU F-33

(producto conocido como Integral F-33), (1.24) *Bacillus siamensis*, (1.25) *Bacillus sphaericus* (productos conocidos como VectoLex<sup>®</sup>), (1.26) *Bacillus subtilis*, en particular la cepa GB03 (productos conocidos como Kodiak<sup>®</sup>) y la cepa QST 713 (NRRL B-21661) (productos conocidos como Serenade QST 713<sup>®</sup>, Serenade Soil, Serenade Max, Rhapsody), o *Bacillus subtilis* var. amyloliquefaciens cepa FZB24 (productos conocidos como Taegro<sup>®</sup>, Rhizopro, FZB24) o la cepa MBI 600 (productos conocidos como Subtilex), (1.27) *Bacillus thuringiensis*, en particular *Bacillus thuringiensis* var. israelensis (productos conocidos como VectoBac<sup>®</sup>) o *Bacillus thuringiensis* subesp. aizawai cepa ABTS-1857 (productos conocidos como XenTari<sup>®</sup>), o *Bacillus thuringiensis* subesp. kurstaki cepa HD-1 (productos conocidos como Dipel<sup>®</sup> ES) o *Bacillus thuringiensis* subesp. tenebrionis cepa NB 176 (productos conocidos como Novodor<sup>®</sup> FC) o *Bacillus thuringiensis* subesp. morrisoni o *Bacillus thuringiensis* var. san diego o *Bacillus thuringiensis* subesp. thuringiensis (serotipo 1) MPPL002, o *Bacillus thuringiensis* var. aegyptii, o *Bacillus thuringiensis* var. colmeri, o *Bacillus thuringiensis* var. darmstadiensis, o *Bacillus thuringiensis* var. Dendrolimus, o *Bacillus thuringiensis* var. Galleria, o *Bacillus thuringiensis* var. Japonensis, o *Bacillus thuringiensis* cepa HD-1 (productos conocidos como Dipel<sup>®</sup> ES), o *Bacillus thuringiensis* var. 7216, o *Bacillus thuringiensis* var. T36, (1.28) *Bacillus uniflagellatus*, (1.29) *Delftia acidovorans*, en particular la cepa RAY209 (productos conocidos como BioBoost<sup>®</sup>), (1.30) *Lysobacter antibioticus*, en particular la cepa 13-1 (véase Biological Control 2008, 45, 288-296), (1.31) *Pasteuria penetrans*, (1.32) *Pseudomonas chlororaphis*, en particular la cepa MA 342 (productos conocidos como Cedomon), (1.33)

- Pseudomonas proradix (productos conocidos como Proradix®), (1.34)
- Streptomyces galbus, en particular la cepa K61 (productos conocidos como Mycostop®, véase Crop Protection 2006, 25, 468-475), (1.35) Streptomyces griseoviridis (productos conocidos como Mycostop®), (1.36) Bacillus lautus,
- 5 (1.37) Bacillus atrophaeus, (1.38) Bacillus anthracis, (1.39) Bacillus mycoides, en particular aislado J/BmJ o la cepa 683, (1.40) Bacillus acidoterrestris, (1.41) Bacillus fastidiosus, (1.42) Bacillus megaterium, (1.43) Bacillus psychrosaccharolyticus, (1.44) Bacillus maroccanus, (1.45) Bacillus megaterium C, (1.46) Bacillus pantothenicus, (1.47) Bacillus lentus, (1.48)
- 10 Bacillus badius, (1.49) Bacillus smithi y (1.50) Bacillus firmus, en particular la cepa I-1582, (1.51) *Bacillus circulans*, (1.52) *Paenibacillus polymyxa*, (1.53) *Paenibacillus popilliae* (formerly *Bacillus popilliae*), (1.54) *Serratia entomophila*, (1.55) *Chromobacterium subtsugae* en particular la cepa PRAA4-1T (producto conocido como Grandevo), (1.56) *Acinetobacter sp.*,
- 15 (1.57) *Pasteuria usgae* (producto conocido como Econem™ Biological Nematicide), (1.58) *Bacillus chitinosporus* (producto conocido como Ne-Plex), (1.59) *Pseudomonas cepacia* (ex *Burkholderia cepacia*) en particular las cepas M54 y la cepa J82, y (1.60) *Bacillus nematocida*, (1.61) *Xenorhabdus luminescence*, (1.62) *Brevibacillus laterosporus* (también conocido como
- 20 *Bacillus laterosporus*), en particular la cepa 64 o la cepa G4 o la cepa 1111 o la cepa 1645 o la cepa 1647, (1.63) *Corynebacterium paurometabolum*, (1.64) *Lactobacillus acidophilus* (productos conocidos como Fruitsan®), (1.65) *Paenibacillus alvei*, en particular la cepa T36 o la cepa III3DT-1A o la cepa III2E o la cepa 46C3 o la cepa 2771, (1.66) *Paenibacillus macerans*,
- 25 (1.67) *Pasteuria nishizawae*, en particular la cepa Pn1, (1.68) *Pasteuria*

ramosa, (1.69) *Pasteuria thornei*, (1.70) *Pseudomonas aeruginosa*, (1.71) *Pseudomonas aureofaciens*, (1.72) *Pseudomonas fluorescens* (productos conocidos como BlightBan o Victus), (1.73) *Pseudomonas putida*, (1.74) *Pseudomonas resinovorans* (productos conocidos como Solanacure), (1.75) *Pseudomonas syringae* (productos conocidos como Bio-Save), (1.76) *Serratia marcescens*, en particular la cepa SRM (MTCC8708) o la cepa R35, (1.77) *Streptomyces candidus* (productos conocidos como BioAid), (1.78) *Streptomyces lydicus*, en particular la cepa WYCD108 y la cepa WYEC108 (productos conocidos como ActinovateSP), (1.79) *Streptomyces saraceticus*, (1.80) *Streptomyces venezuelae*, (1.81) *Xenorhabdus nematophila*, (1.82) *Agrobacterium radiobacter*, (1.83) *Bacillus mojavensis*, especialmente la cepa CECT-7666, (1.84) *Pantoea agglomerans*, en particular la cepa E325 (productos conocidos como Bloomtime Biological FD Biopesticide), (1.85) *Streptomyces colombiensis*, (1.86) *Streptomyces* sp. WYE 20 (KCTC 0341BP) and WYE 324 (KCTC 0342BP), (1.87) *Bacillus brevis* (también conocida como *Brevibacillus brevis*), (1.88) *Erwinia carotovora* (también conocida como *Pectobacterium carotovorum*) *carotovora* (producto conocido como Biokeeper), (1.89) *Xanthomonas campestris* pv *vesicatoria* (producto conocido como Camprico), (1.90) *Pasteuria reniformis*, en particular la cepa Pr3, (1.91) *Burkholderia spec* cepa A396 (NRRL B-50319) (producto conocido como MBI-206 EP o MBI-206-TGAI).

Los *Bacillus* (abreviatura: B.) es un género de bacterias gram-positivas con forma de barra que pueden producir endosporas en condiciones ambientales estresantes. Las especies individuales de este género difieren en gran medida con respecto a su aplicabilidad en el sector de la fitoprotección. El *Bacillus firmus*, cepa

I-1582, es conocido como nematocida con un gran potencial para aumentar el crecimiento de plantas y mejorar su salud. Puede usarse para aplicación en el suelo y para tratamiento de semillas.

El *Bacillus subtilis*, por ejemplo las cepas GB03 y QST 713, así como el *Bacillus subtilis* var *amyloliquefaciens* strain FZB 24 y el *Bacillus amyloliquefaciens* cepa 42, son especies con propiedades fitopatógenas. Estas bacterias se aplican al suelo y/o a las hojas.

El *Bacillus thuringiensis* con sus diferentes subespecies produce cristales que contienen endotoxina que tiene una especificidad patógena alta por insectos. El *Bacillus thuringiensis* subesp. *kurstaki*, cepa HD-1, se usa para combatir larvas de lepidópteros, pero excluyendo los noctuidos. El *Bacillus thuringiensis* subesp. *aizawai*, por ejemplo las cepas SAN 401 I, ABG-6305 y ABG-6346, son eficaces contra especies diferentes de lepidópteros, incluidos también los noctuidos. El *Bacillus thuringiensis* subesp. *tenebrionis*, por ejemplo las cepas SAN 418 I y ABG-6479, protege plantas frente a larvas de escarabajos de las hojas. El *Bacillus thuringiensis* subesp. *israelensis*, por ejemplo las cepas SAN 402 I y ABG-6164, se aplica contra larvas de diversas plagas de dípteros, por ejemplo mosquitos y nematoceros.

De las bacterias (1.1) a (1.91) o (1.1) a (1.50) dadas, las bacterias o mutantes de las mismas que tienen una actividad insecticida o promotora del crecimiento de las plantas son preferentes para su uso en la presente invención, en una realización en combinación con el compuesto (I), opcionalmente en presencia de un inoculante.

De las bacterias (1.1) a (1.91) o (1.1) a (1.50) dadas, las bacterias o mutantes de las mismas que tienen una actividad fungicida son preferentes para su uso en la

presente invención, en una realización en combinación con el compuesto (I), opcionalmente en presencia de un inoculante.

En una realización, de las bacterias (1.1) a (1.91) o (1.1) a (1.50) dadas, las bacterias indicadas con los números (1.4), (1.5), (1.6), (1.15), (1.16), (1.17), (1.22),  
5 (1.23), (1.26), (1.27), (1.50) y (1.36) a (1.45) pueden usarse en la presente invención, tal como en combinación con el compuesto (I), opcionalmente en presencia de un inoculante. Estas bacterias pertenecen a la clase de bacterias del grupo 1, como se divulga por Ash y col., 1991, Lett Appl Microbiology 13, 202-206.

La genealogía de bacterias del grupo 1 también se muestra en la figura 1. En  
10 particular, las bacterias del grupo 1 pueden dividirse en subgrupos en función de la ramificación dentro del grupo. Por lo tanto, el subgrupo (1) está constituido por *B. pantothenicus*, *B. lentus*, *B. badius* y *B. smithi*; el subgrupo (2) está constituido por *B. azotoformans*, *B. firmus*, *B. circulans*, *B. benzoovorans*, *B. simplex*, *B. marrocanus*, *B. psychrosaccharolyticus*, *B. megaterium* y *B. fastidiosus*; y el  
15 subgrupo (3) está constituido por *B. lautus*, *B. licheniformis*, *B. subtilis*, *B. amyloliquifaciens*, *B. lentimorbus*, *B. popilliae*, *B. atrophaeus*, *B. pumilus*, *B. cereus*, *B. anthracis*, *B. thuringiensis*, *B. medusa*, *B. mycoides*, *B. coagulans* y *B. acidoterrestris*. El subgrupo (3) puede dividirse adicionalmente en el subgrupo (3a) que está constituido por *B. lautus*, *B. licheniformis*, *B. subtilis*, *B. amyloliquifaciens*,  
20 *B. lentimorbus*, *B. popilliae* y *B. atrophaeus*; el subgrupo (3b) está constituido por *B. pumilus*, *B. cereus*, *B. anthracis*, *B. thuringiensis*, *B. medusa* y *B. mycoides*; y el subgrupo (3c) está constituido por *B. coagulans* y *B. acidoterrestris*. El subgrupo (4) está constituido por *B. firmus*.

En una realización, las bacterias del subgrupo (3), (3a), (3b) o (3c) o (4) pueden usarse en la presente invención, como en combinación con el compuesto (I), opcionalmente en presencia de un inoculante.

En otra realización, las bacterias del subgrupo (1) pueden usarse en la presente  
5 invención, como en combinación con el compuesto (I), opcionalmente en presencia de un inoculante.

En otra realización, las bacterias indicadas con los números (1.4), (1.5), (1.23) y (1.26) pueden usarse en la presente invención, como en combinación con el compuesto (I), opcionalmente en presencia de un inoculante.

10 De las bacterias (1.4) dadas, las bacterias (1.4a) *Bacillus amyloliquefaciens* cepa IN937a y (1.4b) *Bacillus amyloliquefaciens* cepa FZB42 se usan en la presente invención, en una realización en combinación con el compuesto (I), opcionalmente en presencia de un inoculante.

De las bacterias (1.5) dadas, la bacteria (1.5a) *Bacillus cereus* cepa CNCM I-1562,  
15 especialmente esporas, se usa o emplea en la presente invención, en una realización en combinación con el compuesto (I), opcionalmente en presencia de un inoculante.

De las bacterias (1.23) dadas, la bacteria (1.23a) *Bacillus pumilus* cepa GB34 o (1.23b) *Bacillus pumilus* cepa QST2808 se usa o emplea en la presente invención,  
20 en una realización en combinación con el compuesto (I), opcionalmente en presencia de un inoculante.

De las bacterias (1.26) dadas, las bacterias (1.26a) *Bacillus subtilis* cepa GB03 y (1.26b) *Bacillus subtilis* var. *amyloliquefaciens* cepa FZB24 o (1.26c) *Bacillus subtilis* cepa QST 713 se usan o emplean en la presente invención en una

realización en combinación con el compuesto (I), opcionalmente en presencia de un inoculante.

De las bacterias (1.27) dadas, las bacterias (1.27a) *Bacillus thuringiensis* subesp. *tenebrionis* NB 176, (1.27b) *Bacillus thuringiensis* subesp. *aizawai* cepa ABTS-  
5 1857, (1.27c) *Bacillus thuringiensis* subesp. *israelensis* cepa AM 65-52 y (1.27d) *Bacillus thuringiensis* subesp. *kurstaki* HD-1 se usan o emplean en la presente invención en una realización en combinación con el compuesto (I), opcionalmente en presencia de un inoculante.

En una realización, las bacterias del subgrupo (4) pueden usarse o emplearse en  
10 la presente invención, como en combinación con el compuesto (I), opcionalmente en presencia de un inoculante.

De las bacterias (1.50) dadas, la bacteria (1.50a) *Bacillus firmus* cepa I-1582, especialmente esporas, se usa o emplea en la presente invención, en una realización en combinación con el compuesto (I), opcionalmente en presencia de  
15 un inoculante.

Según la invención, los agentes de combate biológico que se resumen con el término "hongos" o "levaduras" son:

(2.1) *Ampelomyces quisqualis*, en particular la cepa AQ 10 (producto conocido como AQ 10<sup>®</sup>), (2.2) *Aureobasidium pullulans*, en particular  
20 blastoesporas de la cepa DSM14940 o blastoesporas de la cepa DSM 14941 o mezclas de las mismas (producto conocido como Blossom Protect<sup>®</sup>), (2.3) *Beauveria bassiana*, en particular la cepa ATCC 74040 (productos conocidos como Naturalis<sup>®</sup>) o la cepa ATP02 (DSM 24665) o la cepa GHA (productos conocidos como BOTANIGARD<sup>®</sup> 22WP, MYCOTROL<sup>®</sup> O) o la cepa CG716  
25 (producto conocido como BoveMax), (2.4) *Candida oleophila*, en particular la

cepa O (productos conocidos como Nexy<sup>®</sup>) o la cepa I-182 (productos  
 conocidos como ASPIRE<sup>®</sup>, Decco I-182), (2.6) *Coniothyrium minitans*, en  
 particular la cepa CON/M/91-8 (DSM-9660) (productos conocidos como  
 Contans<sup>®</sup>), (2.7) *Dilophosphora alopecuri* (productos conocidos como Twist  
 5 Fungus<sup>®</sup>), (2.8) *Gliocladium catenulatum*, en particular la cepa J1446  
 (productos conocidos como Prestop<sup>®</sup>), (2.9) *Lecanicillium*  
*lecanii* (anteriormente conocida como *Verticillium lecanii*), en particular  
 conidios de la cepa KV01 (productos conocidos como Mycotal<sup>®</sup>, Vertalec<sup>®</sup>) o  
 la cepa DAOM198499 o la cepa DAOM216596, (2.10) *Metarhizium*  
 10 *anisopliae*, en particular la cepa F52 (DSM 3884, ATCC 90448) (productos  
 conocidos como BIO 1020, MET52) o var. *acridum* aislado IMI  
 330189/ARSEF 7486 (productos conocidos como Green Muscle<sup>®</sup>), (2.11)  
*Metschnikovia fructicola*, en particular la cepa NRRL Y-30752 (productos  
 conocidos como Shemer<sup>®</sup>), (2.12) *Microsphaeropsis ochracea* (productos  
 15 conocidos como Microx<sup>®</sup>), (2.13) *Muscodor albus*, en particular la cepa QST  
 20799 (productos conocidos como QRD300), (2.14) *Nomuraea rileyi*, en  
 particular las cepas SA86101, GU87401, SR86151, CG128 y VA9101,  
 (2.15a) *Paecilomyces lilacinus*, en particular esporas de *P. lilacinus* strain 251  
 (AGAL 89/030550) (productos conocidos como BioAct<sup>®</sup>, cf. *Crop Protection*  
 20 **2008**, 27, 352-361), o (2.15b) *Paecilomyces fumosoroseus* (también conocida  
 como *Isaria fumosorosea*), en particular la cepa apopka 97 (ATCC 20874)  
 (productos conocidos como PreFeRal<sup>®</sup> WG, PFR-97TM 20% WDG) o la  
 cepa FE 9901, (2.16) *Penicillium bilaii*, en particular la cepa ATCC22348  
 (productos conocidos como JumpStart<sup>®</sup>, PB-50, Provide), (2.17) *Pichia*  
 25 *anomala*, en particular la cepa WRL-076, (2.18) *Pseudozyma flocculosa*, en

particular la cepa PF-A22 UL (productos conocidos como Sporodex<sup>®</sup> L),  
(2.19) *Pythium oligandrum*, en particular la cepa DV74 (productos conocidos  
como Polyversum), (2.20) *Trichoderma asperellum*, en particular la cepa ICC  
012 (productos conocidos como Bioten<sup>®</sup>) o la cepa SKT-1 (productos  
5 conocidos como ECO-HOPE<sup>®</sup>) o la cepa T34/ CECT N° 20417 (productos  
conocidos como T34 Biocontrol) o la cepa SF04, (2.21) *Trichoderma*  
*harzianum*, en particular *T. harzianum* T39 (productos conocidos como  
Trichodex<sup>®</sup>) o la cepa T-22 (productos conocidos como PLANTSHIELD<sup>®</sup>T-  
22G, Rootshield, TurfShield), o la cepa TH 35 (productos conocidos como  
10 ROOT PRO<sup>®</sup>) o la cepa TSTh20/PTA-0317 o la cepa 1295-22 (productos  
conocidos como Bio-Trek) y (2.22) *Beauveria brongniartii*, (2.23) *Aschersonia*  
*aleyrodes*, (2.24) *Hirsutella thompsonii* (producto conocido como Mycohit),  
(2.25) *Lagenidium giganteum* (productos conocidos como LAGINEX<sup>®</sup>), (2.26)  
*Metarhizium flavoviride*, (2.27) *Myrothecium verrucaria*, en particular la cepa  
15 AARC-0255 (producto conocido como DiTera<sup>TM</sup>), (2.28) *Pandora delphacis*,  
(2.29) *Tsukamurella paurometabola*, en particular la cepa C-924 (productos  
conocidos como HeberNem<sup>®</sup>), (2.27) ARF 18 (Arkansas Fungus 18), (2.28)  
*Glomus aggregatum*, (2.29) *Glomus etunicatum*, (2.30) *Glomus intraradices*,  
(2.31) *Glomus mosseae*, (2.32) *Trichoderma atroviride*, en particular la cepa  
20 CNCM I-1237 o la cepa NMI V08/002387, o la cepa NMI V08/002389 o la  
cepa SKT-1/FERM P-1651 o la cepa SKT-2/FERM P-16511 o la cepa SKT-  
3/FERM P-17021 (descrita en el documento JP3691264) o la cepa L52  
(producto conocido como SENTINEL<sup>®</sup>), (2.37) *Arthrobotrys dactyloides*,  
(2.38) *Arthrobotrys oligospora*, (2.39) *Arthrobotrys superba* (2.40) *Aspergillus*  
25 *flavus* cepa NRRL 21882 (producto conocido como Afla-Guard<sup>®</sup>), (2.41)

*Candida saitoana*, en particular la cepa NRRL Y-21022 (productos conocidos como BIOCURE® o BIOCOAT®), (2.42) *Chaetomium cupreum*, (2.43) *Chaetomium globosum*, (2.44) *Chondrostereum purpureum*, en particular la cepa PFC2139, (2.45) *Cladosporium cladosporioides* cepa H39 (tal como se describe en el documento EP2230918 A1), (2.46) *Conidiobolus obscurus*, (2.47) *Cryptococcus albidus* (producto conocido como Yield Plus®.), (2.48) *Cryptococcus flavescens*, en particular la cepa NRRL Y- 50378 y la cepa NRRL Y-50379, (2.49), *Dactylaria candida*, (2.50) *Entomophthora virulenta*, (2.51) *Harposporium anguillulae*, (2.52) *Hirsutella minnesotensis*, (2.53) *Hirsutella rhossiliensis*, (2.54) *Meristacrum asterospermum*, (2.55) *Microdochium dimerum*, (2.56) *Monacrosporium cionopagum*, (2.57) *Monacrosporium psychrophilum*, (2.58) *Monacrosporium drechsleri*, (2.59) *Monacrosporium gephyropagum*, (2.60) *Ophiostoma piliferum*, en particular la cepa D97 (productos conocidos como Sylvanex), (2.61) *Paecilomyces variotii*, en particular la cepa Q-09 (producto conocido como Nemaquim), (2.62) *Pochonia chlamydosporia* (= *Vercillium chlamydosporium*), (2.63) *Pseudozyma aphidis*, (2.64) *Stagonospora heteroderae*, (2.65) *Stagonospora phaseoli*, (2.66) *Talaromyces flavus*, en particular la cepa V117b (productos conocidos como PROTUS ®), (2.67) *Trichoderma viride* (también conocida como *Trichoderma gamsii*), en particular la cepa ICC 080 (productos conocidos como REMEDIER® WP, Bioderma®) y la cepa TV1 (productos conocidos como T. viride TV1, Agribiotec), (2.68) *Trichoderma harmatum*, aislado 382 (2.69) *Trichoderma koningii*, (2.70) *Trichoderma lignorum*, (2.71) *Trichoderma polysporum*, aislado IMI 206040 (ATCC 20476), (2.72) *Trichoderma stromaticum*, (2.73) *Trichoderma virens* (también conocida como

- Gliocladium virens*), en particular la cepa GL-21 (productos conocidos como SOILGARD ®), (2.74) *Ulocladium oudemansii*, en particular la cepa HRU3 (productos conocidos como BOTRY-ZEN ®), (2.75) *Verticillium albo-atrum* en particular la cepa WCS850, (2.76) *Verticillium chlamydosporium*, (2.77)
- 5 *Verticillium dahlia* aislado WCS 850 (productos conocidos como Dutch Trig), (2.78) *Zoophtora radicans*, (2.79) *Cylindrocarpon heteronema* , (2.80) *Exophiala jeanselmei*, (2.81) *Exophiala pisciphila*, (2.82) *Fusarium aspergilus*, (2.83) *Fusarium oxysporum*, por ejemplo la cepa no patógena Fo47 (producto FUSACLEAN) o la cepa no patógena 251/2RB (producto conocido como
- 10 BIOFOX®), (2.84) *Fusarium solani*, por ejemplo la cepa Fs-K (tal como se describe en la solicitud de patente US20110059048), (2.85) *Gliocladium roseum*, (2.86) *Mucor haemelis* (productos conocidos como BIO-AVARD), (2.87) *Nematoctonus geogenius*, (2.88) *Nematoctonus leiosporus*, (2.89) *Phlebiopsis gigantea* (productos conocidos como ROTSOP®) , (2.90)
- 15 *Trichoderma album* (productos conocidos como Biozeid®),

En una realización, de los hongos y levaduras (2.1) a (2.90) o (2-1) a (2-22) dados, los hongos y levaduras indicados con los números (2.10), (2.11), y (2.15) pueden usarse o emplearse en la presente invención, en una realización en combinación con el compuesto (I), opcionalmente en presencia de un inoculante.

- 20 Es preferente usar o emplear en la presente invención el compuesto de fórmula (I) en combinación con (2.9) *Lecanicillium lecanii*, opcionalmente en presencia de un inoculante.

- Es preferente usar o emplear en la presente invención el compuesto de fórmula (I) en combinación con (2.9a) *Lecanicillium lecanii* cepa KV01, opcionalmente en
- 25 presencia de un inoculante.

Es preferente usar o emplear en la presente invención el compuesto de fórmula (I) en combinación con (2.10) *Metarhizium anisopliae*, en particular la cepa F 52, opcionalmente en presencia de un inoculante.

- Es preferente usar o emplear en la presente invención el compuesto de fórmula (I)
- 5 en combinación con (2.11) *Metschnikovia fructicola*, en particular la cepa NRRL Y-30752, opcionalmente en presencia de un inoculante.

Es preferente usar o emplear en la presente invención el compuesto de fórmula (I) en combinación con (2.15a) *Paecilomyces lilacinus*, en particular espores de *P. lilacinus* cepa 251, opcionalmente en presencia de un inoculante.

- 10 Es preferente usar o emplear en la presente invención el compuesto de fórmula (I) en combinación con (2.14) *Nomuraea rileyi*, opcionalmente en presencia de un inoculante.

Según la invención, los agentes de combate biológico que se resumen con el término "protozoos" son:

- 15 (3.1) *Nosema locustae* y (3.2) *Vairimorpha*.

Es preferente usar o emplear en la presente invención el compuesto de fórmula (I) en combinación con (3.1) *Nosema locustae*, opcionalmente en presencia de un inoculante.

- Es preferente usar o emplear en la presente invención el compuesto de fórmula (I)
- 20 en combinación con (3.2) *Vairimorpha*, opcionalmente en presencia de un inoculante.

Según la invención, los agentes de combate biológico que se resumen con el término "virus" son:

- (4.1) nucleopoliedrovirus (NPV) de la lagarta (*Lymantria dispar*), (4.2) NPV de
- 25 limántridos (*Lymantriidae*), (4.3) NPV de *Heliothis*, (4.4) NPV de la mosca de

sierra del pino (Neodiprion) y (4.5) granulovirus (GV) de la polilla de la manzana (Cydia pomonella).

Es preferente usar o emplear en la presente invención el compuesto de fórmula (I) en combinación con (4.1) nucleopoliedrovirus (NPV) de la lagarta, opcionalmente  
5 en presencia de un inoculante.

Es preferente usar o emplear en la presente invención el compuesto de fórmula (I) en combinación con (4.2) NPV de limántridos, opcionalmente en presencia de un inoculante.

Es preferente usar o emplear en la presente invención el compuesto de fórmula (I) en combinación con (4.3) NPV de Heliothis, opcionalmente en presencia de un  
10 inoculante.

Es preferente usar o emplear en la presente invención el compuesto de fórmula (I) en combinación con (4.4) NPV de la mosca de sierra del pino, opcionalmente en presencia de un inoculante.

Es preferente usar o emplear en la presente invención el compuesto de fórmula (I) en combinación con (4.5) granulovirus (GV) de la polilla de la manzana, opcionalmente en presencia de un inoculante.

Según la invención, los agentes de combate biológico que se resumen con el término "nematodos entomopatógenos" son:

20 (5.1) Steinernema scapterisci, (5.2) Steinernema feltiae, (5.3) Steinernema carpocapsae, (5.4) Heterorhabditis heliothidis y (5.5) Xenorhabdus luminescence.

Es preferente usar o emplear en la presente invención el compuesto de fórmula (I) en combinación con (5.1) Steinernema scapterisci, opcionalmente en presencia de un inoculante.

Es preferente usar o emplear en la presente invención el compuesto de fórmula (I) en combinación con (5.2) *Steinernema feltiae*, opcionalmente en presencia de un inoculante.

Es preferente usar o emplear en la presente invención el compuesto de fórmula (I)  
5 en combinación con (5.3) *Steinernema carpocapsae*, opcionalmente en presencia de un inoculante.

Es preferente usar o emplear en la presente invención el compuesto de fórmula (I) en combinación con (5.4) *Heterorhabditis heliothidis*, opcionalmente en presencia de un inoculante.

10 Es preferente usar o emplear en la presente invención el compuesto de fórmula (I) en combinación con (5.5) *Xenorhabdus luminescence*, opcionalmente en presencia de un inoculante.

Ejemplos de inoculantes que pueden usarse según la invención son bacterias del género *Rhizobium leguminosarum*, *Rhizobium tropici*, *Rhizobium loti*, *Rhizobium trifolii*,  
15 *Rhizobium meliloti*, *Rhizobium fredii*, *Azorhizobium caulinodans*, *Pseudomonas*, *Azospirillum*, *Azotobacter*, *Streptomyces*, *Burkholderia*, *Agrobacterium*, *Mycorhizza* Endo-, Ecto-, Vesicular-Arbuscular (VA). Es preferente usar inoculantes para el suelo.

La cantidad de agente de combate biológico seleccionada de bacterias, en  
20 particular bacterias formadoras de esporas, hongos o levaduras, protozoos, virus y entomopatógenos que se usa o emplea en combinación con un compuesto de fórmula (I), preferentemente con un compuesto (I), opcionalmente en presencia de un inoculante, depende de la formulación final, así como del tamaño o el tipo de la planta, partes de la planta, semillas, frutos recolectados y hortalizas recolectadas  
25 que se desean tratar. Habitualmente, el agente de combate biológico que se usa

según la invención está presente en aproximadamente el 2 % a aproximadamente el 80 % (p/p), preferentemente en aproximadamente el 5 % a aproximadamente el 75 % (p/p), más preferentemente en aproximadamente el 10 % a aproximadamente el 70 % (p/p) de su formulación individual o formulación combinada con el compuesto de fórmula (I), y opcionalmente el inoculante.

Si se seleccionan bacterias, hongos o levaduras como agente de combate biológico, en particular los que se indica que son preferentes, es decir, (1.4), (1.5), (1.23), (1.26), (1.27), (1.50), (2.10), (2.11) y (2.15a), es preferente que estén presentes en una formulación individual o la formulación combinada en una concentración superior a  $10^5 - 10^{12}$  ufc/g (unidades formadoras de colonias por gramo), preferentemente superior a  $10^6 - 10^{11}$  ufc/g, más preferentemente en  $10^7 - 10^{10}$  ufc/g.

También, la cantidad de compuesto de fórmula (I) que se usa en combinación con el agente de combate biológico seleccionado de bacterias, en particular bacterias formadoras de esporas, hongos o levaduras, protozoos, virus y nematodos entomopatógenos, opcionalmente en presencia de un inoculante, depende de la formulación final, así como del tamaño o el tipo de la planta, partes de la planta, semillas, frutos recolectados y hortalizas recolectadas que se desean tratar. Habitualmente, el compuesto de fórmula (I) que se usa según la invención está presente en aproximadamente el 0,1 % a aproximadamente el 80 % (p/p), preferentemente en aproximadamente el 1 % a aproximadamente el 60 % (p/p), más preferentemente en aproximadamente el 10 % a aproximadamente el 50 % (p/p) de su formulación individual o formulación combinada en combinación con el agente de combate biológico seleccionado de bacterias, en particular bacterias

formadoras de esporas, hongos o levaduras, protozoos, virus y nematodos entomopatógenos, y opcionalmente el inoculante.

Es preferente usar el compuesto de fórmula (I) y el agente de combate biológico seleccionado de bacterias, en particular bacterias formadoras de esporas, hongos  
5 o levaduras, protozoos, virus y nematodos entomopatógenos, y si está presente también el inoculante en una relación en peso sinérgica. El experto sabrá encontrar las relaciones en peso sinérgicas para la presente invención mediante procedimientos de rutina. El experto entiende que estas relaciones se refieren a la relación dentro de una formulación combinada, así como a la relación calculativa  
10 de compuesto de fórmula (I) y el agente de combate biológico descrito en el presente documento cuando ambos componentes se aplican como formulaciones individuales a una planta que se desea tratar. El experto puede calcular esta relación usando matemáticas sencillas, ya que el volumen y la cantidad de compuestos de fórmula (I) y el agente de combate biológico, respectivamente, en  
15 una formulación individual son conocidos por el experto. En una realización, dicha relación se refiere a la relación de ambos componentes después de aplicar ambos componentes, es decir, el compuesto de fórmula (I) y el agente de combate biológico, respectivamente, a una planta que se desea tratar independientemente de si los componentes se aplican a una planta que se desea tratar en forma de  
20 aplicaciones individuales o en forma de una formulación combinada.

En particular, la relación en peso sinérgica del compuesto de fórmula (I) con respecto a las bacterias, en particular bacterias formadoras de esporas, como agente de combate biológico se encuentra en el intervalo de 100 : 1 y 1: 5000 (p/p), 100 : 1 y 1: 2500 (p/p), 100 : 1 y 1: 1000 (p/p), preferentemente en el  
25 intervalo de 50 : 1 y 1: 500 (p/p), más preferentemente en el intervalo de 10 : 1 y 1:

- 500 (p/p), 5 : 1 a 1: 500 (p/p), 5 : 1 y 1: 200 (p/p), 5 : 1 y 1: 100 (p/p), 1 : 1 y 1: 100 (p/p), 1 : 1 y 1: 50 (p/p), 1 : 1 y 1: 10 (p/p). Debe indicarse que los intervalos de relaciones mencionados anteriormente se basan en la asunción de que la preparación de esporas de la bacteria contiene aproximadamente  $10^{11}$  esporas por
- 5 gramo. Si las preparaciones de esporas varían en densidad, las relaciones deben adaptarse en consecuencia para que coincidan con los intervalos de relaciones enumerados anteriormente. Una relación de 1:100 significa 100 partes en peso de las preparaciones de esporas de las bacterias formadoras de esporas y 1 parte en peso del compuesto de fórmula (I).
- 10 En particular, la relación en peso sinérgica del compuesto de fórmula (I) con respecto a los hongos o las levaduras se encuentra en el intervalo de 100 : 1 a 1: 20.000, preferentemente en el intervalo de 50:1 a 1:10.000, 10 : 1 y 1: 5000, 10 : 1 y 1: 2000, 10 : 1 y 1: 1000, 5 : 1 y 1: 1000, 5 : 1 y 1: 500, 5 : 1 y 1: 200, 5 : 1 y 1: 100, 1 : 1 y 1: 100, 1 : 1 y 1: 50 . Se ha de indicar que los intervalos mencionados
- 15 anteriormente se basan en una preparación de esporas del agente de combate biológico que contiene aproximadamente  $10^9$ - $10^{10}$  esporas (hongos) o células (levadura) por gramo. Si las preparaciones de esporas varían en densidad, las relaciones deben adaptarse en consecuencia para que coincidan con los intervalos de relaciones enumerados anteriormente. Una relación de 1:100
- 20 significa 100 partes en peso de las preparaciones de esporas o células de los hongos o la levadura y 1 parte en peso del compuesto de fórmula (I).
- En una realización de la presente invención, un agente de combate biológico es un hongo y la concentración del hongo después de la dispersión es al menos 50 g/ha, tal como 50 – 7500 g/ha, 50 – 2500 g/ha, 50 – 1500 g/ha; al menos 250 g/ha
- 25 (hectárea), al menos 500 g/ha o al menos 800 g/ha.

En una realización de la presente invención, un agente de combate biológico es un hongo, tal como *Paecilomyces lilacinus*, por ejemplo la cepa 251, y la concentración del hongo después de la dispersión es al menos 50 g/ha; al menos 100 g/ha; al menos 1000 g/ha; al menos 2500 g/ha, tal como 2500 – 7500 g/ha, 2500 – 6000 g/ha; o al menos 4000 g/ha, tal como 4000 – 6000 g/ha.

En una realización de la presente invención, un agente de combate biológico es un hongo, tal como *Metarhizium anisopliae*, por ejemplo la cepa F52, y la concentración del hongo después de la dispersión es al menos 50 g/ha; tal como 50 – 7500 g/ha, 50 – 2500 g/ha, 50 – 250 g/ha; o al menos 100 g/ha, tal como 100 g/ha– 1000 g/ha o 100 – 250 g/ha.

En una realización de la presente invención, un agente de combate biológico es una levadura, tal como *Metschnikowia fructicola*, y la concentración de la levadura después de la dispersión es al menos 50 g/ha; tal como 50 – 5.000 g/ha, 50 – 2.000 g/ha; al menos 1.000 g/ha, al menos 1.500 g/ha, tal como 500 – 5.000 g/ha, 50 – 2.500 g/ha, 500 – 2.000 g/ha.

En una realización de la presente invención, un agente de combate biológico es una bacteria y la concentración de la bacteria después de la dispersión es al menos 50 g/ha, al menos 100 g/ha o al menos 150 g/ha.

En una realización de la presente invención, un agente de combate biológico es una bacteria, tal como *B. thuringiensis* y la concentración de la bacteria después de la dispersión es al menos 50 g/ha (hectárea), tal como 50 – 7500 g/ha, 50 – 2500 g/ha, 50 – 1500 g/ha; al menos 250 g/ha; al menos 100 g/ha, tal como 100 – 5000 g/ha, 100 – 2500 g/ha, 100 – 1500 g/ha o 100 – 250 g/ha; o al menos 800 g/ha, tal como 800 – 5000 g/ha o 800 – 2500 g/ha.

En otra realización de la presente invención, un agente de combate biológico es una bacteria, tal como *B. subtilis*, por ejemplo la cepa GB 03, y la concentración de la bacteria después de la dispersión es al menos 50 g/ha; tal como 50 – 5.000 g/ha, 50 – 2500 g/ha, 50 – 200 g/ha; al menos 100 g/ha, al menos 500 g/ha, al  
5 menos 800 g/ha, tal como 800 – 5.000 g/ha u 800 – 2.500 g/ha.

En una realización de la presente invención, un agente de combate biológico es una bacteria, tal como *B. subtilis*, por ejemplo, la cepa QST713, y la concentración de la bacteria después de la dispersión es al menos 50 g/ha (hectárea), tal como  
50 – 8.000 g/ha, 50 – 2500 g/ha, 50 – 1500 g/ha; 50 - 250 g/ha; al menos 250  
10 g/ha, al menos 100 g/ha, tal como 100 – 5000 g/ha, 100 – 2500 g/ha, 100 – 1500 g/ha o 100 – 250 g/ha; o al menos 800 g/ha, tal como 800 – 5000 g/ha o 800 – 2500 g/ha.

En otra realización de la presente invención, un agente de combate biológico es una bacteria, tal como *B. firmus*, por ejemplo la cepa I-1582, y la concentración de  
15 la bacteria después de la dispersión es al menos 50 g/ha; tal como 50 – 5.000 g/ha, 50 – 2500 g/ha, 50 – 200 g/ha; al menos 100 g/ha, al menos 500 g/ha, al menos 800 g/ha, tal como 800 – 5.000 g/ha u 800 – 2.500 g/ha.

En una realización de la presente invención, un agente de combate biológico es una bacteria, tal como *B. pumilus*, por ejemplo, la cepa QST2808, y la  
20 concentración de la bacteria después de la dispersión es al menos 50 g/ha (hectárea), tal como 50 – 7.500 g/ha, 50 – 2500 g/ha, 50 – 1500 g/ha; 50 - 200 g/ha; al menos 250 g/ha, al menos 100 g/ha, tal como 100 – 5000 g/ha, 100 – 2500 g/ha, 100 – 1500 g/ha o 100 – 250 g/ha; o al menos 800 g/ha, tal como 800 – 5000 g/ha o 800 – 2500 g/ha.

En otra realización de la presente invención, un agente de combate biológico es una bacteria, tal como *B. amyloliquefaciens* y la concentración de las bacterias después de la dispersión es al menos 500 g/ha, tal como 500 – 5000 g/ha, 500 – 2500 g/ha.

5 En una realización de la presente invención, un agente de combate biológico es un virus y la concentración del virus después de la dispersión es al menos 50 g/ha, tal como 50 – 7500 g/ha, 50 – 2500 g/ha, 50 – 1500 g/ha; al menos 100 g/ha o al menos 150 g/ha.

10 En una realización de la presente invención, un agente de combate biológico es un virus, tal como el granulovirus de la polilla de la manzana (*Cydia pomonella*) y la concentración del virus después de la dispersión es al menos 50 g/ha (hectárea) tal como 50 – 5.000 g/ha, 50 – 1500 g/ha o 50 – 250 g/ha, o al menos 100 g/ha, tal como 100 g/ha– 1000 g/ha, 100 – 500 g/ha o 100 – 250 g/ha.

En una realización de la presente invención, un agente de combate biológico es un  
 15 nematodo y la concentración de los nematodos es al menos  $10^6$  nematodos/ha, por ejemplo, nematodos en estadio larvario/ha, tal como  $10^6 - 10^{15}$  nematodos/ha, por ejemplo, nematodos en estadio larvario/ha,  $10^6 - 10^{12}$  nematodos/ha, por ejemplo, nematodos en estadio larvario/ha, al menos  $10^8$  nematodos/ha, por ejemplo, nematodos en estadio larvario/ha tal como  $10^8 - 10^{15}$  nematodos/ha, por  
 20 ejemplo, nematodos en estadio larvario/ha,  $10^8 - 10^{12}$  nematodos/ha, por ejemplo, nematodos en estadio larvario/ha; o al menos  $10^9$  nematodos/ha, por ejemplo, nematodos en estadio larvario/ha, tal como  $10^9 - 10^{15}$  nematodos/ha, por ejemplo, nematodos en estadio larvario/ha o  $10^9 - 10^{12}$  nematodos/ha, por ejemplo, nematodos en estadio larvario/ha.

En una realización de la presente invención, las relaciones entre un compuesto de fórmula (I) y las bacterias (tales como *Bacillus amyloliquefaciens*, *Bacillus subtilis*, *Bacillus firmus*, *Bacillus thuringiensis* subesp. *aizawai*, *Bacillus thuringiensis* subesp. *israeliensis*, *Bacillus thuringiensis* subesp. *kurstaki*, *Bacillus thuringiensis* subesp. *tenebrionis*, *Bacillus pumilus*, *Bacillus cereus*) en una formulación combinada o sobre o en una planta que se desea tratar o sus alrededores, hábitat o espacio de almacenamiento es de 100:1 a 1:1000, de 50:1 a 1:500 o incluso 5:1 a 1:100.

En una realización de la presente invención, las relaciones entre un compuesto de fórmula (I) y hongos (tales como *Metarhizium anisopliae*, *Paecilomyces lilacinus*, *Beauveria bassiana*, *Nomuraea rileyi*) en una formulación combinada o sobre o en una planta que se desea tratar o sus alrededores, hábitat o espacio de almacenamiento es de 100:1 a 1:2000, de 50:1 a 1:1000 o incluso 25:1 a 1:200.

En una realización de la presente invención, las relaciones entre un compuesto de fórmula (I) y una levadura (tal como *Metschnikowia fructicola*) en una formulación combinada o sobre o en una planta que se desea tratar o sus alrededores, hábitat o espacio de almacenamiento es de 100:1 a 1:2000, de 50:1 a 1:1000 o incluso 25:1 a 1:200.

En una realización de la presente invención, las relaciones entre nematodos (tales como *Steinernema feltiae* y *Steinernema carpocapsae*) y un compuesto de fórmula (I) en una formulación individual o combinada o sobre o en una planta que se desea tratar o sus alrededores, hábitat o espacio de almacenamiento es de 125:1 a 1:125, de 100:1 a 1:25 o incluso 50:1 a 1:5.

La buena actividad insecticida y acaricida de las combinaciones de la invención es evidente a partir de los ejemplos siguientes. Aunque los principios activos

individuales muestren debilidades en su actividad, las combinaciones muestran una actividad que sobrepasa la simple suma de las actividades.

Hay presencia de un efecto sinérgico en insecticidas y acaricidas siempre que la actividad de las combinaciones de principios activos sea superior a la suma de las actividades de los principios activos aplicados individualmente.

#### **Fórmula para la eficacia de la combinación de dos compuestos**

La eficacia esperada de una combinación dada de dos compuestos se calcula como sigue (véase Colby, S.R., "Calculating Synergistic and antagonistic Responses of Herbicide Combinations", Weeds 15, páginas 20-22, 1967):

10 si

X es la eficacia expresada en % de mortalidad del control no tratado para el compuesto de ensayo A a una concentración de m ppm o m g/ha,

Y es la eficacia expresada en % de mortalidad del control no tratado para el compuesto de ensayo B a una concentración de n ppm o n g/ha,

15 E es la eficacia expresada en % de mortalidad del control no tratado usando la mezcla de A y B a m y n ppm o m y n g/ha,

entonces 
$$E = X + Y - \frac{X \cdot Y}{100}$$

Si la eficacia insecticida observada en la combinación es superior a la calculada como "E", entonces la combinación de los dos compuestos es más que aditiva, es decir, hay un efecto sinérgico.

20

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## Ejemplos

### **Ejemplo 1:**

#### **Ensayo con *Myzus persicae***

Disolvente: 78,0 partes en peso de acetona

5 1,5 partes en peso de dimetilformamida

Emulsionante: 0,5 partes en peso de alquilarilpoliglicoléter

Para producir una preparación adecuada de compuesto activo, se mezcla 1 parte en peso de compuesto activo con la cantidad indicada de disolvente y emulsionante, y el concentrado se diluye con agua que contiene emulsionante a la concentración deseada. Para producir una preparación adecuada de una suspensión biológica de las células o esporas se diluye con agua que contiene emulsionante a la concentración deseada.

Discos de hoja de col china (*Brassica pekinensis*) infectados con todos los estadios el áfido del melocotón verde (*Myzus persicae*) se pulverizan con una preparación del principio activo a la concentración deseada.

Después del periodo especificado, se determina la mortalidad en %. El 100 % quiere decir que todos los áfidos han muerto; el 0 % quiere decir que ninguno de los áfidos ha muerto.

Las combinaciones de compuestos (I) y otro principio activo o agente de combate biológico siguientes mostraron un efecto sinérgico según la invención:

**Tabla 1: Ensayo de *Myzus persicae***

| Principio activo/ agente de combate biológico | Concentración g de pa/ha | Mortalidad en % después de 1 <sup>d</sup> |
|-----------------------------------------------|--------------------------|-------------------------------------------|
| Compuesto (I)                                 | 100                      | 0                                         |
|                                               | 20                       | 0                                         |
|                                               | 4                        | 0                                         |
| Acrinatrina                                   | 0,8                      | 80                                        |
| Compuesto (I) + acrinatrina                   |                          | <u>obs.</u> * <u>cal.</u> **              |
|                                               | 4 + 0,8                  | 100 80                                    |
| Imidacloprid                                  | 0,8                      | 0                                         |
| Compuesto (I) + imidacloprid                  |                          | <u>obs.</u> * <u>cal.</u> **              |
|                                               | 4 + 0,8                  | 70 0                                      |
| Clotianidina                                  | 20                       | 0                                         |
| Compuesto (I) + clotianidina                  |                          | <u>obs.</u> * <u>cal.</u> **              |
|                                               | 100 + 20                 | 90 0                                      |
| Dinotefuran                                   | 20                       | 0                                         |
| Compuesto (I) + dinotefuran                   |                          | <u>obs.</u> * <u>cal.</u> **              |
|                                               | 20 + 20                  | 70 0                                      |
| Clorpirifos                                   | 4                        | 70                                        |
| Compuesto (I) + clorpirifos                   |                          | <u>obs.</u> * <u>cal.</u> **              |
|                                               | 4 + 4                    | 100 70                                    |
| Sulfoxaflor                                   | 0,16                     | 0                                         |
| Compuesto (I) + sulfoxaflor                   |                          | <u>obs.</u> * <u>cal.</u> **              |
|                                               | 4 + 0,16                 | 80 0                                      |
| Flupiradifurona                               | 20                       | 70                                        |

| Principio activo/ agente de combate biológico | Concentración g de pa/ha | Mortalidad en % después de 1 <sup>d</sup> |
|-----------------------------------------------|--------------------------|-------------------------------------------|
| Compuesto (I) + flupiradifurona               | 100 + 20                 | <u>obs.</u> * <u>cal.</u> **<br>90 70     |

| Principio activo/ agente de combate biológico                              | Concentración g de pa/ha | Mortalidad en % después de 6 <sup>d</sup> |
|----------------------------------------------------------------------------|--------------------------|-------------------------------------------|
| Compuesto (I)                                                              | 100<br>20<br>4           | 0<br>0<br>0                               |
| Azadiractina                                                               | 100                      | 0                                         |
| Compuesto (I) + azadiractina                                               | 100 + 100                | <u>obs.</u> * <u>cal.</u> **<br>70 0      |
| Bacillus subtilis cepa GB 03<br>(Kodiak, 5.5 x 10 <sup>10</sup> esporas/g) | 2000                     | 0                                         |
| Compuesto (I) + Bacillus subtilis                                          | 100 + 2000               | <u>obs.</u> * <u>cal.</u> **<br>70 0      |
| Granulovirus de Cydia pomonella<br>(CpGV)                                  | 1000                     | <u>0</u>                                  |
| Compuesto (I) + CpGV                                                       | 100 + 1000               | <u>obs.</u> * <u>cal.</u> **<br>100 0     |
| Clorantraniliprol                                                          | 4                        | <u>80</u>                                 |
| Compuesto (I) + clorantraniliprol                                          | 100 + 4                  | <u>obs.</u> * <u>cal.</u> **<br>100 80    |
| Milbemectina                                                               | 4                        | <u>70</u>                                 |

| Principio activo/ agente de combate biológico | Concentración g de pa/ha | Mortalidad en % después de 6 <sup>d</sup> |
|-----------------------------------------------|--------------------------|-------------------------------------------|
| Compuesto (I) + milbemectina                  | 20 + 4                   | <u>obs.</u> * <u>cal.</u> **<br>90 70     |
| Pimetrozina                                   | 4                        | <u>0</u>                                  |
| Compuesto (I) + pimetrozina                   | 4 + 4                    | <u>obs.</u> * <u>cal.</u> **<br>100 0     |
| Lambda-cihalotrina                            | 0,16                     | <u>0</u>                                  |
| Compuesto (I) + lambda-cihalotrina            | 4 + 0,16                 | <u>obs.</u> * <u>cal.</u> **<br>100 0     |
| Dimetoato                                     | 20                       | <u>0</u>                                  |
| Compuesto (I) + dimetoato                     | 20 + 20                  | <u>obs.</u> * <u>cal.</u> **<br>80 0      |

## Ejemplo 2:

### Aplicación por pulverización: larvas de *Phaedon cochleariae*

Disolvente: 78,0 partes en peso de acetona

1,5 partes en peso de dimetilformamida

5 Emulsionante: 0,5 partes en peso de alquilarilpoligicoléter

Para producir una preparación adecuada de compuesto activo, se mezcla 1 parte en peso de compuesto activo con la cantidad indicada de disolvente y emulsionante, y el concentrado se diluye con agua que contiene emulsionante a la concentración deseada. Para producir una preparación adecuada de una suspensión biológica de

10 las células, virus o esporas se diluye con agua que contiene emulsionante a la concentración deseada.

Se pulverizan discos de hoja de col china (*Brassica pekinensis*) con una preparación del principio activo de la concentración deseada. Una vez secos, los discos de hojas se infestan con larvas del escarabajo de la mostaza (*Phaedon*  
15 *cochleariae*).

Después del periodo especificado, se determina la mortalidad en %. El 100 % significa que todas las larvas de escarabajo han muerto y el 0 % significa que ninguna de las larvas de escarabajo ha muerto. Los valores de mortalidad determinados de este modo se recalculan usando la fórmula de Colby.

20 Las combinaciones de compuestos (I) y otro principio activo o agente de combate biológico siguientes mostraron un efecto sinérgico según la invención:

Tabla 2: Ensayo con larvas de *Phaedon cochleariae*

| Principio activo/ agente de combate biológico                                                                                                                                                                                                                                                               | Concentración g de pa/ha | Mortalidad en % después de 2 <sup>d</sup> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------------------------------------|
| Compuesto (I)                                                                                                                                                                                                                                                                                               | 100                      | 0                                         |
|                                                                                                                                                                                                                                                                                                             | 20                       | 0                                         |
|                                                                                                                                                                                                                                                                                                             | 4                        | 0                                         |
|                                                                                                                                                                                                                                                                                                             | 0,8                      | 0                                         |
| 1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-[[5-(trifluorometil)-1H-tetrazol-1-il]metil]-1H-pirazol-5-carboxamida/<br>1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-[[5-(trifluorometil)-2H-tetrazol-2-il]metil]-1H-pirazol-5-carboxamida                 | 0,8                      | 50                                        |
| Compuesto (I) + 1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-[[5-(trifluorometil)-1H-tetrazol-1-il]metil]-1H-pirazol-5-carboxamida/<br>1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-[[5-(trifluorometil)-2H-tetrazol-2-il]metil]-1H-pirazol-5-carboxamida | 20 + 0,8                 | <u>obs.</u> * <u>cal.</u> **<br>100   50  |
| Flupiradifurona                                                                                                                                                                                                                                                                                             | 500                      | 50                                        |
| Compuesto (I) + flupiradifurona                                                                                                                                                                                                                                                                             |                          | <u>obs.</u> * <u>cal.</u> **              |

|                                        |                 |                                        |
|----------------------------------------|-----------------|----------------------------------------|
|                                        | 100 + 500       | 100 50                                 |
| Fipronilo                              | 0,16            | 0                                      |
| Compuesto (I) + fipronilo              | 0,8 + 0,16      | <u>obs.</u> * <u>cal.</u> **<br>100 0  |
| Lambda-cihalotrina                     | 0,8             | 67                                     |
| Compuesto (I) + lambda-cihalotrina     | 20 + 0,8        | <u>obs.</u> * <u>cal.</u> **<br>100 67 |
| Benzoato de emamectina                 | 0,8             | 67                                     |
| Compuesto (I) + benzoato de emamectina | 100 + 0,8       | <u>obs.</u> * <u>cal.</u> **<br>100 67 |
| Lepimectina                            | 4               | 50                                     |
| Compuesto (I) + lepimectina            | 4 + 4           | <u>obs.</u> * <u>cal.</u> **<br>83 50  |
| Tiametoxam                             | 20              | 67                                     |
| Compuesto (I) + tiametoxan             | <u>100 + 20</u> | <u>obs.</u> * <u>cal.</u> **<br>83 67  |

| Principio activo/ agente de combate biológico | Concentración g de pa/ha | Mortalidad en % después de 6 <sup>d</sup> |
|-----------------------------------------------|--------------------------|-------------------------------------------|
| Compuesto (I)                                 | 100                      | 0                                         |
|                                               | 20                       | 0                                         |
|                                               | 4                        | 0                                         |
| Clorantraniliprol                             | 0,8                      | <u>33</u>                                 |
| Compuesto (I) + clorantraniliprol             | 20 + 0,8                 | <u>obs.</u> * <u>cal.</u> **<br>83 33     |

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| Principio activo/ agente de combate biológico | Concentración g de pa/ha | Mortalidad en % después de 6 <sup>d</sup> |
|-----------------------------------------------|--------------------------|-------------------------------------------|
| Sulfoxaflor                                   | 4                        | 0                                         |
| Compuesto (I) + sulfoxaflor                   | 100 + 4                  | <u>obs.</u> * <u>cal.</u> **<br>33 0      |
| Alfa-cipermetrina                             | 4                        | 0                                         |
| Compuesto (I) + alfa-cipermetrina             | 100 + 4                  | <u>obs.</u> * <u>cal.</u> **<br>67 0      |
| Bifentrina                                    | 0,8                      | 50                                        |
| Compuesto (I) + bifentrina                    | 20 + 0,8                 | <u>obs.</u> * <u>cal.</u> **<br>83 50     |
| Imidacloprid                                  | 20                       | 0                                         |
| Compuesto (I) + imidacloprid                  | 100 + 20                 | <u>obs.</u> * <u>cal.</u> **<br>50 0      |
| Tiacloprid                                    | 20                       | 33                                        |
| Compuesto (I) + tiacloprid                    | 100 + 20                 | <u>obs.</u> * <u>cal.</u> **<br>83 33     |
| Clotianidina                                  | 20                       | 83                                        |
| Compuesto (I) + clotianidina                  | 100 + 20                 | <u>obs.</u> * <u>cal.</u> **<br>100 83    |
| Acetamiprid                                   | 20                       | 33                                        |
| Compuesto (I) + acetamiprid                   | 100 + 20                 | <u>obs.</u> * <u>cal.</u> **<br>83 33     |
| Dinotefuran                                   | 20                       | 0                                         |
| Compuesto (I) + dinotefuran                   |                          | <u>obs.</u> * <u>cal.</u> **              |

| Principio activo/ agente de combate biológico | Concentración g de pa/ha | Mortalidad en % después de 6 <sup>d</sup> |
|-----------------------------------------------|--------------------------|-------------------------------------------|
|                                               | 20 + 20                  | 33 0                                      |
| Nitenpiram                                    | 20                       | 0                                         |
| Compuesto (I) + nitenpiram                    | 100 + 20                 | obs.* cal.**<br>50 0                      |
| Teflutrina                                    | 20                       | 50                                        |
| Compuesto (I) + teflutrina                    | 100 + 20                 | obs.* cal.**<br>83 50                     |
| Flufenoxuron                                  | 20                       | 0                                         |
| Compuesto (I) + flufenoxuron                  | 100 + 20                 | obs.* cal.**<br>50 0                      |
| Triflumuron                                   | 20                       | 0                                         |
| Compuesto (I) + triflumuron                   | 100 + 20                 | obs.* cal.**<br>67 0                      |
| Beta-ciflutrina                               | 0,8                      | 50                                        |
| Compuesto (I) + beta-ciflutrina               | 20 + 0,8                 | obs.* cal.**<br>100 50                    |
| Dimetoato                                     | 100                      | 0                                         |
| Compuesto (I) + dimetoato                     | 100 + 100                | obs.* cal.**<br>50 0                      |
| Tiodicarb                                     | 100                      | 0                                         |

| Principio activo/ agente de combate biológico | Concentración g de pa/ha | Mortalidad en % después de 6 <sup>d</sup> |
|-----------------------------------------------|--------------------------|-------------------------------------------|
|-----------------------------------------------|--------------------------|-------------------------------------------|

|                           |           |                              |
|---------------------------|-----------|------------------------------|
| Compuesto (I) + tiodicarb |           | <u>obs.</u> * <u>cal.</u> ** |
|                           | 100 + 100 | 33    0                      |

\*obs = eficacia insecticida observada, \*\* cal. = eficacia calculada con la fórmula de Colby

**Ejemplo 3:**

**Aplicación por pulverización: *Spodoptera frugiperda***

Disolvente:            78,0 partes en peso de acetona  
                             1,5 partes en peso de dimetilformamida

5 Emulsionante:       0,5 partes en peso de alquilarilpoligicoléter

Para producir una preparación adecuada de compuesto activo, se mezcla 1 parte en peso de compuesto activo con la cantidad indicada de disolvente y emulsionante, y el concentrado se diluye con agua que contiene emulsionante a la concentración deseada. Para producir una preparación adecuada de una suspensión biológica de

10 las células, virus o esporas se diluye con agua que contiene emulsionante a la concentración deseada.

Se pulverizan discos de hoja de col silvestre (*Brassica oleracea*) con una preparación del principio activo de la concentración deseada. Una vez secas, se infestan los discos de hojas con larvas de orugas militares tardías (*Spodoptera*

15 *frugiperda*).

Después del periodo especificado, se determina la mortalidad en %. El 100 % significa que todas las orugas han muerto; el 0 % significa que ninguna de las orugas ha muerto. Los valores de mortalidad determinados de este modo se recalculan usando la fórmula de Colby.

20 Las combinaciones de compuestos (I) y otro principio activo o agente de combate biológico siguientes mostraron un efecto sinérgico según la invención:

Tabla 3: Ensayo con Spodoptera frugiperda

| Principio activo/ agente de combate biológico                                                                                                                                                                                                                                                               | Concentración g de pa/ha | Mortalidad en % después de 2 <sup>d</sup> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------------------------------------|
| Compuesto (I)                                                                                                                                                                                                                                                                                               | 100                      | 0                                         |
|                                                                                                                                                                                                                                                                                                             | 20                       | 0                                         |
|                                                                                                                                                                                                                                                                                                             | 4                        | 0                                         |
| 1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-{{5-(trifluorometil)-1H-tetrazol-1-il]metil}-1H-pirazol-5-carboxamida/<br>1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-{{5-(trifluorometil)-2H-tetrazol-2-il]metil}-1H-pirazol-5-carboxamida                 | 0,16                     | 67                                        |
| Compuesto (I) + 1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-{{5-(trifluorometil)-1H-tetrazol-1-il]metil}-1H-pirazol-5-carboxamida/<br>1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-{{5-(trifluorometil)-2H-tetrazol-2-il]metil}-1H-pirazol-5-carboxamida | 4 + 0,16                 | obs.* cal.**<br>100 67                    |
| Gamma-cihalotrina                                                                                                                                                                                                                                                                                           | 0,16                     | 0                                         |
| Compuesto (I) + gamma-cihalotrina                                                                                                                                                                                                                                                                           |                          | obs.* cal.**                              |

| Principio activo/ agente de combate biológico | Concentración g de pa/ha | Mortalidad en % después de 2 <sup>d</sup> |
|-----------------------------------------------|--------------------------|-------------------------------------------|
|                                               | 4 + 0,16                 | 50 0                                      |
| Clorpirifos                                   | 100                      | 50                                        |
| Compuesto (I) + clorpirifos                   | 20 + 20                  | <u>obs.</u> * <u>cal.</u> **<br>67 50     |
| Triflumuron                                   | 20                       | 0                                         |
| Compuesto (I) + triflumuron                   | 100 + 20                 | <u>obs.</u> * <u>cal.</u> **<br>67 0      |
| Diflubenzuron                                 | 100                      | 67                                        |
| Compuesto (I) + diflubenzuron                 | 100 + 100                | <u>obs.</u> * <u>cal.</u> **<br>100 67    |

| Principio activo/ agente de combate biológico | Concentración g de pa/ha | Mortalidad en % después de 6 <sup>d</sup> |
|-----------------------------------------------|--------------------------|-------------------------------------------|
| Compuesto (I)                                 | 100                      | 0                                         |
|                                               | 20                       | 0                                         |
|                                               | 4                        | 0                                         |
|                                               | 0,8                      | 0                                         |
| Bifentrina                                    | 0,16                     | 0                                         |
| Compuesto (I) + bifentrina                    | 4 + 0,16                 | <u>obs.</u> * <u>cal.</u> **<br>33 0      |
| Tiacloprid                                    | 20                       | 0                                         |
| Compuesto (I) + tiacloprid                    | 100 + 20                 | <u>obs.</u> * <u>cal.</u> **<br>33 0      |

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| Principio activo/ agente de combate biológico | Concentración g de pa/ha | Mortalidad en % después de 6 <sup>d</sup> |
|-----------------------------------------------|--------------------------|-------------------------------------------|
| Lambda-cihalotrina                            | 0,16                     | 33                                        |
| Compuesto (I) + lambda-cihalotrina            | 4 + 0,16                 | <u>obs.</u> * <u>cal.</u> **<br>50 33     |
| Milbemectina                                  | 0,8                      | 0                                         |
| Compuesto (I) + milbemectina                  | 4 + 0,8                  | <u>obs.</u> * <u>cal.</u> **<br>33 0      |
| Cipermetrina                                  | 0,8                      | 67                                        |
| Compuesto (I) + cipermetrina                  | 4 + 0,8                  | <u>obs.</u> * <u>cal.</u> **<br>83 67     |
| Deltametrina                                  | 0,032                    | 0                                         |
| Compuesto (I) + deltametrina                  | 0,8 + 0,032              | <u>obs.</u> * <u>cal.</u> **<br>67 0      |
| Beta-ciflutrina                               | 0,8                      | 83                                        |
| Compuesto (I) + beta-ciflutrina               | 20 + 0,8                 | <u>obs.</u> * <u>cal.</u> **<br>100 83    |
| Indoxacarb                                    | 0,8                      | 50                                        |
| Compuesto (I) + indoxacarb                    | 4 + 0,8                  | <u>obs.</u> * <u>cal.</u> **<br>100 50    |

\* obs. = eficacia insecticida observada, \*\* cal. = eficacia calculada con la fórmula de Colby

**Ejemplo 4:**

**Ensayo con Tetranychus urticae (resistente a OP)**

5    Disolvente:        78,0                   partes en peso de acetona

1,5 partes en peso de dimetilformamida

Emulsionante: 0,5 partes en peso de alquilarilpoliglicoléter

Para producir una preparación adecuada de compuesto activo, se mezcla 1 parte en peso de compuesto activo con la cantidad indicada de disolvente y emulsionante, y el  
5 concentrado se diluye con agua que contiene emulsionante a la concentración deseada. Para producir una preparación adecuada de una suspensión biológica de las células o esporas se diluye con agua que contiene emulsionante a la concentración deseada.

Se pulverizaron discos de hojas de alubias francesas (*Phaseolus vulgaris*)  
10 infectados con todos los estadios de arañas rojas comunes (*Tetranychus urticae*) con la preparación del principio activo a la concentración deseada.

Después del periodo especificado, se determina la mortalidad en %. 100 % quiere decir que todos los tetránquidos han muerto; 0 % quiere decir que ninguno de los tetránquidos ha muerto.

15 Las combinaciones de compuestos (I) y otro principio activo o agente de combate biológico siguientes mostraron un efecto sinérgico según la invención:

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**Tabla 4: Ensayo con Tetranychus urticae**

| Principio activo/ agente de combate biológico                               | Concentración g de pa/ha | Mortalidad en % después de 2 <sup>d</sup> |
|-----------------------------------------------------------------------------|--------------------------|-------------------------------------------|
| Compuesto (I)                                                               | 20                       | 80                                        |
|                                                                             | 4                        | 30                                        |
| Azadiractina                                                                | 100                      | 0                                         |
| Compuesto (I) + azadiractina                                                | 20 + 100                 | obs.* cal.**<br>100 80                    |
| Fluensulfona                                                                | 2000                     | 0                                         |
| Compuesto (I) + fluensulfona                                                | 4 + 2000                 | obs.* cal.**<br>70 30                     |
| Proteína harpin                                                             | 1.5                      | 0                                         |
| Compuesto (I) + Proteína harpin                                             | 4 + 1,5                  | obs.* cal.**<br>70 30                     |
| Metschnikowia fructicola<br>(Shemer, 2 x 10 <sup>10</sup> células/g)        | 500                      | 0                                         |
| Compuesto (I) + Metschnikowia fructicola                                    | 4 + 500                  | obs.* cal.**<br>70 30                     |
| Paecilomyces lilacinus cepa 251<br>(BioAct, 1 x 10 <sup>10</sup> esporas/g) | 4000                     | 0                                         |
| Compuesto (I) + Paecilomyces lilacinus                                      | 4 + 4000                 | obs.* cal.**<br>70 30                     |
| Piretrum                                                                    | 500                      | 70                                        |
| Compuesto (I) + piretrum                                                    | 4 + 500                  | obs.* cal.**<br>90 79                     |

| Principio activo/ agente de combate biológico | Concentración g de pa/ha | Mortalidad en % después de 2 <sup>d</sup> |
|-----------------------------------------------|--------------------------|-------------------------------------------|
| Buprofezina                                   | 500                      | 0                                         |
| Compuesto (I) + buprofezina                   | 4 + 500                  | <u>obs.</u> * <u>cal.</u> **<br>80 30     |
| Alfa-cipermetrina                             | 0,16                     | 0                                         |
| Compuesto (I) + alfa-cipermetrina             | 4 + 0,16                 | <u>obs.</u> * <u>cal.</u> **<br>70 30     |
| Imidacloprid                                  | 0,8                      | 0                                         |
| Compuesto (I) + imidacloprid                  | 4 + 0,8                  | <u>obs.</u> * <u>cal.</u> **<br>90 30     |
| Nitenpiram                                    | 0,8                      | 0                                         |
| Compuesto (I) + nitenpiram                    | 4 + 0,8                  | <u>obs.</u> * <u>cal.</u> **<br>100 30    |
| Pirifluquinazona                              | 0,8                      | 0                                         |
| Compuesto (I) + pirifluquinazona              | 4 + 0,8                  | <u>obs.</u> * <u>cal.</u> **<br>80 30     |
| Flupiradifurona                               | 0,8                      | 0                                         |
| Compuesto (I) + flupiradifurona               | 4 + 0,8                  | <u>obs.</u> * <u>cal.</u> **<br>70 30     |
| Sulfoxaflor                                   | 0,16                     | 0                                         |
| Compuesto (I) + sulfoxaflor                   | 4 + 0,16                 | <u>obs.</u> * <u>cal.</u> **<br>80 30     |
| Espinetoram                                   | 0,8                      | 0                                         |
| Compuesto (I) + espinetoram                   |                          | <u>obs.</u> * <u>cal.</u> **              |

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| Principio activo/ agente de combate biológico | Concentración g de pa/ha | Mortalidad en % después de 2 <sup>d</sup> |
|-----------------------------------------------|--------------------------|-------------------------------------------|
|                                               | 4 + 0,8                  | 70 30                                     |
| Espinosad                                     | 0,8                      | 0                                         |
| Compuesto (I) + espinosad                     | 4 + 0,8                  | <u>obs.</u> * <u>cal.</u> **<br>80 30     |
| Teflutrina                                    | 0,8                      | 0                                         |
| Compuesto (I) + teflutrina                    | 4 + 0,8                  | <u>obs.</u> * <u>cal.</u> **<br>70 30     |
| Fipronilo                                     | 0,8                      | 0                                         |
| Compuesto (I) + fipronilo                     | 4 + 0,8                  | <u>obs.</u> * <u>cal.</u> **<br>70 30     |
| Clorpirifos                                   | 4                        | 0                                         |
| Compuesto (I) + clorpirifos                   | 4 + 4                    | <u>obs.</u> * <u>cal.</u> **<br>70 30     |
| Tiodicarb                                     | 4                        | 0                                         |
| Compuesto (I) + tiodicarb                     | 4 + 4                    | <u>obs.</u> * <u>cal.</u> **<br>70 30     |
| Diflubenzuron                                 | 4                        | 0                                         |
| Compuesto (I) + diflubenzuron                 | 4 + 4                    | <u>obs.</u> * <u>cal.</u> **<br>70 30     |
| Flufenoxuron                                  | 0,8                      | 0                                         |
| Compuesto (I) + flufenoxuron                  | 4 + 0,8                  | <u>obs.</u> * <u>cal.</u> **<br>70 30     |
| Clorfenapir                                   | 0,8                      | 0                                         |

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| Principio activo/ agente de combate biológico | Concentración g de pa/ha | Mortalidad en % después de 2 <sup>d</sup> |
|-----------------------------------------------|--------------------------|-------------------------------------------|
| Compuesto (I) + clorfenapir                   | 4 + 0,8                  | <u>obs.</u> * <u>cal.</u> **<br>70    0   |
| Tebufenpirad                                  | 4                        | 0                                         |
| Compuesto (I) + tebufenpirad                  | 4 + 4                    | <u>obs.</u> * <u>cal.</u> **<br>80    30  |
| Abamectina                                    | 0,032                    | 0                                         |
| Compuesto (I) + abamectina                    | 4 + 0,032                | <u>obs.</u> * <u>cal.</u> **<br>70    30  |

| Principio activo/ agente de combate biológico                              | Concentración g de pa/ha | Mortalidad en % después de 6 <sup>d</sup> |
|----------------------------------------------------------------------------|--------------------------|-------------------------------------------|
| Compuesto (I)                                                              | 4                        | 30                                        |
| Bacillus firmus I-1582<br>(10 <sup>11</sup> esporas/g)                     | 250                      | 0                                         |
| Compuesto (I) + Bacillus firmus                                            | 4 + 250                  | <u>obs.</u> * <u>cal.</u> **<br>70    30  |
| Timol                                                                      | 500                      | 0                                         |
| Compuesto (I) + timol                                                      | 4 + 500                  | <u>obs.</u> * <u>cal.</u> **<br>100   30  |
| Bacillus subtilis cepa GB 03<br>(Kodiak, 5,5 x 10 <sup>10</sup> esporas/g) | 2000                     | 0                                         |
| Compuesto (I) + Bacillus subtilis                                          | 4 + 2000                 | <u>obs.</u> * <u>cal.</u> **<br>80    30  |

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| Principio activo/ agente de combate biológico                          | Concentración g de pa/ha | Mortalidad en % después de 6 <sup>d</sup> |
|------------------------------------------------------------------------|--------------------------|-------------------------------------------|
| Metarhizium anisopliae cepa F 52<br>(MET52, 9 x 10 <sup>8</sup> ufc/g) | 100                      | 0                                         |
| Compuesto (I) + Metarhizium anisopliae                                 | 4 + 100                  | <u>obs.</u> * <u>cal.</u> **<br>90 30     |
| Granulovirus de Cydia pomonella<br>(CpGV)<br>(Madex)                   | 1000                     | <u>0</u>                                  |
| (I) + CpGV                                                             | 4 + 1000                 | <u>obs.</u> * <u>cal.</u> **<br>70 30     |

\* obs. = eficacia insecticida observada, \*\* cal. = eficacia calculada con la fórmula de Colby

**Ejemplo 5:**

**Ensayo con *Tetranychus urticae*; resistente a OP; (TETRUR)**

Disolvente: 7 partes en peso de dimetilformamida

Emulsionante: 2 partes en peso de alquilarilpoligicoléter

- 5 Para producir una preparación adecuada de compuesto activo, se mezcla 1 parte en peso de compuesto activo con la cantidad indicada de disolvente y emulsionante, y el concentrado se diluye con agua que contiene emulsionante a la concentración deseada. Se añade sal de amonio y/o promotor de la penetración en una dosis de 1000 ppm a la concentración deseada si es necesario. Para producir una preparación
- 10 adecuada de una suspensión biológica de las células o esporas se diluye con agua que contiene emulsionante a la concentración deseada.

Se tratan hojas de judía (*Phaseolus vulgaris*) infestadas abundantemente por todos los estadios de arañas rojas comunes (*Tetranychus urticae*) pulverizando con la preparación del compuesto activo de la concentración deseada.

- 15 Después del periodo especificado, se determina la mortalidad en %. 100 % quiere decir que todos los tetránquidos han muerto; 0 % quiere decir que ninguno de los tetránquidos ha muerto.

Las combinaciones de compuestos (I) y otro principio activo o agente de combate biológico siguientes mostraron un efecto sinérgico según la invención:

Tabla 5A.

| Principio activo/ agente de combate biológico                                 | Concentración ppm | Mortalidad en % después de 3 <sup>d</sup> |
|-------------------------------------------------------------------------------|-------------------|-------------------------------------------|
| Compuesto (I)                                                                 | 0,8               | 40                                        |
| <i>Bacillus pumilus</i> cepa QST2808<br>(Sonata, 1,0 x 10 <sup>9</sup> UFC/g) | 1000              | 0                                         |
| Compuesto (I) + <i>Bacillus pumilus</i> cepa QST2808                          | 0,8 + 1000        | obs.* cal.**<br>65 40                     |

\* obs. = eficacia insecticida observada, \*\* cal. = eficacia calculada con la fórmula de Colby

Tabla 5B. Ensayo con *Tetranychus urticae*

| Principio activo/ agente de combate biológico                                                  | Concentración ppm | Mortalidad en % despues de 5 <sup>d</sup> |
|------------------------------------------------------------------------------------------------|-------------------|-------------------------------------------|
| Compuesto (I)                                                                                  | 0,8               | 40                                        |
| <i>Bacillus thuringiensis</i> spp aizawai<br>(XenTari, 1,5x10 <sup>7</sup> ufc/g)              | 1000              | 15                                        |
| Compuesto (I) + <i>Bacillus thuringiensis</i>                                                  | 0,8 + 1000        | obs.* cal.**<br>80 49                     |
| <i>Bacillus amyloliquefaciens</i> FZB42<br>(Rhizovital líquido, 2,5 x 10 <sup>10</sup> ufc/ml) | 2000              | 0                                         |
| Compuesto (I) + <i>Bacillus amyloliquefaciens</i>                                              | 0,8 + 2000        | obs.* cal.**<br>60 40                     |

5 \* obs. = eficacia insecticida observada, \*\* cal. = eficacia calculada con la fórmula de Colby

Ejemplo 6:

Ensayo de germinación de soja: tratamiento de semillas

Se trataron semillas de soja (*Glycine max*) mezclándolas con la cantidad deseada de compuesto activo y esporas y agua. Después de secar, se sembraron 25  
5 semillas en cada una de las macetas rellenas con marga arenosa.

Después del periodo especificado, se determinó el nivel de actividad expresada en %. El nivel de actividad se calculó en base al número de plantas de soja que habían germinado con éxito.

La combinación de compuesto y producto biológico siguiente mostró un efecto de  
10 germinación superior en comparación con los tratamientos individuales y de control:

Tabla 6: Germinación de soja

| Principio activo/ agente de combate biológico                         | Concentración g de pa/kg de semillas | % de germinación después de 3 días<br>El control se ajustó al 100 % |
|-----------------------------------------------------------------------|--------------------------------------|---------------------------------------------------------------------|
| Control (semillas sin tratamiento)                                    |                                      | 100                                                                 |
| Compuesto (I)                                                         | 0,15                                 | 97                                                                  |
| <i>Bacillus pumilus</i> QST2808 (Sonata, 1,0 x 10 <sup>9</sup> UFC/g) | 0,002                                | 91                                                                  |
| Compuesto (I) + <i>Bacillus pumilus</i> QST2808                       | 0,15 + 0,002                         | 108                                                                 |

**Ejemplo 7**

**Soja: peso del brote**

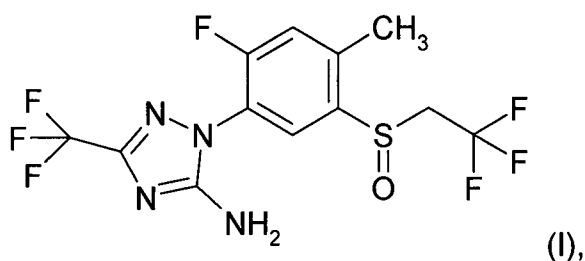
- Se trataron semillas de soja (*Glycine max*) mezclándolas con la cantidad deseada de compuesto activo y esporas y agua. Después de secar, cada semilla se sembró
- 5 en una maceta rellena con marga arenosa. Las macetas se dispusieron en el invernadero con condiciones apropiadas para un buen crecimiento de las plantas. Después del periodo especificado, las plantas se recolectaron y se determinó el peso del brote de las plantas. El peso se expresa en %, con lo cual el peso del control se ajusta al 100 %.
- 10 Las combinaciones de compuesto y producto biológico siguientes mostraron un peso del brote superior en comparación con los tratamientos individuales y de control:

**Tabla 7: Soja: peso del brote**

| Principio activo/ agente de combate biológico                                   | Concentración g de pa/kg de semillas | Peso del brote después de 21 días<br>El control se ajustó al 100 % |
|---------------------------------------------------------------------------------|--------------------------------------|--------------------------------------------------------------------|
| Control (semillas sin tratamiento)                                              |                                      | 100                                                                |
| Compuesto (I)                                                                   | 0,3                                  | 98                                                                 |
| <i>Bacillus subtilis</i> QST713<br>(Serenade Soil, 1,0 x 10 <sup>9</sup> UFC/g) | 0,002                                | 97                                                                 |
| Compuesto (I) + <i>Bacillus subtilis</i> QST713                                 | 0,3 + 0,002                          | 105                                                                |

**REIVINDICACIONES**

1. Combinaciones de principios activos que comprenden un compuesto de la fórmula (I)



- 5 y uno o más insecticidas y/o acaricidas y/o agentes de combate biológico adicionales del grupo (II), seleccionados entre
- (1) Inhibidores de acetilcolinesterasa (AChE), por ejemplo carbamatos, por ejemplo, alanicarb (II-1-1), aldicarb (II-1-2), bendiocarb (II-1-3), benfuracarb (II-1-4), butoxycarboxim (II-1-5), carbarilo (II-1-6), carbofurano (II-1-7), carbosulfán (II-1-8), etiofencarb (II-1-9), fenobucarb (II-1-10), furatiocarb (II-1-11), isoprocarb (II-1-12), metomilo (II-1-13), metolcarb (II-1-14), oxamilo (II-1-15), pirimicarb (II-1-16), propoxur (II-1-17), tiodicarb (II-1-18) y XMC (II-1-19); o
- 15 organofosfatos, por ejemplo acefato (II-1-20), azinfos-etilo (II-1-21), azinfos-metilo (II-1-22), cloretoxifos (II-1-23), clorfenvinfos (II-1-24), clorpirifos (II-1-25), clorpirifos-metilo (II-1-26), cianofos (II-1-27), diazinona (II-1-28), diclorvos/DDVP (II-1-29), dimetoato (II-1-30), dimetilvinfos (II-1-31), disulfoton (II-1-32), EPN (II-1-46), etion (II-1-33), etoprofos (II-1-34), fenamifos (II-1-35), fenitrothion (II-1-36), fention (II-1-37), fostiazato (II-1-38), isofenfos (II-1-39), O-(metoxiaminotio-fosforil)salicilato de isopropilo (II-1-40), isoxation (II-1-41), malation (II-1-42), metidation (II-1-43), monocrotofos (II-1-44), naled (II-1-45), oxidemeton-metilo (II-1-46), fentoato (II-1-47), fosalona (II-1-48), fosmet (II-1-49), pirimifos-metilo (II-1-50), profenofos (II-1-
- 20

51), protiofos (II-1-52), piraclofos (II-1-53), piridafention (II-1-54), quinalfos (II-1-55), tetraclorvinfos (II-1-56), tiometon (II-1-57), triclorfon (II-1-58) y vamidotion (II-1-59);

5 (2) antagonistas de los canales de cloruro accionados por GABA, por ejemplo

ciclodieno organoclorados, por ejemplo clordano (II-2-1) y endosulfan (II-2-2); o

fenilpirazoles (fiproles), por ejemplo fipronilo (II-2-3) ;

10 (3) Moduladores de los canales de sodio/ bloqueadores de los canales de sodio dependientes de la tensión, por ejemplo

piretroides, por ejemplo acrinatrina (II-3-1), aletrina (II-3-2), d-cis-trans aletrina (II-3-3), d-trans aletrina (II-3-4), bifentrina (II-3-5), cicloprotrina (II-3-6), ciflutrina (II-3-7), beta-ciflutrina (II-3-8), cihalotrina (II-3-9), lambda-cihalotrina (II-3-10), gamma-cihalotrina (II-3-11), cipermetrina (II-3-12), alfa-cipermetrina (II-3-13), beta-cipermetrina (II-3-14), theta-cipermetrina (II-3-15), zeta-cipermetrina (II-3-16), deltametrina (II-3-17), etofenprox (II-3-18), fenpropatrina (II-3-19), fenvalerato (II-3-20), flucitrinato (II-3-21), tau-fluvalinato (II-3-22), kadetrina (II-3-23), permetrina (II-3-24), fenotrina [isómero (1R)-trans) (II-3-25), piretrina (piretrum) (II-3-26), resmetrina (II-3-27), silafluofeno (II-3-28), teflutrina (II-3-29), tetrametrina (II-3-30), tetrametrina [isómeros (1R))] (II-3-31) y tralometrina (II-3-32), o

DDT (II-3-33) o metoxiclor (II-3-34);

(4) Agonistas de los receptores nicotínicos de acetilcolina (nAChR), por ejemplo

neonicotinoides, por ejemplo acetamiprid (II-4-1), clotianidina (II-4-2), dinotefurano (II-4-3), imidacloprid (II-4-4), nitenpiram (II-4-5), tiacloprid (II-4-6) y tiametoxam (II-4-7); o

nicotina (II-4-8);

5 (5) Activadores alostéricos de los receptores nicotínicos de acetilcolina (nAChR), por ejemplo

espinosinas, por ejemplo espinetoram (II-5-1) y espinosad (II-5-2);

(6) Activadores de los canales de cloruro, por ejemplo

10 avermectinas/milbemicinas, por ejemplo abamectina (II-6-1), benzoato de emamectina (II-6-2), lepimectina (II-6-3) y milbemectina (II-6-4);

(7) Imitadores de hormonas juveniles, por ejemplo

análogos de hormonas juveniles, por ejemplo y metopreno (II-7-1); o

fenoxicarb (II-7-2) o piriproxifeno (II-7-3);

(8) Surtido de inhibidores no específicos (múltiples sitios), por ejemplo

15 haluros de alquilo, por ejemplo bromuro de metilo (II-8-1) y otros haluros de alquilo; o

cloropicrina (II-8-2) o fluoruro de sulfurilo (II-8-3) o borax (II-8-4) o antimoniltartrato de potasio (II-8-5);

(9) Bloqueadores de alimentación de homópteros selectivos, por ejemplo

20 pimetrozina (II-9-1);

(10) Inhibidores del crecimiento de ácaros, por ejemplo clofentezina (II-10-1), hexitiazox (II-10-2) y diflovidazina (II-10-3); o

etoxazol (II-10-4)

(11) Disruptores microbianos de la membrana digestiva de insectos, por

25 ejemplo *Bacillus thuringiensis* subespecie *israelensis* (II-11-1), *Bacillus*

sphaericus (II-11-2), Bacillus thuringiensis subespecie aizawai (II-11-3), Bacillus thuringiensis subespecie kurstaki (II-11-4), Bacillus thuringiensis subespecie tenebrionis (II-11-5) y proteínas vegetales BT: Cry1Ab, Cry1Ac, Cry1Fa, Cry2Ab, mCry3A, Cry3Ab, Cry3Bb, Cry34/35Ab1 (II-11-6);

5 (12) Inhibidores de ATP-sintasa mitocondrial, por ejemplo diafentiuron (II-12-1); o

acaricidas de organoestaño, por ejemplo azociclotina (II-12-2), cihexatina (II-12-3) y óxido de fenbutatina (II-12-4); o

propargita (II-12-5) o tetradifon (II-12-6);

10 (13) Desacopladores de la fosforilación oxidativa mediante interrupción del gradiente de protones, por ejemplo clorfenapir (II-13-1), DNOC (II-13-2) y sulfluramida (II-13-3);

(14) Bloqueadores del canal del receptor de acetilcolina nicotínico (nAChR), por ejemplo bensultap (II-14-1), clorhidrato de cartap (II-14-2) y tiociclam (II-14-3);

15 (15) Inhibidores de la biosíntesis de quinina, tipo 0, por ejemplo clorfluazuron (II-15-1), diflubenzuron (II-15-2), flucicloxuron (II-15-3), flufenoxuron (II-15-4), hexaflumuron (II-15-5), lufenuron (II-15-6), teflubenzuron (II-15-7) y triflumuron (II-15-8);

20 (16) Inhibidores de biosíntesis de quitina, de tipo 1, por ejemplo buprofezina (II-16-1);

(17) Disruptores de muda, por ejemplo ciromazina (II-17-1);

(18) Agonistas de receptor de octopamina, por ejemplo amitraz (II-18-1);

- (19) Inhibidores del transporte de electrones en el complejo III mitocondrial, por ejemplo hidrametilnona (II-19-1) o acequinocilo (II-19-2) o fluacipirim (II-19-3);
- 5 (20) Inhibidores del transporte de electrones en el complejo I mitocondrial, por ejemplo
- acaricidas METI, por ejemplo fenpiroximato (II-20-1), pirimidifeno (II-20-2), piridabeno (II-20-3), tebufenpirad (II-20-4) y tolfenpirad (II-20-5); o
- rotenona (Derris) (II-20-6);
- 10 (21) Bloqueadores de canales de sodio dependientes de voltaje, por ejemplo indoxacarb (II-21-1);
- (22) Inhibidores de acetil CoA carboxilasa, por ejemplo
- derivados de ácido tetrónico y tetrámico, por ejemplo espiroclorfenol (II-22-1);
- (23) Inhibidores del transporte de electrones en el complejo IV mitocondrial,
- 15 por ejemplo
- fosfinas, por ejemplo fosfuro de aluminio (II-23-1), fosfuro de calcio (II-23-2), fosfina (II-23-3) y fosfuro de cinc (II-23-4); o
- cianuro (II-23-5).
- (24) Moduladores del receptor de rianodina, por ejemplo
- 20 diamidas, por ejemplo clorantraniliprol (II-24-1);
- otros principios activos con modo de acción desconocido o indeterminado, por ejemplo amidoflumet (II-25-1), azadiractina (II-25-2), benclotiaz (II-25-3), benzoximato (II-25-4), bifenazato (II-25-5), bromopropilato (II-25-6), quinometionato (II-25-7), criolita (II-25-8), ciantraniliprol (ciazipir) (II-25-9),
- 25 dicofol (II-25-10), diflovidazina (II-25-11), fluensulfona (II-25-12), flufiprol (II-

25-13), fluopiram (II-25-14), fufenozida (II-25-15), imidacloz (II-25-16),  
 iprodiona (II-25-17), meperflutrina (II-25-18), pirifluquinazona (II-25-19),  
 tetrametilflutrina (II-25-20) y yodometano (II-25-21); otros productos basados  
 en *Bacillus firmus* (incluida, pero sin limitación, la cepa CNCM I-1582, tal  
 5 como, por ejemplo, VOTIVO™, BioNem) (II-25-22) *Bacillus subtilis* GB03 (II-  
 25-23) y QST 713 (II-25-24), *Bacillus subtilis* var. *amyloliquefaciens* FZB24  
 (II-25-25) y *Bacillus amyloliquefaciens* FZB 42 (II-25-26), *Bacillus*  
*thuringiensis* subespecies *aizawai* (II-25-27), *kurstaki* (II-25-28), *tenebrionis*  
 (II-25-29) e *israelensis* (II-25-30), *Bacillus sphaericus*, *Acinetobacter* sp.,  
 10 *Pasteuria penetrans*, *Streptomyces venezuelae*, *Metarhizium anisopliae* F52  
 (II-25-31), *Metschnikowia fructicola* (II-25-32), *Paecilomyces lilacinus* cepa  
 251 (II-25-33), *Paecilomyces fumosoroseus* (II-25-34), *Nomuraea rileyi* (II-25-  
 35), *Hirsutella thompsoni*, *Beauveria bassiana*, *Beauveria brongniartii*,  
*Lagenidium giganteum*, *Myrothecium verrucaria*, *Tsukamurella*  
 15 *paurometabola*, *granulovirus* de *Cydia pomonella* (II-25-36), *granulovirus* de  
*Adoxophyes orana*, *nucleopoliedrovirus* de *Helicoverpa armigera*,  
*nucleopoliedrovirus* de *Spodoptera exigua*, *nucleopoliedrovirus* de  
*Spodoptera littoralis*, *nucleopoliedrovirus* de *Spodoptera litura*,  
*nucleopoliedrovirus* de *Neodiprion abietis*, *nucleopoliedrovirus* de *Neodiprion*  
 20 *sertifer*, *Verticillium lecanii*, *piretrum* (II-25-37), proteína harpin (II-25-38),  
 timol (II-25-39), quitina, extracto de Quillaja saponaria, *Bacillus pumilus* cepa  
 GB34 y cepa QST2808  
 o uno de los compuestos activos conocidos siguientes: 3-bromo-N-{2-bromo-  
 4-cloro-6-[(1-ciclopropiletil)carbamoil]fenil}-1-(3-cloropiridin-2-il)-1H-pirazol-5-  
 25 carboxamida (II-25-40) (conocida por el documento WO2005/077934), 4-[[6-

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bromopiridin-3-il)metil](2-fluoroetil)amino}furan-2(5H)-ona (II-25-41) (conocida por el documento WO2007/115644), 4-[[[(6-fluoropiridin-3-il)metil](2,2-difluoroetil)amino}furan-2(5H)-ona (II-25-42) (conocida por el documento WO2007/115644), 4-[[[(2-cloro-1,3-tiazol-5-il)metil](2-fluoroetil)amino}furan-2(5H)-ona (II-25-43) (conocida por el documento WO2007/115644), 4-[[[(6-cloropiridin-3-il)metil](2-fluoroetil)amino}furan-2(5H)-ona (II-25-44) (conocida por el documento WO2007/115644), flupiradifurona (II-25-45), 4-[[[(6-cloro-5-fluoropiridin-3-il)metil](metil)amino}furan-2(5H)-ona (II-25-46) (conocida por el documento WO2007/115643), 4-[[[(5,6-dicloropiridin-3-il)metil](2-fluoroetil)amino}furan-2(5H)-ona (II-25-47) (conocida por el documento WO2007/115646), 4-[[[(6-cloro-5-fluoropiridin-3-il)metil](ciclopropil)amino}furan-2(5H)-ona (II-25-48) (conocida por el documento WO2007/115643), 4-[[[(6-cloropiridin-3-il)metil](ciclopropil)amino}furan-2(5H)-ona (II-25-49) (conocida por el documento EP-A-0 539 588), 4-[[[(6-cloropiridin-3-il)metil](metil)amino}furan-2(5H)-ona (II-25-50) (conocida por el documento EP-A-0 539 588), {[1-(6-cloropiridin-3-il)etil](metil)óxido- $\lambda^4$ -sulfanilideno}cianamida (II-25-51) (conocida por el documento WO2007/149134) y sus diastereómeros {[1-(6-cloropiridin-3-il)etil](metil)óxido- $\lambda^4$ -sulfanilideno}cianamida (A) (II-25-52) y {[1-(1S)-1-(6-cloropiridin-3-il)etil](metil)óxido- $\lambda^4$ -sulfanilideno}cianamida (B) (II-25-53) (también conocidas por el documento WO2007/149134), así como sulfoxaflor (II-25-54) y sus diastereómeros [(R)-metil(óxido){1-(1R)-1-[6-(trifluorometil)piridin-3-il]etil}- $\lambda^4$ -sulfanilideno]cianamida (A1) (II-25-55) y [(S)-metil(óxido){1-(1S)-1-[6-(trifluorometil)piridin-3-il]etil}- $\lambda^4$ -sulfanilideno]cianamida (A2) (II-25-56), denominado grupo de diastereómeros A (conocidos por los

documentos WO2010/074747, WO2010/074751), [(R)-metil(óxido){(1S)-1-[6-(trifluorometil)piridin-3-il]etil}- $\lambda^4$ -sulfanilideno]cianamida (B1) (II-25-57) y [(S)-metil(óxido){(1R)-1-[6-(trifluorometil)piridin-3-il]etil}- $\lambda^4$ -sulfanilideno]cianamida (B2) (II-25-58), denominado grupo de diastereómeros B (también conocidos por los documentos WO2010/074747, WO2010/074751) y 11-(4-cloro-2,6-dimetilfenil)-12-hidroxi-1,4-dioxa-9-azadiespiro[4.2.4.2]tetradec-11-en-10-ona (II-25-59) (conocida por el documento WO2006/089633), 3-(4'-fluoro-2,4-dimetilbifenil-3-il)-4-hidroxi-8-oxa-1-azaespiro[4.5]dec-3-en-2-ona (II-25-60) (conocida por el documento WO2008/067911), 1-{2-fluoro-4-metil-5-[(2,2,2-trifluoroetil)sulfinil]fenil}-3-(trifluorometil)-1H-1,2,4-triazol-5-amina (II-25-61) (conocida por el documento WO2006/043635), ciclopropanocarboxilato de [(3S,4aR,12R,12aS,12bS)-3-[(ciclopropilcarbonil)oxi]-6,12-dihidroxi-4,12b-dimetil-11-oxo-9-(piridin-3-il)-1,3,4,4a,5,6,6a,12,12a,12b-decahidro-2H,11H-benzo[f]pirano[4,3-b]cromen-4-il]metilo (II-25-62) (conocido por el documento WO2008/066153), 2-ciano-3-(difluorometoxi)-N,N-dimetilbencenosulfonamida (II-25-63) (conocida por el documento WO2006/056433), 2-ciano-3-(difluorometoxi)-N-metilbencenosulfonamida (II-25-64) (conocida por el documento WO2006/100288), 2-ciano-3-(difluorometoxi)-N-etilbencenosulfonamida (II-25-65) (conocida por el documento WO2005/035486), 1,1-dióxido de 4-(difluorometoxi)-N-etil-N-metil-1,2-benzotiazol-3-amina (II-25-66) (conocido por el documento WO2007/057407), N-[1-(2,3-dimetilfenil)-2-(3,5-dimetilfenil)etil]-4,5-dihidro-1,3-tiazol-2-amina (II-25-67) (conocida por el documento WO2008/104503), {1'-[(2E)-3-(4-clorofenil)prop-2-en-1-il]-5-fluoroespiro[indol-3,4'-piperidin]-1(2H)-il}(2-cloropiridin-4-il)metanona (II-25-68) (conocida por el documento

WO2003/106457), 3-(2,5-dimetilfenil)-4-hidroxi-8-metoxi-1,8-diazaespiro[4.5]dec-3-en-2-ona (II-25-69) (conocida por el documento WO2009/049851), carbonato de 3-(2,5-dimetilfenil)-8-metoxi-2-oxo-1,8-diazaespiro[4.5]dec-3-en-4-ilo y etilo (II-25-50) (conocido por el documento

5 WO2009/049851), 4-(but-2-in-1-ilo)-6-(3,5-dimetilpiperidin-1-il)-5-fluoropirimidina (II-25-71) (conocida por el documento WO2004/099160), (2,2,3,3,4,4,5,5-octafluoropentil)(3,3,3-trifluoropropil)malononitrilo (II-25-72) (conocido por el documento WO2005/063094), (2,2,3,3,4,4,5,5-octafluoropentil)(3,3,4,4,4-pentafluorobutil)malononitrilo (II-25-73) (conocido

10 por el documento WO2005/063094), 8-[2-(ciclopropilmetoxi)-4-(trifluorometil)fenoxi]-3-[6-(trifluorometil)piridazin-3-il]-3-azabicyclo[3.2.1]octano (II-25-74) (conocido por el documento WO2007/040280), flometoquina (II-25-75), PF1364 (N° CAS 1204776-60-2) (II-25-76) (conocido por el documento JP2010/018586), 5-[5-(3,5-

15 diclorofenil)-5-(trifluorometil)-4,5-dihidro-1,2-oxazol-3-il]-2-(1H-1,2,4-triazol-1-il)benzonitrilo (II-25-77) (conocido por el documento WO2007/075459), 5-[5-(2-cloropiridin-4-il)-5-(trifluorometil)-4,5-dihidro-1,2-oxazol-3-il]-2-(1H-1,2,4-triazol-1-il)benzonitrilo (II-25-78) (conocido por el documento

20 WO2007/075459), 4-[5-(3,5-diclorofenil)-5-(trifluorometil)-4,5-dihidro-1,2-oxazol-3-il]-2-metil-N-{2-oxo-2-[(2,2,2-trifluoroetil)amino]etil}benzamida (II-25-79) (conocido por el documento WO2005/085216), 4-[[6-cloropiridin-3-il)metil](ciclopropil)amino}-1,3-oxazol-2(5H)-ona (II-25-80), 4-[[6-cloropiridin-3-il)metil](2,2-difluoroetil)amino}-1,3-oxazol-2(5H)-ona (II-25-81), 4-[[6-cloropiridin-3-il)metil](etil)amino}-1,3-oxazol-2(5H)-ona (II-25-82), 4-[[6-cloropiridin-3-il)metil](metil)amino}-1,3-oxazol-2(5H)-ona (II-25-83) (todos

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conocidos por el documento WO2010/005692), NNI-0711 (piflubumida) (II-25-84) (conocida por el documento WO2002/096882), 1-acetil-N-[4-(1,1,1,3,3,3-hexafluoro-2-metoxipropan-2-il)-3-isobutilfenil]-N-isobutiril-3,5-dimetil-1H-pirazol-4-carboxamida (II-25-85) (conocida por el documento

5 WO2002/096882), 2-[2-({[3-bromo-1-(3-cloropiridin-2-il)-1H-pirazol-5-il]carbonil}amino)-5-cloro-3-metilbenzoil]-2-metilhidrazincarboxilato de metilo (II-25-86) (conocido por el documento WO2005/085216), 2-[2-({[3-bromo-1-(3-cloropiridin-2-il)-1H-pirazol-5-il]carbonil}amino)-5-ciano-3-metilbenzoil]-2-etilhidrazincarboxilato de metilo (II-25-87) (conocido por el documento

10 WO2005/085216), 2-[2-({[3-bromo-1-(3-cloropiridin-2-il)-1H-pirazol-5-il]carbonil}amino)-5-ciano-3-metilbenzoil]-2-metilhidrazincarboxilato de metilo (II-25-88) (conocido por el documento WO2005/085216), 2-[3,5-dibromo-2-({[3-bromo-1-(3-cloropiridin-2-il)-1H-pirazol-5-il]carbonil}amino)benzoil]-1,2-dietilhidrazincarboxilato de metilo (II-25-89) (conocido por el documento

15 WO2005/085216), 2-[3,5-dibromo-2-({[3-bromo-1-(3-cloropiridin-2-il)-1H-pirazol-5-il]carbonil}amino)benzoil]-2-etilhidrazincarboxilato de metilo (II-25-90) (conocido por el documento WO2005/085216), (5RS,7RS;5RS,7SR)-1-(6-cloro-3-piridilmetil)-1,2,3,5,6,7-hexahidro-7-metil-8-nitro-5-propoxiimidazo[1,2-a]piridina (II-25-91) (conocida por el documento

20 WO2007/101369), 2-{6-[2-(5-fluoropiridin-3-il)-1,3-tiazol-5-il]piridin-2-il}pirimidina (II-25-92) (conocida por el documento WO2010/006713), 2-{6-[2-(piridin-3-il)-1,3-tiazol-5-il]piridin-2-il}pirimidina (II-25-93) (conocida por el documento WO2010/006713), 1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-{[5-(trifluorometil)-1H-tetrazol-1-il]metil}-1H-pirazol-5-

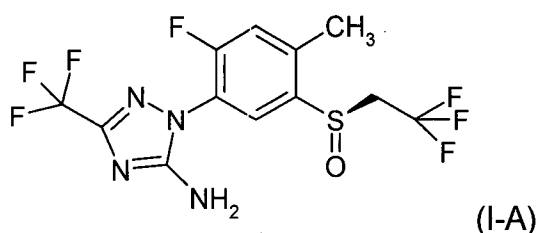
25 carboxamida (II-25-94) (conocida por el documento WO2010/069502), 1-(3-

cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-[[5-(trifluorometil)-2H-tetrazol-2-il]metil]-1H-pirazol-5-carboxamida (II-25-95) (conocida por el documento WO2010/069502), N-[2-(terc-butilcarbamoil)-4-ciano-6-metilfenil]-1-(3-cloropiridin-2-il)-3-[[5-(trifluorometil)-1H-tetrazol-1-il]metil]-1H-pirazol-5-carboxamida (II-25-96) (conocida por el documento WO2010/069502), N-[2-(terc-butilcarbamoil)-4-ciano-6-metilfenil]-1-(3-cloropiridin-2-il)-3-[[5-(trifluorometil)-2H-tetrazol-2-il]metil]-1H-pirazol-5-carboxamida (II-25-97) (conocida por el documento WO2010/069502), (1E)-N-[(6-cloropiridin-3-il)metil]-N'-ciano-N-(2,2-difluoroetil)etanimidamida (II-25-98) (conocida por el documento WO2008/009360), N-[2-(5-amino-1,3,4-tiadiazol-2-il)-4-cloro-6-metilfenil]-3-bromo-1-(3-cloropiridin-2-il)-1H-pirazol-5-carboxamida (II-25-99) (conocida por el documento CN102057925) y 2-[3,5-dibromo-2-({[3-bromo-1-(3-cloropiridin-2-il)-1H-pirazol-5-il]carbonil}amino)benzoil]-2-etil-1-metilhidrazincarboxilato de metilo (II-25-100) (conocido por el documento WO2011/049233), afidopiropeno (II-25-101) (conocido por el documento WO2008/066153), heptaflutrina (II-25-102) (conocida por el documento WO2010/043122), piriminostrobin (II-25-103) (conocida por el documento WO2010/139271), flufenoxistrobin (II-25-103) (conocida por el documento WO2007/000098), 3-cloro-N<sup>2</sup>-(2-cianopropan-2-il)-N<sup>1</sup>-[4-(1,1,1,2,3,3,3-heptafluoropropan-2-il)-2-metilfenil]ftalamida (II-25-104) (conocida por el documento WO2012/034472)

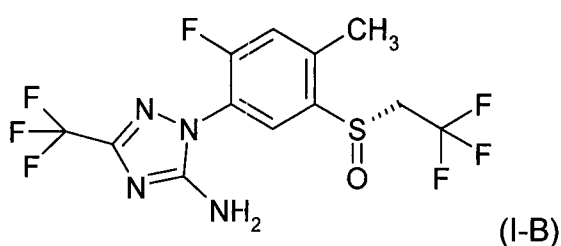
u otros agentes de combate biológico seleccionados de entre bacterias, en particular bacterias formadoras de esporas, hongos o levaduras, protozoos, virus.

2. Combinaciones según la reivindicación 1, en las que el compuesto de

fórmula (I) es un compuesto (I-A)



3. Combinaciones según la reivindicación 1, en las que el compuesto de fórmula (I) es un compuesto (I-B)



4. Combinaciones según cualquiera de las reivindicaciones 1 a 3, en las que el insecticida y/o acaricida y/o agente de combate biológico del grupo (II) se selecciona de entre

abamectina, acefato, acequinocilo, acetamiprid, acrinatrina, aldicarb, alfa-  
10 cipermetrina, amitraz, azadiractina, azinfos-metilo, benfuracarb, beta-  
ciflutrina, bifenazato, bifentrina, bensultap (nereistoxina), buprofezina,  
carbarilo, carbofuran, carbosulfan, clorhidrato de cartap, clorantraniliprol  
(rinazipir), clorfenapir, clorfluazuron, cloropicrina, clorpirifos, clotianidina,  
ciantraniliprol (ciazipir), ciflutrina, cihalotrina, cipermetrina, ciromazina,  
15 deltametrina, diafentiuron, diazinona, dicloropropeno, diclorfos, dicofol,  
diflubenzuron, dimetoato, dinotefuran, disulfoton, (benzoato de) emamectina,  
endosulfan, etoprofos, etofenprox, etoxazol, fenamifos, óxido de fenbutatina,  
fenitrothion, fenobucarb, fenoxicarb, fenpropatrina, fenpiroximato, fenvalerato,  
fipronilo, fluacripirim, fluensulfona, flufenoxuron, flupiradifurona, fostiazato,  
20 gamma-cihalotrina, hexitiazox, hexaflumuron, imidacloprid, imidaclopriz,

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- indoxacarb, lambda-cihalotrina, lepimectina, lufenuron, malation, metaldehído, metidation, metomilo, milbemectina, monocrotofos, nitenpiram, oxamilo, permetrina, pirimicarb, profenofos, propargita, pimetozina, pirafluprol, piretrina, piridaben, pirifluquinazona, pirimetanilo, pirimidifeno, piriprol, piriproxifeno, quinalfos, resmetrina, espinetoram, espinosad, espirodiclofeno, sulfoxaflor, tau-fluvalinato, tebufenpirad, teflubenzuron, teflutrina, tiacloprid, tiametoxam, tiodicarb, triclofon, triflumuron; zeta-cipermetrina, 1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-[[5-(trifluorometil)-1H-tetrazol-1-il]metil]-1H-pirazol-5-carboxamida/ 1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-3-[[5-(trifluorometil)-2H-tetrazol-2-il]metil]-1H-pirazol-5-carboxamida, 2-{6-[2-(5-fluoropiridin-3-il)-1,3-tiazol-5-il]piridin-2-il}pirimidina, 2-{6-[2-(piridin-3-il)-1,3-tiazol-5-il]piridin-2-il}pirimidina, (1E)-N-[(6-cloropiridin-3-il)metil]-N'-ciano-N-(2,2-difluoroetil)etanimidamida, *Bacillus firmus* I-1582, *Bacillus subtilis* GB03 y QST 713, *Bacillus subtilis* var. *amyloliquefaciens* FZB24 y *Bacillus amyloliquefaciens* FZB 42, *Bacillus thuringiensis* subespecies *aizawai*, *kurstaki*, *tenebrionis* e *israelensis*, *Metarhizium anisopliae* F52, *Metschnikowia fructicola*, *Paecilomyces lilacinus* cepa 251, *Paecilomyces fumosoroseus*, *Nomuraea rileyi*, granulovirus de *Cydia pomonella*, piretrum, proteína harpin y timol, *Bacillus pumilus* cepa GB34 y cepa QST2808.
5. Combinaciones según cualquiera de las reivindicaciones 1 a 4, en las que el insectida y/o acaricida y/o agente de combate biológico del grupo (II) se selecciona de entre
- abamectina, acetamiprid, acrinatrina, alfa-cipermetrina, beta-ciflutrina, bifentrina, buprofezina, flupiradifurona, clorfenapir, clorpirifos, clotianidina,

- 5 ciantraniliprol, ciflutrina, cipermetrina, deltametrina, diafentiuron, dinotefuran,  
(benzoato de) emamectina, fenpiroximato, fipronilo, fluensulfona, gamma-  
cihalotrina, imidacloprid, indoxacarb, L-cihalotrina, milbemectina, nitenpiram,  
pirifluquinazona, pimetroxina, clorantraniliprol, espinetoram, espinosad,  
5 espiroclorfen, sulfoxaflor, tebufenpirad, teflutrina, tiacloprid, tiametoxam,  
tiodicarb, triflumuron; 1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-  
(metilcarbamoil)fenil]-3-[[5-(trifluorometil)-1H-tetrazol-1-il]metil]-1H-pirazol-5-  
carboxamida/ 1-(3-cloropiridin-2-il)-N-[4-ciano-2-metil-6-(metilcarbamoil)fenil]-  
3-[[5-(trifluorometil)-2H-tetrazol-2-il]metil]-1H-pirazol-5-carboxamida, 2-{6-[2-  
10 (5-fluoropiridin-3-il)-1,3-tiazol-5-il]piridin-2-il}pirimidina, 2-{6-[2-(piridin-3-il)-1,3-  
tiazol-5-il]piridin-2-il}pirimidina, (1E)-N-[(6-cloropiridin-3-il)metil]-N'-ciano-N-  
(2,2-difluoroetil)etanimidamida, Bacillus firmus I-1582, Bacillus subtilis GB03 y  
QST 713, Bacillus subtilis var. amyloliquefaciens FZB24 y Bacillus  
amyloliquefaciens FZB 42, Bacillus thuringiensis subespecies aizawai,  
15 kurstaki, tenebrionis e israelensis, Metarhizium anisopliae F52, Paecilomyces  
lilacinus cepa 251, Nomuraea rileyi, Bacillus pumilus cepa GB34 y cepa  
QST2808.
- 20 6. Combinaciones según cualquiera de las reivindicaciones 1 a 5, en las que el  
insectida y/o acaricida y/o agente de combate biológico del grupo (II) se  
selecciona de entre
- 25 Bacillus firmus I-1582, Bacillus subtilis GB03 y QST 713, Bacillus subtilis var.  
amyloliquefaciens FZB24 y Bacillus amyloliquefaciens FZB 42, Bacillus  
thuringiensis subespecies aizawai, kurstaki, tenebrionis e israelensis,  
Metarhizium anisopliae F52, Metschnikowia fructicola, Paecilomyces lilacinus  
cepa 251, Paecilomyces fumosoroseus, Nomuraea rileyi, granulovirus de

Cydia pomonella, piretrum, proteína harpin y timol, Bacillus pumilus cepa GB34 y cepa QST2808.

- 7.    Uso de combinaciones de principios activos según cualquiera de las reivindicaciones 1 a 6 que comprenden un compuesto de la fórmula (I) en  
5    combinación con al menos un agente de combate biológico seleccionado de entre bacterias, hongos o levaduras, protozoos, virus y nematodos entomopatógenos, opcionalmente en presencia de inoculantes, para reducir el daño general de plantas y partes de plantas, así como pérdidas en frutos recolectados y hortalizas recolectadas causados por insectos, nematodos y  
10    fitopatógenos.
- 8.    El uso según la reivindicación 7, en el que la parte de la planta es una semilla o una planta que brota de la semilla.
- 9.    El uso según la reivindicación 8, en el que la semilla es de una planta convencional o una planta transgénica.
- 15    10.    Uso según la reivindicación 8 o 9, en el que la planta es un cultivo hortícola seleccionado de entre zanahorias, zapallo, calabaza, calabacín, patata, maíz dulce, cebollas, plantas ornamentales, hierbas medicinales, hierbas culinarias, espinacas, pimiento, melón, lechuga, pepino, apio, remolachas, repollo, coliflor, brócoli, coles de Bruselas, colinabo, col, rábano, rutabaga,  
20    nabo, espárrago, alubias, guisantes, manzanas, frambuesa, fresa, banana, mango, uvas, melocotones, peras, guayaba, piña, granada, ajo, plantas del género capsicum, chile, rábano, carambola, tapioca, nueces, limón, mandarina, acelga, setas, aceitunas, naranja, papaya, pimiento, fruta de la pasión, cacahuètes, pacanas, ciruelas pasas, pistachos, caquis, pomelo,  
25    berenjena, endivias, arándano, grosella, avellanas, kiwi, almendras,

amaranto, albaricoque, alcachofa, aguacate, moras, anacardos, cerezas, clementina, coco y cantalupos.

- 5
11. El uso según la reivindicación 8 o 9, en el que la planta es un cultivo a gran escala seleccionado de entre algodón, maíz, soja, cereales, canola, colza, caña de azúcar y arroz.
- 10
12. Un procedimiento para reducir el daño general de plantas y partes de plantas, así como pérdidas en frutos recolectados y hortalizas recolectadas causado por insectos y/o fitopatógenos que comprende la etapa de aplicar simultánea o secuencialmente un compuesto de fórmula (I) tal como se ha definido en las reivindicaciones 1 a 3 y al menos un agente de combate biológico seleccionado de entre bacterias, hongos o levaduras, protozoos, virus y opcionalmente al menos un inoculante a la planta, partes de la planta, frutos recolectados u hortalizas recolectadas.
- 15
13. Una combinación de principios activos tal como se ha definido en cualquiera de las reivindicaciones 1 a 6 que comprende diluyentes y/o tensioactivos.

**Combinaciones de principios activos que tienen propiedades insecticidas y acaricidas**

**Resumen**

Las combinaciones de principios activos novedosas que comprenden un compuesto de la fórmula (I) en combinación con otros principios con actividad insecticida o agentes de combate biológico son muy adecuadas para combatir plagas animales tales como insectos y/o acáridos no deseados e, indirectamente, mejorar la salud de las plantas. Los compuestos de la fórmula (I) en combinación con otros principios con actividad insecticida o agentes de combate biológico pueden usarse para reducir el daño general de plantas y partes de plantas, así como pérdidas en frutos recolectados u hortalizas recolectadas causados por insectos, nematodos y fitopatógenos.

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(54) Title: ACTIVE INGREDIENT COMBINATIONS HAVING INSECTICIDAL AND ACARICIDAL PROPERTIES

(57) Abstract: The novel active ingredient combinations which comprise a compound of the formula (I) in combination with further active insecticidal ingredients or biological control agents are very suitable for control of animal pests such as insects and/or unwanted acarids and indirectly improve plant health. The compound of the formula (I) in combination with further active insecticidal ingredients or biological control agents can be used for reducing overall damage of plants and plant parts as well as losses in harvested fruits or vegetables caused by insects, nematodes and phytopathogens.

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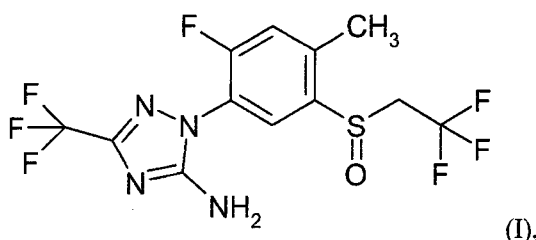
**Active ingredient combinations having insecticidal and acaricidal properties**

The present invention relates to novel active ingredient combinations which comprise a compound of the formula (I) in combination with further active insecticidal ingredients or biological control agents and are very suitable for control of animal pests such as insects and / or unwanted acarids and indirectly improve plant growth. The present invention further relates to the use of a compound of the formula (I) in combination with further active insecticidal ingredients or biological control agents for reducing overall damage of plants and plant parts as well as losses in harvested fruits or vegetables caused by insects, nematodes and phytopathogens.

The compound of the formula (I) is known from WO 1999/055668 and WO 2006/043635) and its insecticidal action has been described. The active ingredients specified in this description by their common name are known, for example, from "The Pesticide Manual" 14th ed., British Crop Protection Council 2006, and the website <http://www.alanwood.net/pesticides>.

However, the acaricidal and/or insecticidal efficacy and/or the activity spectrum and/or the compatibility of the known compounds with plants, especially with respect to crop plants, is not always adequate.

It has now been found that active ingredient combinations comprising a compound of the formula (I)



and one or more further insecticides and / or acaricides and / or biological control agents from the group (II), selected from

(1) Acetylcholinesterase (AChE) inhibitors, for example

carbamates, e.g. Alanycarb (II-1-1), Aldicarb (II-1-2), Bendiocarb (II-1-3), Benfuracarb (II-1-4), Butoxycarboxim (II-1-5), Carbaryl (II-1-6), Carbofuran (II-1-7), Carbosulfan (II-1-8), Ethiofencarb (II-1-9), Fenobucarb (II-1-10), Furathiocarb (II-1-11), Isoprocarb (II-1-12), Methomyl (II-1-13), Metolcarb (II-1-14), Oxamyl (II-1-15), Pirimicarb (II-1-16), Propoxur (II-1-17), Thiodicarb (II-1-18), and XMC (II-1-19); or

organophosphates, e.g. Acephate (II-1-20), Azinphos-ethyl (II-1-21), Azinphos-methyl (II-1-22), Chlorethoxyfos (II-1-23), Chlorfenvinphos (II-1-24), Chlorpyrifos (II-1-25), Chlorpyrifos-methyl (II-1-26), Cyanophos (II-1-27), Diazinon (II-1-28), Dichlorvos/DDVP (II-1-29), Dimethoate (II-1-30),

Dimethylvinphos (II-1-31), Disulfoton (II-1-32), EPN (II-1-46), Ethion (II-1-33), Ethoprophos (II-1-34), Fenamiphos (II-1-35), Fenitrothion (II-1-36), Fenthion (II-1-37), Fosthiazate (II-1-38), Isofenphos (II-1-39), Isopropyl O-(methoxyaminothio-phosphoryl) salicylate (II-1-40), Isoxathion (II-1-41), Malathion (II-1-42), Methidathion (II-1-43), Monocrotophos (II-1-44), Naled (II-1-45), Oxydemeton-methyl (II-1-46),  
5 Phenthoate (II-1-47), Phosalone (II-1-48), Phosmet (II-1-49), Pirimiphos-methyl (II-1-50), Profenofos (II-1-51), Prothiofos (II-1-52), Pyraclofos (II-1-53), Pyridaphenthion (II-1-54), Quinalphos (II-1-55), Tetrachlorvinphos (II-1-56), Thiometon (II-1-57), Triclorfon (II-1-58), and Vamidothion (II-1-59);

(2) GABA-gated chloride channel antagonists, for example

cyclodiene organochlorines, e.g. Chlordane (II-2-1) and Endosulfan (II-2-2); or

10 phenylpyrazoles (fiproles), e.g. Fipronil (II-2-3) ;

(3) Sodium channel modulators / voltage-dependent sodium channel blockers, for example

pyrethroids, e.g. Acrinathrin (II-3-1), Allethrin (II-3-2), d-cis-trans Allethrin (II-3-3), d-trans Allethrin (II-3-4), Bifenthrin (II-3-5), Cycloprothrin (II-3-6), Cyfluthrin (II-3-7), beta-Cyfluthrin (II-3-8), Cyhalothrin (II-3-9), lambda-Cyhalothrin (II-3-10), gamma-Cyhalothrin (II-3-11), Cypermethrin (II-3-12), alpha-  
15 Cypermethrin (II-3-13), beta-Cypermethrin (II-3-14), theta-Cypermethrin (II-3-15), zeta-Cypermethrin (II-3-16), Deltamethrin (II-3-17), Etofenprox (II-3-18), Fenpropathrin (II-3-19), Fenvalerate (II-3-20), Flucythrinate (II-3-21), tau-Fluvalinate (II-3-22), Kadethrin (II-3-23), Permethrin (II-3-24), Phenothrin [(1R)-trans isomer] (II-3-25), Pyrethrine (pyrethrum) (II-3-26), Resmethrin (II-3-27), Silafluofen (II-3-28), Tefluthrin (II-3-29), Tetramethrin (II-3-30), Tetramethrin [(1R) isomers]] (II-3-31), and  
20 Tralomethrin (II-3-32), or

DDT (II-3-33); or Methoxychlor (II-3-34);

(4) Nicotinic acetylcholine receptor (nAChR) agonists, for example

neonicotinoids, e.g. Acetamiprid (II-4-1), Clothianidin (II-4-2), Dinotefuran (II-4-3), Imidacloprid (II-4-4), Nitenpyram (II-4-5), Thiacloprid (II-4-6), and Thiamethoxam (II-4-7); or

25 Nicotine (II-4-8);

(5) Nicotinic acetylcholine receptor (nAChR) allosteric activators, for example

spinosyns, e.g. Spinetoram (II-5-1) and Spinosad (II-5-2);

(6) Chloride channel activators, for example

avermectins/milbemycins, e.g. Abamectin (II-6-1), Emamectin benzoate (II-6-2), Lepimectin (II-6-3), and Milbemectin (II-6-4);

(7) Juvenile hormone mimics, for example

juvenile hormon analogues, e.g. and Methoprene (II-7-1); or

5 Fenoxycarb (II-7-2); or Pyriproxyfen (II-7-3);

(8) Miscellaneous non-specific (multi-site) inhibitors, for example

alkyl halides, e.g. Methyl bromide (II-8-1) and other alkyl halides; or

Chloropicrin (II-8-2); or Sulfuryl fluoride (II-8-3); or Borax (II-8-4); or Tartar emetic (II-8-5);

(9) Selective homopteran feeding blockers, e.g. Pymetrozine (II-9-1);

10 (10) Mite growth inhibitors, e.g. Clofentezine (II-10-1), Hexythiazox (II-10-2), and Diflovidazin (II-10-3); or

Etoxazole (II-10-4);

(11) Microbial disruptors of insect midgut membranes, e.g. *Bacillus thuringiensis* subspecies *israelensis* (II-11-1), *Bacillus sphaericus* (II-11-2), *Bacillus thuringiensis* subspecies *aizawai* (II-11-3), *Bacillus thuringiensis* subspecies *kurstaki* (II-11-4), *Bacillus thuringiensis* subspecies *tenebrionis* (II-11-5), and BT crop proteins: Cry1Ab, Cry1Ac, Cry1Fa, Cry2Ab, mCry3A, Cry3Ab, Cry3Bb, Cry34/35Ab1 (II-11-6);

(12) Inhibitors of mitochondrial ATP synthase, for example Diafenthuron (II-12-1); or

organotin miticides, e.g. Azocyclotin (II-12-2), Cyhexatin (II-12-3), and Fenbutatin oxide (II-12-4); or

20 Propargite (II-12-5); or Tetradifon (II-12-6);

(13) Uncouplers of oxidative phoshorylation via disruption of the proton gradient, for example Chlorfenapyr (II-13-1), DNOC (II-13-2), and Sulfluramid (II-13-3);

(14) Nicotinic acetylcholine receptor (nAChR) channel blockers, for example Bensultap (II-14-1), Cartap hydrochloride (II-14-2), and Thiocyclam (II-14-3);

- (15) Inhibitors of chitin biosynthesis, type 0, for example Chlorfluazuron (II-15-1), Diflubenzuron (II-15-2), Flucycloxuron (II-15-3), Flufenoxuron (II-15-4), Hexaflumuron (II-15-5), Lufenuron (II-15-6), Teflubenzuron (II-15-7), and Triflumuron (II-15-8);
- (16) Inhibitors of chitin biosynthesis, type 1, for example Buprofezin (II-16-1);
- 5 (17) Moulting disruptors, for example Cyromazine (II-17-1);
- (18) Octopamine receptor agonists, for example Amitraz (II-18-1);
- (19) Mitochondrial complex III electron transport inhibitors, for example Hydramethylnon (II-19-1); or Acequinocyl (II-19-2); or Fluacrypyrim (II-19-3);
- (20) Mitochondrial complex I electron transport inhibitors, for example
- 10 METI acaricides, e.g. Fenpyroximate (II-20-1), Pyrimidifen (II-20-2), Pyridaben (II-20-3), Tebufenpyrad (II-20-4), and Tolfenpyrad (II-20-5); or
- Rotenone (Derris) (II-20-6);
- (21) Voltage-dependent sodium channel blockers, e.g. Indoxacarb (II-21-1);
- (22) Inhibitors of acetyl CoA carboxylase, for example
- 15 tetronic and tetramic acid derivatives, e.g. Spirodiclofen (II-22-1);
- (23) Mitochondrial complex IV electron transport inhibitors, for example
- phosphines, e.g. Aluminium phosphide (II-23-1), Calcium phosphide (II-23-2), Phosphine (II-23-3), and Zinc phosphide (II-23-4); or
- Cyanide (II-23-5).
- 20 (24) Ryanodine receptor modulators, for example
- diamides, e.g. Chlorantraniliprole (II-24-1);
- further active ingredients with unknown or uncertain mode of action, for example Amidoflumet (II-25-1), Azadirachtin (II-25-2), Benclothiaz (II-25-3), Benzoximate (II-25-4), Bifenazate (II-25-5), Bromopropylate (II-25-6), Chinomethionat (II-25-7), Cryolite (II-25-8), Cyantraniliprole (Cyazypyr) (II-25-9), Dicofol (II-25-10), Diflovidazin (II-25-11), Fluensulfone (II-25-12), Flufiprole (II-25-13), Fluopyram (II-25-14), Fufenozide (II-25-15), Imidaclothiz (II-25-16), Iprodione (II-25-17), Meperfluthrin

(II-25-18), Pyrifluquinazon (II-25-19), Tetramethylfluthrin (II-25-20), and iodomethane (II-25-21); furthermore products based on *Bacillus firmus* (including but not limited to strain CNCM I-1582, such as, for example, VOTiVO™, BioNem) (II-25-22) *Bacillus subtilis* GB03 (II-25-23) and QST 713 (II-25-24), *Bacillus subtilis* var. *amyloliquefaciens* FZB24 (II-25-25) and *Bacillus amyloliquefaciens* FZB 42 (II-25-26), *Bacillus thuringiensis* subspecies *aizawai* (II-25-27), *kurstaki* (II-25-28), *tenebrionis* (II-25-29) and *israelensis* (II-25-30), *Bacillus sphaericus*, *Acinetobacter* sp., *Pasteuria penetrans*, *Streptomyces venezuelae*, *Metarhizium anisopliae* F52 (II-25-31), *Metschnikowia fructicola* (II-25-32), *Paecilomyces lilacinus* strain 251 (II-25-33), *Paecilomyces fumosoroseus* (II-25-34), *Nomuraea rileyi* (II-25-35), *Hirsutella thompsoni*, *Beauveria bassiana*, *Beauveria brongniartii*, *Lagenidium giganteum*, *Myrothecium verrucaria*, *Tsukamurella paurometabola*, *Cydia pomonella* granulosus virus (II-25-36), *Adoxophyes orana* granulosus virus, *Helicoverpa armigera* nucleopolyhedro virus, *Spodoptera exigua* nucleopolyhedro virus, *Spodoptera littoralis* nucleopolyhedro virus, *Spodoptera litura* nucleopolyhedro virus, *Neodiprion abietis* nucleopolyhedro virus, *Neodiprion sertifer* nucleopolyhedro virus, *Verticillium lecanii*, *Pyrethrum* (II-25-37), *Harpin-Protein* (II-25-38), *Thymol* (II-25-39), *Chitin*, *Quillaja saponaria* extract, *Bacillus pumilus* strain GB34 and strain QST2808

or one of the following known active compounds: 3-bromo-N-{2-bromo-4-chloro-6-[(1-cyclopropylethyl)carbamoyl]phenyl}-1-(3-chloropyridin-2-yl)-1H-pyrazole-5-carboxamide (II-25-40) (known from WO2005/077934), 4-{[(6-bromopyridin-3-yl)methyl](2-fluoroethyl)amino}furan-2(5H)-one (II-25-41) (known from WO2007/115644), 4-{[(6-fluoropyridin-3-yl)methyl](2,2-difluoroethyl)amino}furan-2(5H)-one (II-25-42) (known from WO2007/115644), 4-{[(2-chloro-1,3-thiazol-5-yl)methyl](2-fluoroethyl)amino}furan-2(5H)-one (II-25-43) (known from WO2007/115644), 4-{[(6-chloropyridin-3-yl)methyl](2-fluoroethyl)amino}furan-2(5H)-one (II-25-44) (known from WO2007/115644), Flupyradifurone (II-25-45), 4-{[(6-chloro-5-fluoropyridin-3-yl)methyl](methyl)amino}furan-2(5H)-one (II-25-46) (known from WO2007/115643), 4-{[(5,6-dichloropyridin-3-yl)methyl](2-fluoroethyl)amino}furan-2(5H)-one (II-25-47) (known from WO2007/115646), 4-{[(6-chloro-5-fluoropyridin-3-yl)methyl](cyclopropyl)amino}furan-2(5H)-one (II-25-48) (known from WO2007/115643), 4-{[(6-chloropyridin-3-yl)methyl](cyclopropyl)amino}furan-2(5H)-one (II-25-49) (known from EP-A-0 539 588), 4-{[(6-chloropyridin-3-yl)methyl](methyl)amino}furan-2(5H)-one (II-25-50) (known from EP-A-0 539 588), {[(1-(6-chloropyridin-3-yl)ethyl)(methyl)oxido- $\lambda^4$ -sulfanylidene}cyanamide (II-25-51) (known from WO2007/149134) and its diastereomers {[(1R)-1-(6-chloropyridin-3-yl)ethyl](methyl)oxido- $\lambda^4$ -sulfanylidene}cyanamide (A) (II-25-52), and {[(1S)-1-(6-chloropyridin-3-yl)ethyl](methyl)oxido- $\lambda^4$ -sulfanylidene}cyanamide (B) (II-25-53) (also known from WO2007/149134) as well as Sulfoxaflor (II-25-54) and its diastereomers [(R)-methyl(oxido){(1R)-1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}- $\lambda^4$ -sulfanylidene]cyanamide (A1) (II-25-55), and [(S)-methyl(oxido){(1S)-1-[6-(trifluoromethyl)pyridin-3-

yl]ethyl}-λ<sup>4</sup>-sulfanylidene]cyanamide (A2) (II-25-56), referred to as group of diastereomers A (known from WO2010/074747, WO2010/074751), [(R)-methyl(oxido){(1S)-1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}-λ<sup>4</sup>-sulfanylidene]cyanamide (B1) (II-25-57), and [(S)-methyl(oxido){(1R)-1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}-λ<sup>4</sup>-sulfanylidene]cyanamide (B2) (II-25-58), referred to as group of

5 diastereomers B (also known from WO2010/074747, WO2010/074751), and 11-(4-chloro-2,6-dimethylphenyl)-12-hydroxy-1,4-dioxo-9-azadispiro[4.2.4.2]tetradec-11-en-10-one (II-25-59) (known from WO2006/089633), 3-(4'-fluoro-2,4-dimethylbiphenyl-3-yl)-4-hydroxy-8-oxa-1-azaspiro[4.5]dec-3-en-2-one (II-25-60) (known from WO2008/067911), 1-{2-fluoro-4-methyl-5-[(2,2,2-trifluoroethyl)sulfinyl]phenyl}-3-(trifluoromethyl)-1H-1,2,4-triazol-5-amine (II-25-61) (known from

10 WO2006/043635), [(3S,4aR,12R,12aS,12bS)-3-[(cyclopropylcarbonyl)oxy]-6,12-dihydroxy-4,12b-dimethyl-11-oxo-9-(pyridin-3-yl)-1,3,4,4a,5,6,6a,12,12a,12b-decahydro-2H,11H-benzo[f]pyrano[4,3-b]chromen-4-yl]methyl cyclopropanecarboxylate (II-25-62) (known from WO2008/066153), 2-cyano-3-(difluoromethoxy)-N,N-dimethylbenzenesulfonamide (II-25-63) (known from WO2006/056433), 2-cyano-3-(difluoromethoxy)-N-methylbenzenesulfonamide (II-25-64) (known from WO2006/100288), 2-

15 cyano-3-(difluoromethoxy)-N-ethylbenzenesulfonamide (II-25-65) (known from WO2005/035486), 4-(difluoromethoxy)-N-ethyl-N-methyl-1,2-benzothiazol-3-amine 1,1-dioxide (II-25-66) (known from WO2007/057407), N-[1-(2,3-dimethylphenyl)-2-(3,5-dimethylphenyl)ethyl]-4,5-dihydro-1,3-thiazol-2-amine (II-25-67) (known from WO2008/104503), {1'-[(2E)-3-(4-chlorophenyl)prop-2-en-1-yl]-5-fluorospiro[indole-3,4'-piperidin]-1(2H)-yl}(2-chloropyridin-4-yl)methanone (II-25-68) (known from

20 WO2003/106457), 3-(2,5-dimethylphenyl)-4-hydroxy-8-methoxy-1,8-diazaspiro[4.5]dec-3-en-2-one (II-25-69) (known from WO2009/049851), 3-(2,5-dimethylphenyl)-8-methoxy-2-oxo-1,8-diazaspiro[4.5]dec-3-en-4-yl ethyl carbonate (II-25-50) (known from WO2009/049851), 4-(but-2-yn-1-yloxy)-6-(3,5-dimethylpiperidin-1-yl)-5-fluoropyrimidine (II-25-71) (known from WO2004/099160), (2,2,3,3,4,4,5,5-octafluoropentyl)(3,3,3-trifluoropropyl)malononitrile (II-25-72) (known from WO2005/063094),

25 (2,2,3,3,4,4,5,5-octafluoropentyl)(3,3,4,4,4-pentafluorobutyl)malononitrile (II-25-73) (known from WO 2 0 0 5 / 0 6 3 0 9 4 ) , 8-[2-(cyclopropylmethoxy)-4-(trifluoromethyl)phenoxy]-3-[6-(trifluoromethyl)pyridazin-3-yl]-3-azabicyclo[3.2.1]octane (II-25-74) (known from WO2007/040280), Flometoquin (II-25-75), PF1364 (CAS-Reg.No. 1204776-60-2) (II-25-76) (known from JP2010/018586), 5-[5-(3,5-dichlorophenyl)-5-(trifluoromethyl)-4,5-dihydro-1,2-oxazol-3-yl]-2-(1H-1,2,4-triazol-1-

30 yl)benzonitrile (II-25-77) (known from WO2007/075459), 5-[5-(2-chloropyridin-4-yl)-5-(trifluoromethyl)-4,5-dihydro-1,2-oxazol-3-yl]-2-(1H-1,2,4-triazol-1-yl)benzonitrile (II-25-78) (known from WO2007/075459), 4-[5-(3,5-dichlorophenyl)-5-(trifluoromethyl)-4,5-dihydro-1,2-oxazol-3-yl]-2-methyl-N-{2-oxo-2-[(2,2,2-trifluoroethyl)amino]ethyl}benzamide (II-25-79) (known from WO2005/085216), 4-{[(6-chloropyridin-3-yl)methyl](cyclopropyl)amino}-1,3-oxazol-2(5H)-one (II-25-

35 80), 4-{[(6-chloropyridin-3-yl)methyl](2,2-difluoroethyl)amino}-1,3-oxazol-2(5H)-one (II-25-81), 4-{[(6-

chloropyridin-3-yl)methyl](ethyl)amino}-1,3-oxazol-2(5H)-one (II-25-82), 4-{{(6-chloropyridin-3-yl)methyl](methyl)amino}-1,3-oxazol-2(5H)-one (II-25-83) (all known from WO2010/005692), NNI-0711 (Pyflubumide) (II-25-84) (known from WO2002/096882), 1-acetyl-N-[4-(1,1,1,3,3,3-hexafluoro-2-methoxypropan-2-yl)-3-isobutylphenyl]-N-isobutyryl-3,5-dimethyl-1H-pyrazole-4-carboxamide (II-25-85) (known from WO2002/096882), methyl 2-[2-({[3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl}amino)-5-chloro-3-methylbenzoyl]-2-methylhydrazinecarboxylate (II-25-86) (known from WO2005/085216), methyl 2-[2-({[3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl}amino)-5-cyano-3-methylbenzoyl]-2-ethylhydrazinecarboxylate (II-25-87) (known from WO2005/085216), methyl 2-[2-({[3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl}amino)-5-cyano-3-methylbenzoyl]-2-methylhydrazinecarboxylate (II-25-88) (known from WO2005/085216), methyl 2-[3,5-dibromo-2-({[3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl}amino)benzoyl]-1,2-di-ethylhydrazinecarboxylate (II-25-89) (known from WO2005/085216), methyl 2-[3,5-dibromo-2-({[3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl}amino)benzoyl]-2-ethylhydrazinecarboxylate (II-25-90) (known from WO2005/085216), (5RS,7RS;5RS,7SR)-1-(6-chloro-3-pyridylmethyl)-1,2,3,5,6,7-hexahydro-7-methyl-8-nitro-5-propoxyimidazo[1,2-a]pyridine (II-25-91) (known from WO2007/101369), 2-{6-[2-(5-fluoropyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine (II-25-92) (known from WO2010/006713), 2-{6-[2-(pyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine (II-25-93) (known from WO2010/006713), 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl}-1H-pyrazole-5-carboxamide (II-25-94) (known from WO2010/069502), 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl}-1H-pyrazole-5-carboxamide (II-25-95) (known from WO2010/069502), N-[2-(tert-butylcarbamoyl)-4-cyano-6-methylphenyl]-1-(3-chloropyridin-2-yl)-3-{[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl}-1H-pyrazole-5-carboxamide (II-25-96) (known from WO2010/069502), N-[2-(tert-butylcarbamoyl)-4-cyano-6-methylphenyl]-1-(3-chloropyridin-2-yl)-3-{[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl}-1H-pyrazole-5-carboxamide (II-25-97) (known from WO2010/069502), (1E)-N-[(6-chloropyridin-3-yl)methyl]-N'-cyano-N-(2,2-difluoroethyl)ethanimidamide (II-25-98) (known from WO2008/009360), N-[2-(5-amino-1,3,4-thiadiazol-2-yl)-4-chloro-6-methylphenyl]-3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazole-5-carboxamide (II-25-99) (known from CN102057925), and methyl 2-[3,5-dibromo-2-({[3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl}amino)benzoyl]-2-ethyl-1-methylhydrazinecarboxylate (II-25-100) (known from WO2011/049233), Afidopyropen (II-25-101) (known from WO2008/066153), Heptafluthrin (II-25-102) (known from WO2010/043122), Pyriminostrobin (II-25-103) (known from WO2010/139271), Flufenoxystrobin (II-25-103) (known from WO2007/000098), 3-Chlor-N<sup>2</sup>-(2-cyanopropan-2-yl)-N<sup>1</sup>-[4-(1,1,1,2,3,3,3-heptafluoropropan-2-yl)-2-methylphenyl]phthalamid (II-25-104) (known from WO2012/034472)

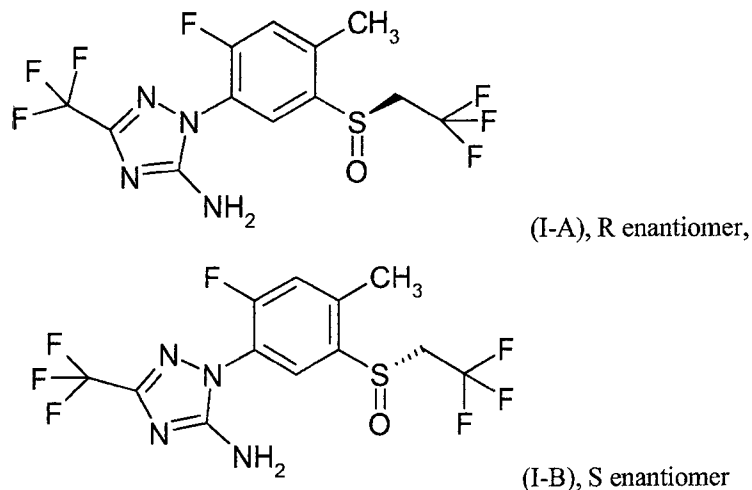
or further biological control agents selected from bacteria, in particular spore-forming bacteria, fungi or yeasts, protozoas, viruses, optionally in the presence of inoculants,

are very suitable for control of animal pests such as insects and/or acaricides and indirectly improve plant health. Further, the compound of the formula (I) in combination with further active insecticidal ingredients  
5 or biological control agents can be used for reducing overall damage of plants and plant parts as well as losses in harvested fruits or vegetables caused by insects, nematodes and phytopathogens.

The active ingredients of group (II) are, in accordance with the IRAC classification, assigned to different classes and groups according to their mechanism of action.

If, within this description, the short form of the common name of an active ingredient is used, this in each  
10 case encompasses all common derivatives, such as the esters and salts, and isomers, especially optical isomers, especially the commercial form or forms. If an ester or salt is referred to by the common name, this also refers in each case to all other common derivatives, such as other esters and salts, the free acids and neutral compounds, and isomers, especially optical isomers, especially the commercial form or forms. The chemical compound names mentioned refer to at least one of the compounds encompassed by the  
15 common name, frequently a preferred compound.

The compound of the formula (I) has a chiral sulphoxide group so that it forms two enantiomers having R or S configuration at the sulphur:



20 In the synthesis from achiral starting materials the two enantiomers are formed in equal amounts so that a racemate is present. The separation of the racemate known from the literature (cf. WO 1999/055668 and WO 2006/043635) into the individual enantiomers can be carried out by preparative HPLC on a chiral stationary phase. The separation may take place, for example, on a Daical Chiralpak AD-H 250 mm x 30 mm column using a mobile phase of n-heptane/ethanol/methanol 60:20:20 (v/v/V), a flow rate of 30  
25 ml/min and UV detection at 220 nm. The two enantiomers can then be characterized by methods known

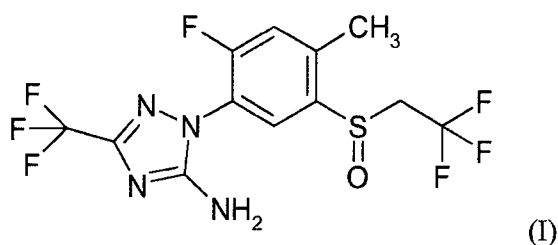
from the literature, for example by X-ray structural analysis or by determining the optical rotation.

Accordingly, the present invention provides novel active compound combinations comprising the racemate or the R or S enantiomer of the compound of the formula (I) and at least one further insecticidally active compound of group (II).

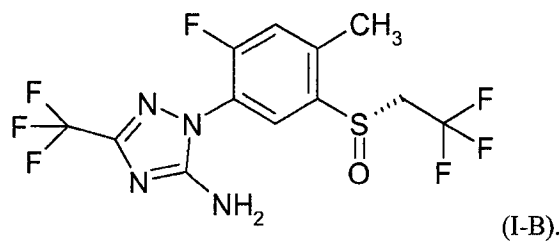
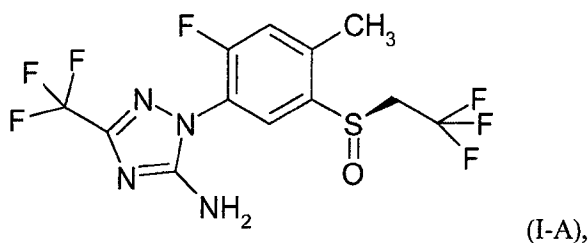
- 5 Surprisingly, the insecticidal and/or acaricidal action of the inventive active ingredient combinations is much higher than the total of the actions of the individual active ingredients. There is an unforeseeable true synergistic effect and not just complementary action.

Preferred combinations comprise one of the preferred compounds of the formula (I) as specified below and at least one preferred active ingredient selected from the group (II).

- 10 Preferred compound is the racemate of the formula (I)



Likewise preferred are the respective R or S enantiomers of the formulae (I-A),(I-B):



- 15 Preferred mixing partners from group (II) are the following ones selected from

Abamectin, Acephate, Acequinocyl, Acetamiprid, Acrinathrin, Aldicarb, Alpha-Cypermethrin, Amitraz, Azadirachtin, Azinphos-methyl, Benfuracarb, Beta-Cyfluthrin, Bifenazate, Bifenthrin, Bensultap (Nereistoxin), Buprofezin, Carbaryl, Carbofuran, Carbosulfan, Cartap hydrochloride, Chloranthraniliprole (Rynazypyr), Chlorfenapyr, Chlorfluazuron, Chloropicrin, Chlorpyrifos, 20 Clothianidin, Cyantraniliprole (Cyazypyr), Cyfluthrin, Cyhalothrin, Cypermethrin, Cyromazine,

Deltamethrin, Diafenthiuron, Diazinon, Dichloropropene, Dichlorfos, Dicofol, Diflubenzuron, Dimethoate, Dinotefuran, Disulfoton, Emamectin-(benzoate), Endosulfan, Ethoprophos, Etofenprox, Etoxazole, Fenamiphos, Fenbutatin oxide, Fenitrothion, Fenobucarb, Fenoxycarb, Fenpropathrin, Fenpyroximate, Fenvalerate, Fipronil, Fluacrypyrim, Fluensulfone, Flufenoxuron, Flupyradifurone, Fosthiazate, Gamma-Cyhalothrin, Hexythiazox, Hexaflumuron, Imidacloprid, Imidaclothiz, Indoxacarb, Lambda-Cyhalothrin, Lepimectin, Lufenuron, Malathion, Metaldehyde, Methidathion, Methomyl, Milbemectin, Monocrotophos, Nitenpyram, Oxamyl, Permethrin, Pirimicarb, Profenofos, Propargite, Pymetrozine, Pyrafluprole, Pyrethrin, Pyridaben, Pyrfluquinazone, Pyrimethanil, Pyrimidifen, Pyriprole, Pyriproxyfen, Quinalphos, Resmethrin, Spinetoram, Spinosad, Spirodiclofen, Sulfoxaflor, Tau-  
 5 Fluvalinate, Tebufenpyrad, Teflubenzuron, Tefluthrin, Thiacloprid, Thiamethoxam, Thiodicarb, Trichlorfon, Triflumuron; Zeta-Cypermethrin, 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl}-1H-pyrazole-5-carboxamide/  
 10 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl}-1H-pyrazole-5-carboxamid, 2-{6-[2-(5-fluoropyridin-3-yl)-1,3-thiazol-5-yl]pyridin-  
 15 2-yl}pyrimidine, 2-{6-[2-(pyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine, (1E)-N-[(6-chloropyridin-3-yl)methyl]-N'-cyano-N-(2,2-difluoroethyl)ethanimidamide, *Bacillus firmus* I-1582, *Bacillus subtilis* GB03 and QST 713, *Bacillus subtilis* var. *amyloliquefaciens* FZB24 and *Bacillus amyloliquefaciens* FZB 42, *Bacillus thuringiensis* subspecies *aizawai*, *kurstaki*, *tenebrionis* and *israelensis*, *Metarhizium anisopliae* F52, *Metschnikowia fructicola*, *Paecilomyces lilacinus* strain 251,  
 20 *Paecilomyces fumosoroseus*, *Nomuraea rileyi*, *Cydia pomonella* *granulosis* virus, Pyrethrum, Harpin-Protein and Thymol, *Bacillus pumilus* strain GB34 and strain QST2808.

More preferred are combinations comprising one preferred compound of the formula (I) and at least one more preferred active ingredient of group (II), selected from

Abamectin, Acetamiprid, Acrinathrin, Alpha-Cypermethrin, Beta-Cyfluthrin, Bifenthrin, Buprofezin, Flupyradifurone, Chlorfenapyr, Chlorpyrifos, Clothianidin, Cyantraniliprole, Cyfluthrin, Cypermethrin, Deltamethrin, Diafenthiuron, Dinotefuran, Emamectin-(benzoate), Fenpyroximate, Fipronil, Fluensulfone, Gamma-Cyhalothrin, Imidacloprid, Indoxacarb, L-Cyhalothrin, Milbemectin, Nitenpyram, Pyrfluquinazone, Pymetrozine, Chloranthraniliprole, Spinetoram, Spinosad, Spirodiclofen, Sulfoxaflor, Tebufenpyrad, Tefluthrin, Thiacloprid, Thiamethoxam, Thiodicarb, Triflumuron; 1-(3-chloropyridin-2-  
 25 yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl}-1H-pyrazole-5-carboxamide/ 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-  
 30 3-{{[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl}-1H-pyrazole-5-carboxamide; 2-{6-[2-(5-fluoropyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine, 2-{6-[2-(pyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine (1E)-N-[(6-chloropyridin-3-yl)methyl]-N'-cyano-N-(2,2-difluoroethyl)ethanimidamide,

Bacillus firmus I-1582, Bacillus subtilis GB03 and QST 713, Bacillus subtilis var. amyloliquefaciens FZB24 and Bacillus amyloliquefaciens FZB 42, Bacillus thuringiensis subspecies aizawai, kurstaki, tenebrionis and israelensis, Metarhizium anisopliae F52, Paecilomyces lilacinus strain 251, Nomuraea rileyi, Bacillus pumilus strain GB34 and strain QST2808.

- 5 Even more preferred are combinations comprising one preferred compound of formula (I) and one even more preferred active ingredient from group (II), selected from

- Abamectin, Acetamiprid, Acrinathrin, Beta-Cyfluthrin, Bifenthrin, Buprofezin, Flupyradifurone, Chlorfenapyr, Chlorpyrifos, Clothianidin, Cyantraniliprole, Cyfluthrin, Deltamethrin, Diafenthiuron, Dinotefuran, Enamectin-(benzoate), Fenpyroximate, Fipronil, Fluensulfone, Imidacloprid, Indoxacarb, L-  
10 Cyhalothrin, Milbemectin, Nitenpyram, Pyrifluquinazone, Pymetrozine, Chloranthraniliprole, Spinetoram, Spinosad, Spirodiclofen, Sulfoxaflor, Tebufenpyrad, Thiacloprid, Thiamethoxam, Thiodicarb, Triflumuron; 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{5-(trifluoromethyl)-1H-tetrazol-1-yl}methyl}-1H-pyrazole-5-carboxamide/ 1-(3-chloropyridin-2-yl)- N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{5-(trifluoromethyl)-2H-tetrazol-2-yl}methyl}-1H-  
15 pyrazole-5-carboxamide; 2-{{6-[2-(5-fluoropyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine, 2-{{6-[2-(pyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine (1E)-N-[(6-chloropyridin-3-yl)methyl]-N'-cyano-N-(2,2-difluoroethyl)ethanimidamide, Bacillus firmus I-1582, Bacillus subtilis GB03 and QST 713, Bacillus subtilis var. amyloliquefaciens FZB24 and Bacillus amyloliquefaciens FZB 42, Bacillus thuringiensis subspecies aizawai, kurstaki, tenebrionis and israelensis, Metarhizium anisopliae F52,  
20 Paecilomyces lilacinus strain 251, Nomuraea rileyi, Bacillus pumilus strain GB34 and strain QST2808.

Especially preferred are combinations comprising the compound (I) and exactly one active ingredient from group II in the mixing ratios specified in Table 1.

Especially preferred are combinations comprising the compound (I-A) and exactly one active ingredient from group II in the mixing ratios specified in Table 1.

- 25 Especially preferred are combinations comprising the compound (I-B) and exactly one active ingredient from group II in the mixing ratios specified in Table 1.

The active ingredient combinations may additionally also comprise further fungicidally, acaricidally or insecticidally active mixture components.

- When the active ingredients are present in particular weight ratios in the inventive active ingredient  
30 combinations, the improved effect is manifested. However, the weight ratios of the active ingredients in the active ingredient combinations can be varied within a relatively wide range. In general, the inventive

combinations comprise active ingredient of the formula (I) to the mixing partner from group (II) in a ratio of 625:1 to 1: 625; whereas for inventive combinations comprising the active ingredient of the formula (I) and a biological control agent selected from group (II), the ratio is typically 100:1 to 1:2000. Preferred and more preferred mixing ratios are specified in Table 1 below.

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the mixing ratios are based on weight ratios. The ratio should be understood as the active ingredient of the formula (I):mixing partner of the group (II) to active ingredient of the formula (I):mixing partner of the group (II).

| Nr. | Mixing partner                                 | Preferred mixing ratio | More preferred mixing ratio | Most preferred mixing ratio |
|-----|------------------------------------------------|------------------------|-----------------------------|-----------------------------|
| 1.  | Abamectin                                      | 625:1 to 1:625         | 125:1 to 1:125              | 25:1 to 1:25                |
| 2.  | Acephate                                       | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 3.  | Acequinocyl                                    | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 4.  | Acetamiprid                                    | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 5.  | Acrinathrin                                    | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 6.  | Aldicarb                                       | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 7.  | alpha-Cypermethrin                             | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 8.  | Amitraz                                        | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 9.  | Azinphos-methyl                                | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 10. | Bacillus subtilis var. amyloliquefaciens FZB24 | 100:1 to 1:1000        | 50:1 to 1:500               | 5:1 to 1:100                |
| 11. | Bacillus amyloliquefaciens FZB42               | 100:1 to 1:5000        | 50:1 to 1:2500              | 5:1 to 1:100                |
| 12. | Bacillus firmus I-1582                         | 100:1 to 1:1000        | 50:1 to 1:500               | 5:1 to 1:100                |
| 13. | Bacillus subtilis GB03                         | 100:1 to 1:1000        | 50:1 to 1:500               | 5:1 to 1:100                |
| 14. | Bacillus subtilis QST 713                      | 100:1 to 1:1000        | 50:1 to 1:500               | 5:1 to 1:100                |
| 15. | Bacillus thuringiensis aizawai                 | 100:1 to 1:2500        | 50:1 to 1:1250              | 5:1 to 1:100                |
| 16. | Bacillus thuringiensis israelensis             | 100:1 to 1:1000        | 50:1 to 1:500               | 5:1 to 1:100                |
| 17. | Bacillus thuringiensis kurstaki                | 100:1 to 1:1000        | 50:1 to 1:500               | 5:1 to 1:100                |
| 18. | Bacillus thuringiensis tenebrionis             | 100:1 to 1:1000        | 50:1 to 1:500               | 5:1 to 1:100                |
| 19. | Benfuracarb                                    | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 20. | beta-Cyfluthrin                                | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 21. | Bifenazate                                     | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 22. | Bifenthrin                                     | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 23. | Bensultap (Nereistoxin)                        | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 24. | Buprofezin                                     | 625:1 to 1:625         | 125:1 to 1:125              | 25:1 to 1:25                |
| 25. | Carbaryl                                       | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 26. | Carbofuran                                     | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 27. | Carbosulfan                                    | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 28. | Cartap hydrochloride                           | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 29. | Chlorantraniliprole (Rynaxypyr)                | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 30. | Chlorfenapyr                                   | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 31. | Chloropicrin                                   | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 32. | Chlorpyrifos                                   | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 33. | Clothianidin                                   | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 34. | Cyantraniliprole (Cyazypyr)                    | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 35. | Cyfluthrin                                     | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 36. | Cyhalothrin                                    | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 37. | Cypermethrin                                   | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 38. | Cyromazine                                     | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 39. | Deltamethrin                                   | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 40. | Diafenthiuron                                  | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 41. | Diazinon                                       | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 42. | Dichloropropene                                | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 43. | Dichlorvos                                     | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |

| Nr. | Mixing partner        | Preferred mixing ratio | More preferred mixing ratio | Most preferred mixing ratio |
|-----|-----------------------|------------------------|-----------------------------|-----------------------------|
| 44. | Dicofol               | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 45. | Diflubenzuron         | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 46. | Dimethoate            | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 47. | Dinotefuran           | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 48. | Disulfoton            | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 49. | Enamectin (-benzoate) | 625:1 to 1:625         | 125:1 to 1:125              | 25:1 to 1:25                |
| 50. | Endosulfan            | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 51. | Ethoprophos           | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 52. | Etofenprox            | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 53. | Etoxazole             | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 54. | Fenamiphos            | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 55. | Fenbutatin oxide      | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 56. | Fenitrothion          | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 57. | Fenobucarb            | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 58. | Fenoxycarb            | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 59. | Fenpropathrin         | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 60. | Fenpyroximate         | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 61. | Fenvalerate           | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 62. | Fipronil              | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 63. | Fluacrypyrim          | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 64. | Fluensulfone          | 625:1 to 1:625         | 500:1 to 1:500              | 100:1 to 1:100              |
| 65. | Flufenoxuron          | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 66. | Flupyradifurone       | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 67. | Fosthiazate           | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 68. | gamma-Cyhalothrin     | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 69. | Hexythiazox           | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 70. | Imidacloprid          | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 71. | Imidaclothiz          | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 72. | Indoxacarb            | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 73. | Lambda-Cyhalothrin    | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 74. | Lepimectin            | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 75. | Lufenuron             | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 76. | Malathion             | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 77. | Metalddehyde          | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 78. | Methidathion          | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 79. | Methomyl              | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 80. | Milbemectin           | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 81. | Monocrotophos         | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 82. | Nitenpyram            | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 83. | Oxamyl                | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 84. | Permethrin            | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 85. | Pirimicarb            | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 86. | Profenofos            | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 87. | Propargite            | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 88. | Pymetrozine           | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 89. | Pyrafluprole          | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 90. | Pyrethrin             | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 91. | Pyridaben             | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 92. | Pyrifluquinazone      | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |

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| Nr.  | Mixing partner                                                                                                                                                                                                                                                                                            | Preferred mixing ratio | More preferred mixing ratio | Most preferred mixing ratio |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------------------|-----------------------------|
| 93.  | Pyrimethanil                                                                                                                                                                                                                                                                                              | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 94.  | Pyrimidifen                                                                                                                                                                                                                                                                                               | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 95.  | Pyriprole                                                                                                                                                                                                                                                                                                 | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 96.  | Pyriproxyfen                                                                                                                                                                                                                                                                                              | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 97.  | Quinalphos                                                                                                                                                                                                                                                                                                | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 98.  | Resmethrin                                                                                                                                                                                                                                                                                                | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 99.  | Spinetoram                                                                                                                                                                                                                                                                                                | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 100. | Spinosad                                                                                                                                                                                                                                                                                                  | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 101. | Spirodiclofen                                                                                                                                                                                                                                                                                             | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 102. | Sulfoxaflor                                                                                                                                                                                                                                                                                               | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 103. | Tau-Fluvalinate                                                                                                                                                                                                                                                                                           | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 104. | Tebufenpyrad                                                                                                                                                                                                                                                                                              | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 105. | Teflubenzuron                                                                                                                                                                                                                                                                                             | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 106. | Tefluthrin                                                                                                                                                                                                                                                                                                | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 107. | Thiacloprid                                                                                                                                                                                                                                                                                               | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 108. | Thiamethoxam                                                                                                                                                                                                                                                                                              | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 109. | Thiodicarb                                                                                                                                                                                                                                                                                                | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 110. | Trichlorfon                                                                                                                                                                                                                                                                                               | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 111. | Triflumuron                                                                                                                                                                                                                                                                                               | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 112. | Zeta-Cypermethrin                                                                                                                                                                                                                                                                                         | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 113. | 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl}-1H-pyrazole-5-carboxamide/<br>1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl}-1H-pyrazole-5-carboxamide | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 114. | 2-{6-[2-(5-fluoropyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine                                                                                                                                                                                                                                   | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 115. | 2-{6-[2-(pyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine                                                                                                                                                                                                                                           | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 116. | Metarhizium anisopliae F52                                                                                                                                                                                                                                                                                | 100:1 to 1:2000        | 50:1 to 1:1000              | 25:1 to 1:200               |
| 117. | Metschnikowia fructicola                                                                                                                                                                                                                                                                                  | 100:1 to 1:2000        | 50:1 to 1:1000              | 25:1 to 1:200               |
| 118. | Paecilomyces lilacinus 251                                                                                                                                                                                                                                                                                | 100:1 to 1:2000        | 50:1 to 1:1000              | 25:1 to 1:200               |
| 119. | Azadirachtin                                                                                                                                                                                                                                                                                              | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 120. | Pyrethrum                                                                                                                                                                                                                                                                                                 | 625:1 to 1:625         | 125:1 to 1:125              | 25:1 to 1:25                |
| 121. | (1E)-N-[(6-chloropyridin-3-yl)methyl]-N'-cyano-N-(2,2-difluoroethyl)ethanimidamide                                                                                                                                                                                                                        | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 122. | Harpin-Protein                                                                                                                                                                                                                                                                                            | 125:1 to 1:125         | 25:1 to 1:25                | 5:1 to 1:5                  |
| 123. | Cydia pomonella granulosus virus (CpGV)                                                                                                                                                                                                                                                                   | 100:1 to 1:2000        | 50:1 to 1:1000              | 25:1 to 1:200               |
| 124. | Thymol                                                                                                                                                                                                                                                                                                    | 625:1 to 1:625         | 125:1 to 1:125              | 25:1 to 1:25                |
| 125. | Bacillus pumilus strain QST2808                                                                                                                                                                                                                                                                           | 100 : 1 to 1 : 2500    | 50 : 1 to 1 : 1250          | 25 : 1 to 1: 500            |

The active ingredient combinations according to the invention, in combination with good plant tolerance and favourable toxicity to warm-blooded animals and being tolerated well by the environment, are suitable for protecting plants and plant organs, for increasing harvest yields, for improving the quality of the harvested material and for controlling animal pests, in particular insects, arachnids, helminths, nematodes and molluscs, which are encountered in agriculture, in horticulture, in animal husbandry, in forests, in gardens and leisure facilities, in protection of stored products and of materials, and in the hygiene sector. They can be preferably used as plant protection agents. They are active against normally sensitive and resistant species and against all or some stages of development. The abovementioned pests include:

- 10 pests from the phylum Arthropoda, especially from the class Arachnida, for example, *Acarus* spp., *Aceria sheldoni*, *Aculops* spp., *Aculus* spp., *Amblyomma* spp., *Amphitetranynchus viennensis*, *Argas* spp., *Boophilus* spp., *Brevipalpus* spp., *Bryobia graminum*, *Bryobia praetiosa*, *Centruroides* spp., *Choriopetes* spp., *Dermanyssus gallinae*, *Dermatophagoides pteronyssinus*, *Dermatophagoides farinae*, *Dermacentor* spp., *Eotetranychus* spp., *Epitrimerus pyri*, *Eutetranychus* spp., *Eriophyes* spp., *Glycyphagus domesticus*,  
15 *Halotydeus destructor*, *Hemitarsonemus* spp., *Hyalomma* spp., *Ixodes* spp., *Latrodectus* spp., *Loxosceles* spp., *Metatetranychus* spp., *Neutrombicula autumnalis*, *Nuphessa* spp., *Oligonychus* spp., *Ornithodoros* spp., *Ornithonyssus* spp., *Panonychus* spp., *Phyllocoptura oleivora*, *Polyphagotarsonemus latus*, *Psoroptes* spp., *Rhipicephalus* spp., *Rhizoglyphus* spp., *Sarcoptes* spp., *Scorpio maurus*, *Steneotarsonemus* spp., *Steneotarsonemus spinki*, *Tarsonemus* spp., *Tetranychus* spp., *Trombicula*  
20 *alfreddugesi*, *Vaejovis* spp., *Vasates lycopersici*;

from the class Chilopoda, for example, *Geophilus* spp., *Scutigera* spp.;

from the order or the class Collembola, for example, *Onychiurus armatus*;

from the class Diplopoda, for example, *Blaniulus guttulatus*;

- from the class Insecta, e.g. from the order Blattodea, for example, *Blattella asahinai*, *Blattella germanica*,  
25 *Blatta orientalis*, *Leucophaea maderae*, *Panchlora* spp., *Parcoblatta* spp., *Periplaneta* spp., *Supella longipalpa*;

- from the order Coleoptera, for example, *Acalymma vittatum*, *Acanthoscelides obtectus*, *Adoretus* spp., *Agelastica alni*, *Agriotes* spp., *Alphitobius diaperinus*, *Amphimallon solstitialis*, *Anobium punctatum*, *Anoplophora* spp., *Anthonomus* spp., *Anthrenus* spp., *Apion* spp., *Apogonia* spp., *Atomaria* spp.,  
30 *Attagenus* spp., *Bruchidius obtectus*, *Bruchus* spp., *Cassida* spp., *Cerotoma trifurcata*, *Ceutorrhynchus* spp., *Chaetocnema* spp., *Cleonus mendicus*, *Conoderus* spp., *Cosmopolites* spp., *Costelytra zealandica*, *Ctenicera* spp., *Curculio* spp., *Cryptolestes ferrugineus*, *Cryptorhynchus lapathi*, *Cylindrocopturus* spp.,

Dermestes spp., Diabrotica spp., Dichocrocis spp., Dieladisma armigera, Diloboderus spp., Epilachna spp., Epitrix spp., Faustinus spp., Gibbium psyllodes, Gnathocerus cornutus, Hellula undalis, Heteronychus arator, Heteronyx spp., Hylamorphia elegans, Hylotrupes bajulus, Hypera postica, Hypomeces squamosus, Hypothenemus spp., Lachnosterna consanguinea, Lasioderma serricorne, 5 Latheticus oryzae, Lathridius spp., Lema spp., Leptinotarsa decemlineata, Leucoptera spp., Lissorhoptrus oryzophilus, Lixus spp., Luperodes spp., Lyctus spp., Megascelis spp., Melanotus spp., Meligethes aeneus, Melolontha spp., Migdolus spp., Monochamus spp., Naupactus xanthographus, Necrobia spp., Niptus hololeucus, Oryctes rhinoceros, Oryzaephilus surinamensis, Oryzaphagus oryzae, Otiorrhynchus spp., Oxycetonia jucunda, Phaeton cochleariae, Phyllophaga spp., Phyllophaga helleri, Phyllotreta spp., 10 Popillia japonica, Premnotrypes spp., Prostephanus truncatus, Psylliodes spp., Ptinus spp., Rhizobius ventralis, Rhizophorthera dominica, Sitophilus spp., Sitophilus oryzae, Sphenophorus spp., Stegobium paniceum, Sternechus spp., Symphyletes spp., Tanymericus spp., Tenebrio molitor, Tenebrioides mauretanicus, Tribolium spp., Trogoderma spp., Tycheus spp., Xylotrechus spp., Zabrus spp.;

from the order Diptera, for example, Aedes spp., Agromyza spp., Anastrepha spp., Anopheles spp., 15 Asphondylia spp., Bactrocera spp., Bibio hortulanus, Calliphora erythrocephala, Calliphora vicina, Ceratitis capitata, Chironomus spp., Chrysomya spp., Chrysops spp., Chrysosoma pluvialis, Cochliomyia spp., Contarinia spp., Cordylobia anthropophaga, Cricotopus sylvestris, Culex spp., Culicoides spp., Culiceta spp., Cuterebra spp., Dacus oleae, Dasyneura spp., Delia spp., Dermatobia hominis, Drosophila spp., Echinocnemus spp., Fannia spp., Gasterophilus spp., Glossina spp., Haematopota spp., Hydrellia spp., Hydrellia griseola, Hylemyia spp., Hippobosca spp., Hypoderma spp., Liriomyza spp., Lucilia spp., 20 Lutzomyia spp., Mansonia spp., Musca spp., Oestrus spp., Oscinella frit, Paratanytarsus spp., Paralauterborniella subcincta, Pegomyia spp., Phlebotomus spp., Phorbia spp., Phormia spp., Piophilina casei, Prodiptosis spp., Psila rosae, Rhagoletis spp., Sarcophaga spp., Simulium spp., Stomoxys spp., Tabanus spp., Tetanops spp., Tipula spp.;

from the order Heteroptera, for example, Anasa tristis, Antestiopsis spp., Boisea spp., Blissus spp., 25 Calocoris spp., Campylomma livida, Cavelerius spp., Cimex spp., Collaria spp., Creontiades dilutus, Dasynus piperis, Dichelops furcatus, Diconocoris hewetti, Dysdercus spp., Euschistus spp., Eurygaster spp., Heliopeltis spp., Horcias nobilellus, Leptocoris spp., Leptocoris varicornis, Leptoglossus phyllopus, Lygus spp., Macropes excavatus, Miridae, Monalonion atratum, Nezara spp., Oebalus spp., 30 Pentomidae, Piesma quadrata, Piezodorus spp., Psallus spp., Pseudacysta perseae, Rhodnius spp., Sahlbergella singularis, Scaptocoris castanea, Scotinophora spp., Stephanitis nashi, Tibraca spp., Triatoma spp.;

from the order Homoptera, for example, Acizzia acaciaebaileyanae, Acizzia dodonaeae, Acizzia uncatoides, Acrida turrita, Acyrthosipon spp., Acrogonia spp., Aeneolamia spp., Agonosceana spp.,

- Aleyrodes proletella, Aleurolobus barodensis, Aleurothrixus floccosus, Allocaridara malayensis, Amrasca spp., Anuraphis cardui, Aonidiella spp., Aphanostigma piri, Aphis spp., Arboridia apicalis, Arytainilla spp., Aspidiella spp., Aspidiotus spp., Atanus spp., Aulacorthum solani, Bemisia tabaci, Blastopsylla occidentalis, Boreioglycaspis melaleucae, Brachycaudus helichrysi, Brachycolus spp., Brevicoryne brassicae, Cacopsylla spp., Calligypona marginata, Carnecephala fulgida, Ceratovacuna lanigera, Cercopidae, Ceroplastes spp., Chaetosiphon fragaefolii, Chionaspis tegalensis, Chlorita onukii, Chondracris rosea, Chromaphis juglandicola, Chrysomphalus ficus, Cicadulina mbila, Cocomytilus halli, Coccus spp., Cryptomyzus ribis, Cryptoneossa spp., Ctenarytaina spp., Dalbulus spp., Dialeurodes citri, Diaphorina citri, Diaspis spp., Drosicha spp., Dysaphis spp., Dysmicoccus spp., Empoasca spp., Eriosoma spp., Erythroneura spp., Eucalyptolyma spp., Euphyllura spp., Euscelis bilobatus, Ferrisia spp., Geococcus coffeae, Glycaspis spp., Heteropsylla cubana, Heteropsylla spinulosa, Homalodisca coagulata, Hyalopterus arundinis, Icerya spp., Idiocerus spp., Idioscopus spp., Laodelphax striatellus, Lecanium spp., Lepidosaphes spp., Lipaphis erysimi, Macrosiphum spp., Macrosteles facifrons, Mahanarva spp., Melanaphis sacchari, Metcalfiella spp., Metopolophium dirhodum, Monellia costalis, Monelliopsis pecanis, Myzus spp., Nasonovia ribisnigri, Nephrotettix spp., Nettigoniclla spectra, Nilaparvata lugens, Oncometopia spp., Orthezia praelonga, Oxya chinensis, Pachypsylla spp., Parabemisia myricae, Paratrioza spp., Parlatoria spp., Pemphigus spp., Peregrinus maidis, Phenacoccus spp., Phloeomyzus passerinii, Phorodon humuli, Phylloxera spp., Pinnaspis aspidistrae, Planococcus spp., Prosopidopsylla flava, Protopulvinaria pyriiformis, Pseudaulacaspis pentagona, Pseudococcus spp., Psyllopsis spp., Psylla spp., Pteromalus spp., Pyrilla spp., Quadraspidiotus spp., Quesada gigas, Rastrococcus spp., Rhopalosiphum spp., Saissetia spp., Scaphoideus titanus, Schizaphis graminum, Selenaspidus articulatus, Sogata spp., Sogatella furcifera, Sogatodes spp., Stictocephala festina, Siphoninus phillyreae, Tenalaphara malayensis, Tetragonocephala spp., Tinocallis caryaefoliae, Tomaspis spp., Toxoptera spp., Trialeurodes vaporariorum, Trioza spp., Typhlocyba spp., Unaspis spp., Viteus vitifolii, Zyginia spp.;

from the order Hymenoptera, for example, Acromyrmex spp., Athalia spp., Atta spp., Diprion spp., Hoplocampa spp., Lasius spp., Monomorium pharaonis, Sirex spp., Solenopsis invicta, Tapinoma spp., Urocerus spp., Vespa spp., Xeris spp.;

from the order Isopoda, for example, Armadillidium vulgare, Oniscus asellus, Porcellio scaber;

- 30 from the order Isoptera, for example, Coptotermes spp., Cornitermes cumulans, Cryptotermes spp., Incisitermes spp., Microtermes obesi, Odontotermes spp., Reticulitermes spp.;

from the order Lepidoptera, for example, Achroia grisella, Acronicta major, Adoxophyes spp., Aedia leucomelas, Agrotis spp., Alabama spp., Amyelois transitella, Anarsia spp., Anticarsia spp., Argyroproce

- spp., *Barathra brassicae*, *Borbo cinnara*, *Bucculatrix thurberiella*, *Bupalus piniarius*, *Busseola* spp., *Cacoecia* spp., *Caloptilia theivora*, *Capua reticulana*, *Carpocapsa pomonella*, *Carposina niponensis*, *Cheimatobia brumata*, *Chilo* spp., *Choristoneura* spp., *Clysia ambiguella*, *Cnaphalocerus* spp., *Cnaphalocrocis medinalis*, *Cnephasia* spp., *Conopomorpha* spp., *Conotrachelus* spp., *Copitarsia* spp.,
- 5 *Cydia* spp., *Dalaca* noctuoides, *Diaphania* spp., *Diatraea saccharalis*, *Earias* spp., *Ecdytolopha aurantium*, *Elasmopalpus lignosellus*, *Eldana saccharina*, *Ephestia* spp., *Epinotia* spp., *Epiphyas postvittana*, *Etiella* spp., *Eulia* spp., *Eupoecilia ambiguella*, *Euproctis* spp., *Euxoa* spp., *Feltia* spp., *Galleria mellonella*, *Gracillaria* spp., *Grapholitha* spp., *Hedylepta* spp., *Helicoverpa* spp., *Heliothis* spp., *Hofmannophila pseudospretella*, *Homoeosoma* spp., *Homona* spp., *Hyponomeuta padella*, *Kakivoria flavofasciata*,
- 10 *Laphygma* spp., *Laspeyresia molesta*, *Leucinodes orbonalis*, *Leucoptera* spp., *Lithocolletis* spp., *Lithophane antennata*, *Lobesia* spp., *Loxagrotis albicosta*, *Lymantria* spp., *Lyonetia* spp., *Malacosoma neustria*, *Maruca testulalis*, *Mamstra brassicae*, *Melanitis leda*, *Mocis* spp., *Monopis obviella*, *Mythimna separata*, *Nemapogon cloacellus*, *Nymphula* spp., *Oiketicus* spp., *Oria* spp., *Orthaga* spp., *Ostrinia* spp., *Oulema oryzae*, *Panolis flammea*, *Parnara* spp., *Pectinophora* spp., *Perileucoptera* spp., *Phthorimaea*
- 15 spp., *Phyllocnistis citrella*, *Phyllonorycter* spp., *Pieris* spp., *Platynota stultana*, *Plodia interpunctella*, *Plusia* spp., *Plutella xylostella*, *Prays* spp., *Prodenia* spp., *Protoparce* spp., *Pseudaletia* spp., *Pseudaletia unipuncta*, *Pseudoplusia includens*, *Pyrausta nubilalis*, *Rachiplusia nu*, *Schoenobius* spp., *Scirpophaga* spp., *Scirpophaga innotata*, *Scotia segetum*, *Sesamia* spp., *Sesamia inferens*, *Sparganothis* spp., *Spodoptera* spp., *Spodoptera praefica*, *Stathmopoda* spp., *Stomopteryx subsecivella*, *Synanthedon* spp.,
- 20 *Tecia solanivora*, *Thermesia gemmatilis*, *Tinea cloacella*, *Tinea pellionella*, *Tineola bisselliella*, *Tortrix* spp., *Trichophaga tapetzella*, *Trichoplusia* spp., *Tryporyza incertulas*, *Tuta absoluta*, *Virachola* spp.;

from the order Orthoptera or Saltatoria, for example, *Acheta domesticus*, *Dichroplus* spp., *Gryllotalpa* spp., *Hieroglyphus* spp., *Locusta* spp., *Melanoplus* spp., *Schistocerca gregaria*;

- from the order Phthiraptera, for example, *Damalinia* spp., *Haematopinus* spp., *Linognathus* spp.,
- 25 *Pediculus* spp., *Ptirus pubis*, *Trichodectes* spp.;

from the order Psocoptera for example *Lepinatus* spp., *Liposcelis* spp.;

from the order Siphonaptera, for example, *Ceratophyllus* spp., *Ctenocephalides* spp., *Pulex irritans*, *Tunga penetrans*, *Xenopsylla cheopsis*;

- from the order Thysanoptera, for example, *Anaphothrips obscurus*, *Baliothrips biformis*, *Drepanothrips reuteri*, *Enneothrips flavens*, *Frankliniella* spp., *Heliothrips* spp., *Hercinothrips femoralis*,
- 30 *Rhipiphorothrips cruentatus*, *Scirtothrips* spp., *Taeniothrips cardamomi*, *Thrips* spp.;

from the order Zygentoma (=Thysanura), for example, *Ctenolepisma* spp., *Lepisma saccharina*,

*Lepismodes inquilinus*, *Thermobia domestica*;

from the class Symphyla, for example, *Scutigera* spp.;

pests from the phylum Mollusca, especially from the class Bivalvia, for example, *Dreissena* spp., and from the class Gastropoda, for example, *Arion* spp., *Biomphalaria* spp., *Bulinus* spp., *Deroceras* spp.,

5 *Galba* spp., *Lymnaea* spp., *Oncomelania* spp., *Pomacea* spp., *Succinea* spp.;

animal pests from the phyla Plathelminthes and Nematoda, for example, *Ancylostoma duodenale*, *Ancylostoma ceylanicum*, *Ancylostoma braziliense*, *Ancylostoma* spp., *Ascaris* spp., *Brugia malayi*, *Brugia timori*, *Bunostomum* spp., *Chabertia* spp., *Clonorchis* spp., *Cooperia* spp., *Dicrocoelium* spp., *Dictyocaulus filaria*, *Diphyllobothrium latum*, *Dracunculus medinensis*, *Echinococcus granulosus*,  
10 *Echinococcus multilocularis*, *Enterobius vermicularis*, *Fasciola* spp., *Haemonchus* spp., *Heterakis* spp., *Hymenolepis nana*, *Hyostrongylus* spp., *Loa Loa*, *Nematodirus* spp., *Oesophagostomum* spp., *Opisthorchis* spp., *Onchocerca volvulus*, *Ostertagia* spp., *Paragonimus* spp., *Schistosoma* spp., *Strongyloides fuelleborni*, *Strongyloides stercoralis*, *Strongyloides* spp., *Taenia saginata*, *Taenia solium*, *Trichinella spiralis*, *Trichinella nativa*, *Trichinella britovi*, *Trichinella nelsoni*, *Trichinella pseudospiralis*,

15 *Trichostrongylus* spp., *Trichuris trichiura*, *Wuchereria bancrofti*;

phytoparasitic pests from the phylum Nematoda, for example, *Aphelenchoides* spp., *Bursaphelenchus* spp., *Ditylenchus* spp., *Globodera* spp., *Heterodera* spp., *Longidorus* spp., *Meloidogyne* spp., *Pratylenchus* spp., *Radopholus* spp., *Trichodorus* spp., *Tylenchulus* spp., *Xiphinema* spp., *Helicotylenchus* spp., *Tylenchorhynchus* spp., *Scutellonema* spp., *Paratrichodorus* spp., *Meloidinema* spp.,  
20 *Paraphelenchus* spp., *Aglenchus* spp., *Belonolaimus* spp., *Nacobbus* spp., *Rotylenchulus* spp., *Rotylenchus* spp., *Neotylenchus* spp., *Paraphelenchus* spp., *Dolichodorus* spp., *Hoplolaimus* spp., *Punctodera* spp., *Criconebella* spp., *Quinisulcius* spp., *Hemicyclophora* spp., *Anguina* spp., *Subanguina* spp., *Hemicriconebellus* spp., *Psilenchus* spp., *Pseudohalenchus* spp., *Criconebellus* spp., *Cacopaurus* spp.

25 It is furthermore possible to control organisms from the subphylum Protozoa, especially from the order Coccidia, such as *Eimeria* spp.

The active ingredient combinations can be converted to the customary formulations, such as solutions, emulsions, wettable powders, suspensions, powders, dusts, pastes, soluble powders, granules, suspoemulsion concentrates, natural products impregnated with active ingredient, synthetic substances  
30 impregnated with active ingredient, and also microencapsulations in polymeric substances.

These formulations are produced in a known manner, for example by mixing the active ingredients with

extenders, i.e. liquid solvents, and/or solid carriers, optionally with the use of surfactants, i.e. emulsifiers and/or dispersants, and/or foam formers.

If the extender used is water, it is also possible to use, for example, organic solvents as auxiliary solvents. Useful liquid solvents essentially include: aromatics such as xylene, toluene or alkylnaphthalenes, chlorinated aromatics and chlorinated aliphatic hydrocarbons such as chlorobenzenes, chloroethylenes or methylene chloride, aliphatic hydrocarbons such as cyclohexane or paraffins, for example mineral oil fractions, mineral and vegetable oils, alcohols such as butanol or glycol and their ethers and esters, ketones such as acetone, methyl ethyl ketone, methyl isobutyl ketone or cyclohexanone, strongly polar solvents such as dimethylformamide and dimethyl sulfoxide, and also water.

10 Useful solid carriers include:

for example ammonium salts and ground natural minerals, such as kaolins, clays, talc, chalk, quartz, attapulgite, montmorillonite or diatomaceous earth, and ground synthetic minerals, such as finely divided silica, alumina and silicates; suitable solid carriers for granules are for example crushed and fractionated natural rocks, such as calcite, marble, pumice, sepiolite, dolomite and synthetic granules of inorganic and organic meals, and granules of organic material, such as sawdust, coconut shells, maize cobs and tobacco stalks; suitable emulsifiers and/or foam formers are for example nonionic and anionic emulsifiers, such as polyoxyethylene fatty acid esters, polyoxyethylene fatty alcohol ethers, for example alkylaryl polyglycol ethers, alkylsulphonates, alkyl sulphates, arylsulphonates and protein hydrolysates; suitable dispersants are for example lignosulphite waste liquors and methylcellulose.

20 In the formulations it is possible to use tackifiers such as carboxymethylcellulose, natural and synthetic polymers in the form of powders, granules or latices, such as gum arabic, polyvinyl alcohol and polyvinyl acetate, or else natural phospholipids such as cephalins and lecithins and synthetic phospholipids. Further additives may be mineral and vegetable oils.

25 It is possible to use dyes such as inorganic pigments, for example iron oxide, titanium oxide and Prussian Blue, and organic dyes such as alizarin dyes, azo dyes and metal phthalocyanine dyes, and trace nutrients such as salts of iron, manganese, boron, copper, cobalt, molybdenum and zinc.

The formulations contain generally between 0.1 and 95% by weight of active ingredient, preferably between 0.5 and 90%.

30 The inventive active ingredient combinations may be present in commercially available formulations and in the use forms, prepared from these formulations, as a mixture with other active ingredients, such as insecticides, attractants, sterilants, bactericides, acaricides, nematocides, fungicides, growth regulators or

herbicides. The insecticides include, for example, phosphoric esters, carbamates, carboxylic esters, chlorinated hydrocarbons, phenylureas, substances produced by microorganisms, etc.

A mixture with other known active ingredients, such as herbicides, or with fertilizers and growth regulators, is also possible.

- 5 When used as insecticides, the inventive active ingredient combinations may also be present in their commercially available formulations and in the use forms, prepared from these formulations, as a mixture with synergists. Synergists are compounds which enhance the action of the active ingredients, without any need for the synergist added to be active itself.

- 10 The active ingredient content of the use forms prepared from the commercially available formulations may vary within wide limits. The active ingredient concentration of the application forms may be from 0.0000001 to 95% by weight of active ingredient, preferably between 0.0001 and 1% by weight.

The compounds are applied in a customary manner appropriate for the use forms.

- 15 All plants and plant parts can be treated in accordance with the invention. Plants are understood here to mean all plants and plant populations, such as desired and undesired wild plants or crop plants (including naturally occurring crop plants). Crop plants may be plants which can be obtained by conventional breeding and optimization methods or by biotechnological and genetic engineering methods or combinations of these methods, including the transgenic plants and including the plant varieties which are protectable and non-protectable by plant breeders' rights. Plant parts are understood to mean all parts and organs of plants above and below the ground, such as shoot, leaf, flower and root, examples of which  
20 include leaves, needles, stalks, stems, flowers, fruit bodies, fruits, seeds, roots, tubers and rhizomes. The plant parts also include harvested material and vegetative and generative propagation material, for example cuttings, tubers, rhizomes, slips and seeds.

- 25 The inventive treatment of the plants and plant parts with the active ingredient combinations is effected directly or by allowing them to act on the surroundings, habitat or storage space thereof by the customary treatment methods, for example by dipping, spraying, vaporizing, pouring on, nebulizing, scattering, painting on, and, in the case of propagation material, especially in the case of seeds, also by applying one or more coats.

- 30 As already mentioned above, it is possible to treat all plants and their parts in accordance with the invention. In a preferred embodiment, wild plant species and plant cultivars, or those obtained by conventional biological breeding methods, such as crossing or protoplast fusion, and also parts thereof, are treated. In a further preferred embodiment, transgenic plants and plant cultivars obtained by genetical

engineering, if appropriate in combination with conventional methods (Genetically Modified Organisms), and parts thereof are treated. The term "parts" or "parts of plants" or "plant parts" has been explained above.

More preferably, plants of the plant cultivars which are each commercially available or in use are treated  
5 in accordance with the invention.

Depending on the plant species or plant cultivars, and the location and growth conditions (soils, climate, vegetation period, diet) thereof, the inventive treatment may also result in superadditive ("synergistic") effects. For example, possibilities include reduced application rates and/or broadening of the activity spectrum and/or an increase in the activity of the compounds and compositions usable in accordance with  
10 the invention, better plant growth, increased tolerance to high or low temperatures, increased tolerance to drought or to levels of water or soil salinity, enhanced flowering performance, easier harvesting, accelerated ripening, higher yields, higher quality and/or higher nutritional value of the harvested products, increased storage life and/or processibility of the harvested products, which exceed the effects normally to be expected.

15 The transgenic plants or plant cultivars (those obtained by genetic engineering) which are to be treated with preference in accordance with the invention include all plants which, through the genetic modification, received genetic material which imparts particular advantageous useful properties ("traits") to these plants. Examples of such properties are better plant growth, increased tolerance to high or low temperatures, increased tolerance to drought or to levels of water or soil salinity, enhanced flowering  
20 performance, easier harvesting, accelerated ripening, higher yields, higher quality and/or a higher nutritional value of the harvested products, better storage life and/or processibility of the harvested products. Further and particularly emphasized examples of such properties are an improved defence of the plants against animal and microbial pests, such as against insects, mites, phytopathogenic fungi, bacteria and/or viruses, and also increased tolerance of the plants to certain herbicidally active ingredients.  
25 Examples of transgenic plants which may be mentioned are the important crop plants, such as cereals (wheat, rice), maize, soya beans, potatoes, cotton, oilseed rape and also fruit plants (with the fruits apples, pears, citrus fruits and grapes), and particular emphasis is given to maize, soya beans, potatoes, cotton and oilseed rape. Traits that are emphasized are in particular increased defence of the plants against insects by toxins formed in the plants, in particular those formed in the plants by the genetic material from  
30 *Bacillus thuringiensis* (for example by the genes CryIA(a), CryIA(b), CryIA(c), CryIIA, CryIIIA, CryIIIB2, Cry9c, Cry2Ab, Cry3Bb and CryIF and also combinations thereof) (hereinbelow referred to as "Bt plants"). Traits that are additionally particularly emphasized are the increased tolerance of the plants to certain active herbicidal ingredients, for example imidazolinones, sulphonylureas, glyphosate or phosphinothricin (for example the "PAT" gene). The genes which impart the desired traits in question may

also be present in combinations with one another in the transgenic plants. Examples of "Bt plants" include maize varieties, cotton varieties, soya varieties and potato varieties which are sold under the trade names YIELD GARD® (for example maize, cotton, soya), KnockOut® (for example maize), StarLink® (for example maize), Bollgard® (cotton), Nucotn® (cotton) and NewLeaf® (potato). Examples of herbicide-tolerant plants include maize varieties, cotton varieties and soya varieties which are sold under the trade names Roundup Ready® (tolerance to glyphosate, for example maize, cotton, soya), Liberty Link® (tolerance to phosphinothricin, for example oilseed rape), IMI® (tolerance to imidazolinones) and STS® (tolerance to sulphonylureas, for example maize). Herbicide-resistant plants (plants bred in a conventional manner for herbicide tolerance) also include the varieties sold under the Clearfield® name (for example maize). Of course, these statements also apply to plant cultivars which have these genetic traits or genetic traits which are still to be developed and will be developed and/or marketed in the future.

The plants listed can be treated according to the invention in a particularly advantageous manner with the active compound mixture according to the invention. The preferred ranges stated above for the mixtures also apply to the treatment of these plants. Particular emphasis is given to the treatment of plants with the mixtures specifically mentioned in the present text.

Using a compound of formula (I) and at least one biological control agent selected from bacteria, in particular spore-forming bacteria, fungi or yeasts, protozoas, viruses, and entomopathogenic nematodes and optionally an inoculant, as a combination is particularly suitable for treating seed. A large part of the damage to crop plants caused by harmful agricultural pests and/or plant diseases is triggered by an infection of the seed during storage or after sowing as well as during and after germination of the plant. This phase is particularly critical since the roots and shoots of the growing plant are particularly sensitive, and even small damage may result in a weak plant (unhealthy plant), reduced yield and even in the death of the plant.

The control of pests and/or phytopathogens by treating the seed of plants has been known for a long time and is the subject of continuous improvements. However, the treatment of seed entails a series of problems which cannot always be solved in a satisfactory manner. Thus, it is desirable to develop methods for protecting the seed and the germinating plant which dispense with the additional application of crop protection agents after sowing or after the emergence of the plants or which at least considerably reduce additional application. It is furthermore desirable to optimize the amount of agrochemicals employed in such a way as to provide maximum protection for the seed and the germinating plant from attack by agricultural pests, but without damaging the plant itself by the active compound employed. In particular, methods for the treatment of seed should also take into consideration the intrinsic insecticidal properties of plants in order to achieve optimum protection of the seed and the germinating plant with a minimum of agrochemicals being employed.

As already mentioned, the compound of formula (I) and the biological control agent selected from bacteria, in particular spore-forming bacteria, fungi or yeasts, protozoas, viruses, and entomopathogenic nematodes and optionally an inoculant can be employed or used according to the invention as a solo- or a combined-formulation. Such formulations may include agriculturally suitable auxiliaries, solvents, carriers, surfactants and/or extenders.

According to the invention biological control agents which are summarized under the term "bacteria" include spore-forming, root-colonizing bacteria, or bacteria useful as biofungicide. Examples of such bacteria to be used or employed according to the invention are:

- (1.1) *Bacillus agri*, (1.2) *Bacillus aizawai*, (1.3) *Bacillus albolactis*, (1.4) *Bacillus amyloliquefaciens*, in particular the strain IN937a, or strain FZB42 (DSM 23117) (product known as RhizoVital®) or strain B3 or var *amyloliquefaciens* D747, (1.5) *Bacillus cereus*, in particular spores of *Bacillus cereus* strain CNCM I-1562 (cf. US 6,406,690), (1.6) *Bacillus coagulans*, (1.7) *Bacillus endoparasiticus*, (1.8) *Bacillus endorhythmos*, (1.9) *Bacillus azotoformans*, (1.10) *Bacillus kurstaki*, (1.11) *Bacillus lacticola*, (1.12) *Bacillus lactimorbus*, (1.13) *Bacillus lactis*, (1.14) *Bacillus laterosporus*, (1.15) *Bacillus lentimorbus*, (1.16) *Bacillus licheniformis*, (1.17) *Bacillus medusa*, (1.18) *Bacillus megaterium*, (1.19) *Bacillus metiens*, (1.20) *Bacillus natto*, (1.21) *Bacillus nigrificans*, (1.22) *Bacillus popillae*, (1.23) *Bacillus pumilus*, in particular strain GB34 (ATCC700814) (products known as Yield Shield®) and strain QST2808 (NRRL-B-30087) (products known as Sonata QST 2808®, Ballad) or strain BU F-33 (product known as Integral F-33), (1.24) *Bacillus siamensis*, (1.25) *Bacillus sphaericus* (products known as VectoLexs®), (1.26) *Bacillus subtilis*, in particular strain GB03 (products known as Kodiak®) and strain QST 713 (NRRL B-21661) (products known as Serenade QST 713®, Serenade Soil, Serenade Max, Rhapsody), or *Bacillus subtilis* var. *amyloliquefaciens* strain FZB24 (products known as Taegro®, Rhizopro, FZB24) or strain MBI 600 (products known as Subtilex), (1.27) *Bacillus thuringiensis*, in particular *Bacillus thuringiensis* var. *israelensis* (products known as VectoBac®) or *Bacillus thuringiensis* subsp. *aizawai* strain ABTS-1857 (products known as XenTari®), or *Bacillus thuringiensis* subsp. *kurstaki* strain HD-1 (products known as Dipel® ES) or *Bacillus thuringiensis* subsp. *tenebrionis* strain NB 176 (products known as Novodor® FC) or *Bacillus thuringiensis* subsp. *morrisoni* or *Bacillus thuringiensis* var. *san diego* or *Bacillus thuringiensis* subsp. *thuringiensis* (serotype 1) MPPL002, or *Bacillus thuringiensis* var. *aegyptii*, or *Bacillus thuringiensis* var. *colmeri*, or *Bacillus thuringiensis* var. *darmstadiensis*, or *Bacillus thuringiensis* var. *Dendrolimus*, or *Bacillus thuringiensis* var. *Galleriae*, or *Bacillus thuringiensis* var. *Japonensis*, or *Bacillus thuringiensis* strain HD-1 (products known as Dipel® ES), or *Bacillus thuringiensis* var. 7216, or *Bacillus thuringiensis* var. T36, (1.28) *Bacillus uniflagellatus*, (1.29)

- Delftia acidovorans, in particular strain RAY209 (products known as BioBoost®), (1.30)  
 Lysobacter antibioticus, in particular strain 13-1 (cf. Biological Control 2008, 45, 288-296), (1.31)  
 Pasteuria penetrans, (1.32) Pseudomonas chlororaphis, in particular strain MA 342 (products  
 known as Cedomon), (1.33) Pseudomonas proradix (products known as Proradix®), (1.34)  
 5 Streptomyces galbus, in particular strain K61 (products known as Mycostop®, cf. Crop Protection  
 2006, 25, 468-475), (1.35) Streptomyces griseoviridis (products known as Mycostop®), (1.36)  
 Bacillus lautus, (1.37) Bacillus atrophaeus, (1.38) Bacillus anthracis, (1.39) Bacillus mycoides, in  
 particular isolate J/BmJ or strain 683, (1.40) Bacillus acidoterrestris, (1.41) Bacillus fastidiosus,  
 (1.42) Bacillus megaterium, (1.43) Bacillus psychrosaccharolyticus, (1.44) Bacillus maroccanus,  
 10 (1.45) Bacillus megaterium C, (1.46) Bacillus pantothenicus, (1.47) Bacillus lentus, (1.48)  
 Bacillus badius, (1.49) Bacillus smithi and (1.50) Bacillus firmus, in particular strain I-1582,  
 (1.51) Bacillus circulans, (1.52) Paenibacillus polymyxa, (1.53) Paenibacillus popilliae (formerly  
 Bacillus popilliae), (1.54) Serratia entomophila, (1.55) Chromobacterium subtsugae in particular  
 strain PRAA4-1T (product known as Grandevo), (1.56) Acinetobacter sp., (1.57) Pasteuria usgae  
 15 (product known as Econem™ Biological Nematicide), (1.58) Bacillus chitinosporus (product  
 known as Ne-Plex), (1.59) Pseudomonas cepacia (ex Burkholderia cepacia) in particular strains  
 M54 and strain J82, and (1.60) Bacillus nematocida, (1.61) Xenorhabdus luminescence, (1.62)  
 Brevibacillus laterosporus (also known as Bacillus laterosporus), in particular strain 64 or strain  
 G4 or strain 1111 or strain 1645 or strain 1647, (1.63) Corynebacterium paurometabolum, (1.64)  
 20 Lactobacillus acidophilus (products known as Fruitsan®), (1.65) Paenibacillus alvei, in  
 particular strain T36 or strain III3DT-1A or strain III2E or strain 46C3 or strain 2771, (1.66)  
 Paenibacillus macerans, (1.67) Pasteuria nishizawae, in particular strain Pn1, (1.68) Pasteuria  
 ramosa, (1.69) Pasteuria thornei, (1.70) Pseudomonas aeruginosa, (1.71) Pseudomonas  
 aureofaciens, (1.72) Pseudomonas fluorescens (products known as BlightBan or Victus), (1.73)  
 25 Pseudomonas putida, (1.74) Pseudomonas resinovorans (products known as Solanacure), (1.75)  
 Pseudomonas syringae (products known as Bio-Save), (1.76) Serratia marcescens, in particular  
 strain SRM (MTCC8708) or strain R35, (1.77) Streptomyces candidus (products known as  
 BioAid), (1.78) Streptomyces lydicus, in particular strain WYCD108 and strain WYEC108  
 (products known as ActinovateSP), (1.79) Streptomyces saraceticus, (1.80) Streptomyces  
 30 venezuelae, (1.81) Xenorhabdus nematophila, (1.82) Agrobacterium radiobacter, (1.83) Bacillus  
 mojavenensis, especially strain CECT-7666, (1.84) Pantoea agglomerans, in particular strain E325  
 (products known as Bloomtime Biological FD Biopesticide), (1.85) Streptomyces colombiensis,  
 (1.86) Streptomyces sp. WYE 20 (KCTC 0341BP) and WYE 324 (KCTC 0342BP), (1.87)  
 Bacillus brevis (also known as Brevibacillus brevis), (1.88) Erwinia carotovora (also known as  
 35 Pectobacterium carotovorum) carotovora (product known as Biokeeper), (1.89) Xanthomonas

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campestris pv vesicatoria (product known as Camprico), (1.90) *Pasteuria reniformis*, in particular strain Pr3, (1.91) *Burkholderia spec* strain A396 (NRRL B-50319) (product known as MBI-206 EP or MBI-206-TGAI).

Bacillus (abbreviation: B.) is a genus of rod-shaped, gram-positive bacteria, which can produce endospores under stressful environmental conditions. The single species of this genus differ strongly with respect to their useability in the area of plant protection. *Bacillus firmus*, strain I-1582, is known as nematicide with a high potential to increase plant growth and health. It can be used for soil application and seed treatment.

*Bacillus subtilis*, for example the strains GB03 and QST 713, as well as *Bacillus subtilis* var *amyloliquefaciens* strain FZB 24 and *Bacillus amyloliquefaciens* strain 42, are species with phytopathogenic properties. These bacteria are applied to the soil and/or to the leaves.

*Bacillus thuringiensis* with its different subspecies produces endotoxin containing crystals which have high insect pathogenic specificity. *Bacillus thuringiensis* subsp. *kurstaki*, strain HD-1, is used for control of lepidopteran larvae, but without noctuidae. *Bacillus thuringiensis* subsp. *aizawai*, for example the strains SAN 401 I, ABG-6305 and ABG-6346, is effective against different lepidopteran species including also noctuidae. *Bacillus thuringiensis* subsp. *tenebrionis*, for example the strains SAN 418 I and ABG-6479, protects plants against leaf beetle larvae. *Bacillus thuringiensis* subsp. *israelensis*, for example the strains SAN 402 I and ABG-6164, is applied against larvae of various dipteran pests, e.g. mosquitoes and nematoceres.

From the given bacteria (1.1) to (1.91) or (1.1) to (1.50), such bacteria or mutants thereof that have an insecticidal or plant growth promoting activity are preferred to be used or employed in the present invention, in one embodiment in combination with compound (I), optionally in the presence of an inoculant.

From the given bacteria (1.1) to (1.91) (1.1) to (1.50), such bacteria or mutants thereof that have a fungicidal activity are preferred to be used or employed in the present invention, in one embodiment in combination with compound (I), optionally in the presence of an inoculant.

In one embodiment, from the given bacteria (1.1) to (1.91) or (1.1) to (1.50), the bacteria given under the numbers (1.4), (1.5), (1.6), (1.15), (1.16), (1.17), (1.22), (1.23), (1.26), (1.27), (1.50) and (1.36) to (1.45) are to be used or employed in the present invention, such as in combination with compound (I), optionally in the presence of an inoculant. These bacteria belong to the class of group 1 bacteria as disclosed in Ash et al., 1991, Lett Appl Microbiology 13, 202-206. The genealogy of group 1 bacteria is also shown in Figure 1. Notably, Group 1 bacteria can be divided into subgroups depending on the

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ramification within the group. Thus, subgroup (1) consists of *B. pantothenicus*, *B. lentus*, *B. badius*, and *B. smithi*; subgroup (2) consists of *B. azotoformans*, *B. firmus*, *B. circulans*, *B. benzoovorans*, *B. simplex*, *B. marrocanus*, *B. psychrosaccharolyticus*, *B. megaterium* and *B. fastidiosus*; and subgroup (3) consists of *B. lautus*, *B. licheniformis*, *B. subtilis*, *B. amyloliquefaciens*, *B. lentimorbus*, *B. popilliae*, *B. atrophaeus*, *B. pumilus*, *B. cereus*, *B. anthracis*, *B. thuringiensis*, *B. medusa*, *B. mycoides*, *B. coagulans*, and *B. acidoterrestris*. Subgroup (3) can be further divided into subgroup (3a) consisting of *B. lautus*, *B. licheniformis*, *B. subtilis*, *B. amyloliquefaciens*, *B. lentimorbus*, *B. popilliae*, and *B. atrophaeus*; subgroup (3b) consisting of *B. pumilus*, *B. cereus*, *B. anthracis*, *B. thuringiensis*, *B. medusa*, and *B. mycoides*; and subgroup (3c) consisting of *B. coagulans*, and *B. acidoterrestris*.

10 Subgroup (4) consists of *B. firmus*.

In one embodiment, the bacteria of subgroup (3), (3a), (3b) or (3c) or (4) are to be used or employed in the present invention, such as in combination with compound (I), optionally in the presence of an inoculant.

15 In another embodiment, the bacteria of subgroup (1) are to be used or employed in the present invention, such as in combination with compound (I), optionally in the presence of an inoculant.

In another embodiment, the bacteria given under the numbers (1.4), (1.5), (1.23), and (1.26) are to be used or employed in the present invention, such as in combination with compound (I), optionally in the presence of an inoculant.

20 From the given bacteria (1.4), the bacteria (1.4a) *Bacillus amyloliquefaciens* strain IN937a, and (1.4b) *Bacillus amyloliquefaciens* strain FZB42 are used or employed in the present invention, in one embodiment in combination with compound (I), optionally in the presence of an inoculant.

From the given bacteria (1.5), the bacterium (1.5a) *Bacillus cereus* strain CNCM I-1562 especially spores are used or employed in the present invention, in one embodiment in combination with compound (I), optionally in the presence of an inoculant.

25 From the given bacteria (1.23), the bacterium (1.23a) *Bacillus pumilus* strain GB34 or (1.23b) *Bacillus pumilus* strain QST2808 is used or employed in the present invention, in one embodiment in combination with compound (I), optionally in the presence of an inoculant.

30 From the given bacteria (1.26), the bacteria (1.26a) *Bacillus subtilis* strain GB03 and (1.26b) *Bacillus subtilis* var. *amyloliquefaciens* strain FZB24 or (1.26c) *Bacillus subtilis* strain QST 713 are used or employed in the present invention in one embodiment in combination with compound (I), optionally in the presence of an inoculant.

From the given bacteria (1.27), the bacteria (1.27a) *Bacillus thuringiensis* subsp. *tenebrionis* NB 176, (1.27b) *Bacillus thuringiensis* subsp. *aizawai* strain ABTS-1857, (1.27c) *Bacillus thuringiensis* subsp. *israelensis* strain AM 65-52. and (1.27d) *Bacillus thuringiensis* subsp. *kurstaki* HD-1 are used or employed in the present invention in one embodiment in combination with compound (I), optionally in the presence of an inoculant.

In another embodiment, the bacteria of subgroup (4) are to be used or employed in the present invention, such as in combination with compound (I), optionally in the presence of an inoculant.

From the given bacteria (1.50), the bacterium (1.50a) *Bacillus firmus* strain I-1582 especially spores are used or employed in the present invention, in one embodiment in combination with compound (I), optionally in the presence of an inoculant.

According to the invention biological control agents that are summarized under the term "fungi" or "yeasts" are:

(2.1) *Ampelomyces quisqualis*, in particular strain AQ 10 (product known as AQ 10<sup>®</sup>), (2.2) *Aureobasidium pullulans*, in particular blastospores of strain DSM14940 or blastospores of strain DSM 14941 or mixtures thereof (product known as Blossom Protect<sup>®</sup>), (2.3) *Beauveria bassiana*, in particular strain ATCC 74040 (products known as Naturalis<sup>®</sup>) or strain ATP02 (DSM 24665) or strain GHA (products known as BOTANIGARD<sup>®</sup> 22WP, MYCOTROL<sup>®</sup> O) or strain CG716 (product known as BoveMax), (2.4) *Candida oleophila*, in particular strain O (products known as Nexy<sup>®</sup>) or strain I-182 (products known as ASPIRE<sup>®</sup>, Decco I-182), (2.6) *Coniothyrium minitans*, in particular strain CON/M/91-8 (DSM-9660) (products known as Contans<sup>®</sup>), (2.7) *Dilophosphora alopecuri* (products known as Twist Fungus<sup>®</sup>), (2.8) *Gliocladium catenulatum*, in particular strain J1446 (products known as Prestop<sup>®</sup>), (2.9) *Lecanicillium lecanii* (formerly known as *Verticillium lecanii*), in particular conidia of strain KV01 (products known as Mycotol<sup>®</sup>, Vertalec<sup>®</sup>) or strain DAOM198499 or strain DAOM216596, (2.10) *Metarhizium anisopliae*, in particular strain F52 (DSM 3884, ATCC 90448) (products known as BIO 1020, MET52) or var. *acridum* isolate IMI 330189/ARSEF 7486 (products known as Green Muscle<sup>®</sup>), (2.11) *Metschnikovia fructicola*, in particular the strain NRRL Y-30752 (products known as Shemer<sup>®</sup>), (2.12) *Microsphaeropsis ochracea* (products known as Microx<sup>®</sup>), (2.13) *Muscodor albus*, in particular strain QST 20799 (products known as QRD300), (2.14) *Nomuraea rileyi*, in particular strains SA86101, GU87401, SR86151, CG128 and VA9101, (2.15a) *Paecilomyces lilacinus*, in particular spores of *P. lilacinus* strain 251 (AGAL 89/030550) (products known as BioAct<sup>®</sup>, cf. *Crop Protection* 2008, 27, 352-361), or (2.15b) *Paecilomyces fumosoroseus* (also known as *Isaria fumosorosea*), in particular strain apopka 97 (ATCC 20874) (products known as PreFeRal<sup>®</sup> WG,

PFR-97TM 20% WDG) or strain strain FE 9901, (2.16) *Penicillium bilaii*, in particular strain ATCC22348 (products known as JumpStart®, PB-50, Provide), (2.17) *Pichia anomala*, in particular strain WRL-076, (2.18) *Pseudozyma flocculosa*, in particular strain PF-A22 UL (products known as Sporodex® L), (2.19) *Pythium oligandrum*, in particular strain DV74  
 5 (products known as Polyversum), (2.20) *Trichoderma asperellum*, in particular strain ICC 012 (products known as Bioten®) or strain SKT-1 (products known as ECO-HOPE®) or strain T34/CECT No. 20417 (products known as T34 Biocontrol) or strain SF04, (2.21) *Trichoderma harzianum*, in particular *T. harzianum* T39 (products known as Trichodex®) or strain T-22 (products known as PLANTSHIELD®T-22G, Rootshield, TurfShield), or strain TH 35 (products  
 10 known as ROOT PRO®) or strain TSTh20/PTA-0317 or strain 1295-22 (products known as Bio-Trek), and (2.22) *Beauveria brongniartii*, (2.23) *Aschersonia aleyrodes*, (2.24) *Hirsutella thompsonii* (product known as Mycohit), (2.25) *Lagenidium giganteum* (products known as LAGINEX®), (2.26) *Metarhizium flavoviride*, (2.27) *Myrothecium verrucaria*, in particular strain strain AARC-0255 (product known as DiTera™), (2.28) *Pandora delphacis*, (2.29) *Tsukamurella paurometabola*, in particular strain C-924 (products known as HeberNem®), (2.27) ARF 18 (Arkansas Fungus 18), (2.28) *Glomus aggregatum*, (2.29) *Glomus etunicatum*, (2.30) *Glomus intraradices*, (2.31) *Glomus mosseae*, (2.32) *Trichoderma atroviride*, in particular strain CNCM I-1237 or strain NMI V08/002387, or strain NMI V08/002389 or strain SKT-1/FERM P-1651 or strain SKT-2/FERM P-16511 or strain SKT-3/FERM P-17021 (described in JP3691264) or strain  
 20 L52 (product known as SENTINEL®), (2.37) *Arthrobotrys dactyloides*, (2.38) *Arthrobotrys oligospora*, (2.39) *Arthrobotrys superba* (2.40) *Aspergillus flavus* strain NRRL 21882 (product known as Afla-Guard®), (2.41) *Candida saitoana*, in particular strain NRRL Y-21022 (products known as BIOCURE® or BIOCOAT®), (2.42) *Chaetomium cupreum*, (2.43) *Chaetomium globosum*, (2.44) *Chondrostereum purpureum*, in particular strain PFC2139, (2.45)  
 25 *Cladosporium cladosporioides* strain H39 (as described in EP2230918 A1), (2.46) *Conidiobolus obscurus*, (2.47) *Cryptococcus albidus* (product known as Yield Plus®), (2.48) *Cryptococcus flavescens*, in particular strain NRRL Y- 50378 and strain NRRL Y-50379, (2.49) *Dactylaria candida*, (2.50) *Entomophthora virulenta*, (2.51) *Harposporium anguillulae*, (2.52) *Hirsutella minnesotensis*, (2.53) *Hirsutella rhossiliensis*, (2.54) *Meristacrum asterospermum*, (2.55)  
 30 *Microdochium dimerum*, (2.56) *Monacrosporium cionopagum*, (2.57) *Monacrosporium psychrophilum*, (2.58) *Monacrosporium drechsleri*, (2.59) *Monacrosporium geophyropagum*, (2.60) *Ophiostoma piliferum*, in particular strain D97 (products known as Sylvanex), (2.61) *Paecilomyces variotii*, in particular strain Q-09 (product known as Nemaquim), (2.62) *Pochonia chlamydosporia* (= *Vercillium chlamydosporium*), (2.63) *Pseudozyma aphidis*, (2.64)  
 35 *Stagonospora heteroderae*, (2.65) *Stagonospora phaseoli*, (2.66) *Talaromyces flavus*, in

particular strain V117b (products known as PROTUS®), (2.67) *Trichoderma viride* (also known as *Trichoderma gamsii*), in particular strain ICC 080 (products known as REMEDIER® WP, Bioderma®) and strain TV1 (products known as T. viride TV1, Agribiotech), (2.68) *Trichoderma harmatum*, isolate 382 (2.69) *Trichoderma koningii*, (2.70) *Trichoderma lignorum*, (2.71) *Trichoderma polysporum*, isolate IMI 206040 (ATCC 20476), (2.72) *Trichoderma stromaticum*, (2.73) *Trichoderma virens* (also known as *Gliocladium virens*), in particular strain GL-21 (products known as SOILGARD®), (2.74) *Ulocladium oudemansii*, in particular strain HRU3 (products known as BOTRY-ZEN®), (2.75) *Verticillium albo-atrum* in particular strain WCS850, (2.76) *Verticillium chlamydosporium*, (2.77) *Verticillium dahlia* isolate WCS 850 (products known as Dutch Trig), (2.78) *Zoophtora radicans*, (2.79) *Cylindrocarpon heteronema*, (2.80) *Exophiala jeanselmei*, (2.81) *Exophiala pisciphila*, (2.82) *Fusarium aspergillus*, (2.83) *Fusarium oxysporum*, for example the non pathogenic strain Fo47 (product FUSACLEAN) or the non pathogenic strain 251/2RB (product known as BIOFOX®), (2.84) *Fusarium solani*, for example strain Fs-K (as described in patent application US20110059048), (2.85) *Gliocladium roseum*, (2.86) *Mucor haemelis* (products known as BIO-AVARD), (2.87) *Nematoctonus geogenius*, (2.88) *Nematoctonus leiosporus*, (2.89) *Phlebiopsis gigantea* (products known as ROTSOP®), (2.90) *Trichoderma album* (products known as Biozeid®),

In one embodiment, from the given fungi and yeasts (2.1) to (2.90) or (2-1) to (2-22), the fungi and yeasts given under the numbers (2.10), (2.11), and (2.15) are to be used or employed in the present invention, in one embodiment in combination with compound (I), optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (2.9) *Lecanicillium lecanii*, optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (2.9a) *Lecanicillium lecanii* strain KV01, optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (2.10) *Metarhizium anisopliae*, in particular strain F 52, optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (2.11) *Metschnikovia fructicola*, in particular strain NRRL Y-30752, optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (2.15a) *Paecilomyces lilacinus*, in particular spores of *P. lilacinus* strain 251, optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (2.14) *Nomuraea rileyi*, optionally in the presence of an inoculant.

According to the invention biological control agents that are summarized under the term "protozoas" are:

(3.1) *Nosema locustae*, and (3.2) *Vairimorpha*.

- 5 It is preferred to use or employ in the present invention the compound of formula (I) in combination with (3.1) *Nosema locustae*, optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (3.2) *Vairimorpha*, optionally in the presence of an inoculant.

According to the invention biological control agents that are summarized under the term "viruses" are:

- 10 (4.1) Gypsy moth (*Lymantria dispar*) nuclear polyhedrosis virus (NPV), (4.2) Tussock moth (*Lymantriidae*) NPV, (4.3) *Heliothis* NPV, (4.4) Pine sawfly (*Neodiprion*) NPV, and (4.5) Codling moth (*Cydia pomonella*) granulosis virus (GV).

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (4.1) Gypsy moth nuclear polyhedrosis virus (NPV), optionally in the presence of an inoculant.

- 15 It is preferred to use or employ in the present invention the compound of formula (I) in combination with (4.2) Tussock moth NPV, optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (4.3) *Heliothis* NPV, optionally in the presence of an inoculant.

- 20 It is preferred to use or employ in the present invention the compound of formula (I) in combination with (4.4) Pine sawfly NPV, optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (4.5) Codling moth granulosis virus (GV), optionally in the presence of an inoculant.

According to the invention biological control agents that are summarized under the term "entomopathogenic nematode" are:

- 25 (5.1) *Steinernema scapterisci*, (5.2) *Steinernema feltiae*, (5.3) *Steinernema carpocapsae*, (5.4) *Heterorhabditis heliothidis*, and (5.5) *Xenorhabdus luminescens*.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (5.1) *Steinernema scapterisci*, optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (5.2) *Steinernema feltiae*, optionally in the presence of an inoculant.

- 5 It is preferred to use or employ in the present invention the compound of formula (I) in combination with (5.3) *Steinernema carpocapsae*, optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (5.4) *Heterorhabditis heliothidis*, optionally in the presence of an inoculant.

- 10 It is preferred to use or employ in the present invention the compound of formula (I) in combination with (5.5) *Xenorhabdus luminescence*, optionally in the presence of an inoculant.

- Examples for inoculants which may be used or employed according to the invention are bacteria of the genus *Rhizobium leguminosarum*, *Rhizobium tropici*, *Rhizobium loti*, *Rhizobium trifolii*, *Rhizobium meliloti*, *Rhizobium fredii*, *Azorhizobium caulinodans*, *Pseudomonas*, *Azospirillum*, *Azotobacter*, *Streptomyces*, *Burkholdia*, *Agrobacterium*, Endo-, Ecto-, Vesicular-Arbuscular (VA) Mycorrhizza. It is preferred to use soil-inoculants.
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- The amount of the biological control agent selected from bacteria, in particular spore-forming bacteria, fungi or yeasts, protozoas, viruses, and entomopathogenic which is used or employed in combination with a compound of formula (I), preferably with a compound (I), optionally in the presence of an inoculant, depends on the final formulation as well as size or type of the plant, plant parts, seeds, harvested fruits and vegetables to be treated. Usually, the biological control agent to be employed or used according to the invention is present in about 2 % to about 80 % (w/w), preferably in about 5 % to about 75 % (w/w), more preferably about 10 % to about 70 % (w/w) of its solo-formulation or combined- formulation with the compound of formula (I), and optionally the inoculant.
- 20

- If bacteria, fungi or yeasts are selected as biological control agent, in particular those who are named as being preferred, namely (1.4), (1.5), (1.23), (1.26), (1.27), (1.50), (2.10), (2.11), and (2.15a), it is preferred that they are present in a solo-formulation or the combined-formulation in a concentration in excess of  $10^5 - 10^{12}$  cfu/g (colony forming units per gram), preferably in excess of  $10^6 - 10^{11}$  cfu/g, more preferably  $10^7 - 10^{10}$  cfu/g.
- 25

- Also the amount of compound of formula (I) which is used or employed in combination with the biological control agent selected from bacteria, in particular spore-forming bacteria, fungi or yeasts, protozoas, viruses, and entomopathogenic nematodes, optionally in the presence of an inoculant, depends
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on the final formulation as well as size or type of the plant, plant parts, seeds, harvested fruit or vegetable to be treated. Usually, the compound of formula (I) to be employed or used according to the invention is present in about 0.1 % to about 80 % (w/w), preferably 1 % to about 60 % (w/w), more preferably about 10 % to about 50 % (w/w) of its solo-formulation or combined-formulation with the biological control agent selected from bacteria, in particular spore-forming bacteria, fungi or yeasts, protozoas, viruses, and entomopathogenic nematodes, and optionally the inoculant.

It is preferred to employ or use the compound of formula (I) and the biological control agent selected from bacteria, in particular spore-forming bacteria, fungi or yeasts, protozoas, viruses, and entomopathogenic nematodes, and if present also the inoculant in an synergistic weight ratio. The skilled person is able to find out the synergistic weight ratios for the present invention by routine methods. The skilled person understands that these ratios refer to the ratio within a combined-formulation as well as to the calculative ratio of compound of formula (I) and the biological control agent described herein when both components are applied as mono-formulations to a plant to be treated. The skilled person can calculate this ratio by simple mathematics since the volume and the amount of compound of formula (I) and the biological control agent, respectively, in a mono-formulation is known to the skilled person. In one embodiment, the said ratio refer to the ratio of the both components after both components, i.e. compound of formula (I) and the biological control agent, respectively, were applied to a plant to be treated independently whether the components were applied to a plant to be treated in form of solo-applications or in form of a combined-formulation.

In particular, the synergistic weight ratio of the compound of formula (I) to the bacteria, in particular spore forming bacteria, as biological control agent lies in the range of 100 : 1 and 1 : 5000 (wt/wt), 100 : 1 and 1 : 2500 (wt/wt); 100 : 1 and 1 : 1000 (wt/wt), preferably in the range of 50 : 1 and 1 : 500 (wt/wt) further preferably in the range of 10 : 1 and 1 : 500 (wt/wt), 5 : 1 to 1 : 500 (wt/wt), 5 : 1 and 1 : 200 (wt/wt), 5 : 1 and 1 : 100 (wt/wt), 1 : 1 and 1 : 100 (wt/wt), 1 : 1 and 1 : 50 (wt/wt), 1 : 1 and 1 : 10 (wt/wt). It has to be noted that before mentioned ratios ranges are based on the assumption that the spore preparation of the bacterium contains around  $10^{11}$  spores per gram. If spore preparations vary in density, the ratios have to be adapted accordingly to match the above listed ratio ranges. A ratio of 1:100 means 100 weight parts of the spore preparations of the spore forming bacteria to 1 weight part of the compound of formula (I).

In particular, the synergistic weight ratio of the compound of formula (I) to the fungi or yeasts lies in the range of 100 : 1 to 1 : 20.000, preferably in the range of 50:1 to 1:10.000, 10 : 1 and 1 : 5000, 10 : 1 and 1 : 2000, 10 : 1 and 1 : 1000, 5 : 1 and 1 : 1000, 5 : 1 and 1 : 500, 5 : 1 and 1 : 200, 5 : 1 and 1 : 100, 1 : 1 and 1 : 100, 1 : 1 and 1 : 50 . It has to be noted that before mentioned ratios ranges are based on a the spore preparation of the biological control agent which contains approx.  $10^9$ - $10^{10}$  spores (fungi) or cells

(yeast) per gram. If spore preparations vary in density, the ratios have to be adapted accordingly to match the above listed ratio ranges. A ratio of 1:100 means 100 weight parts of the spore or cell preparation of the fungi or yeast to 1 weight part of the compound of formula (I)

In one embodiment of the present invention, a biological control agent is a fungus and the concentration of the fungus after dispersal is at least 50 g/ha, such as 50 – 7500 g/ha, 50 – 2500 g/ha, 50 – 1500 g/ha; at least 250 g/ha (hectare), at least 500 g/ha or at least 800 g/ha.

In one embodiment of the present invention, a biological control agent is a fungus, such as *Paecilomyces lilacinus*, e.g., strain 251, and the concentration of the fungus after dispersal is at least 50 g/ha; at least 100 g/ha; at least 1000 g/ha; at least 2500 g/ha, such as 2500 – 7500 g/ha, 2500 – 6000 g/ha; or at least 4000 g/ha, such as 4000 – 6000 g/ha.

In one embodiment of the present invention, a biological control agent is a fungus, such as *Metarhizium anisopliae*, e.g., strain F52 and the concentration of the fungus after dispersal is at least 50 g/ha, such as 50 – 7500 g/ha, 50 – 2500 g/ha, 50 – 250 g/ha; or at least 100 g/ha, such as 100 g/ha – 1000 g/ha or 100 – 250 g/ha.

In one embodiment of the present invention, a biological control agent is yeast, such as *Metschnikowia fructicola*, and the concentration of the yeast after dispersal is at least 50 g/ha, such as 50 – 5000 g/ha, 50 – 2000 g/ha; at least 1000 g/ha; at least 1500 g/ha, such as 500 – 5000 g/ha, 500 – 2500 g/ha, 500 – 2000 g/ha.

In one embodiment of the present invention, a biological control agent is a bacterium and the concentration of the bacteria after dispersal is at least 50 g/ha, at least 100 g/ha or at least 150 g/ha.

In one embodiment of the present invention, a biological control agent is a bacterium, such as *B. thuringiensis* and the concentration of the bacteria after dispersal is at least 50 g/ha (hectare), such as 50 – 7500 g/ha, 50 – 2500 g/ha, 50 – 1500 g/ha; at least 250 g/ha; at least 100 g/ha, such as 100 – 5000 g/ha, 100 – 2500 g/ha, 100 – 1500 g/ha or 100 – 250 g/ha; or at least 800 g/ha, such as 800 – 5000 g/ha or 800 – 2500 g/ha.

In another embodiment of the present invention, a biological control agent is a bacterium, such as *B. subtilis*, e.g., strain GB 03, and the concentration of the bacteria after dispersal is at least 50 g/ha such as 50 – 5000 g/ha, 50 – 2500 g/ha, 50 – 200 g/ha; at least 100 g/ha, at least 500 g/ha, at least 800 g/ha, such as 800 – 5000 g/ha or 800 – 2500 g/ha.

In one embodiment of the present invention, a biological control agent is a bacterium, such as *B. subtilis*, e.g., strain QST713, and the concentration of the bacteria after dispersal is at least 50 g/ha (hectare), such

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as 50 – 8000 g/ha, 50 – 2500 g/ha, 50 – 1500 g/ha, 50 – 200 g/ha; at least 250 g/ha; at least 100 g/ha, such as 100 – 5000 g/ha, 100 – 2500 g/ha, 100 – 1500 g/ha or 100 – 250 g/ha; or at least 800 g/ha, such as 800 – 5000 g/ha or 800 – 2500 g/ha.

In another embodiment of the present invention, a biological control agent is a bacterium, such as *B. firmus*, e.g., strain I-1582, and the concentration of the bacteria after dispersal is at least 50 g/ha such as 50 – 5000 g/ha, 50 – 2500 g/ha, 50 – 200 g/ha; at least 100 g/ha, at least 500 g/ha, at least 800 g/ha, such as 800 – 5000 g/ha or 800 – 2500 g/ha.

In one embodiment of the present invention, a biological control agent is a bacterium, such as *B. pumilus*, e.g., strain QST2808, and the concentration of the bacteria after dispersal is at least 50 g/ha (hectare), such as 50 – 7500 g/ha, 50 – 2500 g/ha, 50 – 1500 g/ha, 50 – 200 g/ha; at least 250 g/ha; at least 100 g/ha, such as 100 – 5000 g/ha, 100 – 2500 g/ha, 100 – 1500 g/ha or 100 – 250 g/ha; or at least 800 g/ha, such as 800 – 5000 g/ha or 800 – 2500 g/ha.

In another embodiment of the present invention, a biological control agent is a bacterium, such as *B. amyloliquefaciens* and the concentration of the bacteria after dispersal is at least 500 g/ha, such as 500 – 5000 g/ha, 500 – 2500 g/ha.

In one embodiment of the present invention, a biological control agent is a virus and the concentration of the virus after dispersal is at least 50 g/ha such as 50 – 7500 g/ha, 50 – 2500 g/ha, 50 – 1500 g/ha; at least 100 g/ha or at least 150 g/ha.

In one embodiment of the present invention, a biological control agent is a virus, such as Codling moth (*Cydia pomonella*) granulosis virus and the concentration of the virus after dispersal is at least 50 g/ha (hectare) such as 50 – 5000 g/ha, 50 – 2500 g/ha, 50 – 1500 g/ha or 50 – 250 g/ha; or at least 100 g/ha, such as 100 – 1000 g/ha, 100 – 500 g/ha or 100 – 250 g/ha.

In one embodiment of the present invention, a biological control agent is a nematode and the concentration of the nematodes is at least  $10^6$  nematodes/ha, e.g., larval stage nematodes/ha, such as  $10^6$  –  $10^{15}$  nematodes/ha, e.g., larval stage nematodes/ha,  $10^6$  –  $10^{12}$  nematodes/ha, e.g., larval stage nematodes/ha, at least  $10^8$  nematodes/ha, e.g., larval stage nematodes/ha such as  $10^8$  –  $10^{15}$  nematodes/ha, e.g., larval stage nematodes/ha,  $10^8$  –  $10^{12}$  nematodes/ha, e.g., larval stage nematodes/ha; or at least  $10^9$  nematodes/ha, e.g., larval stage nematodes/ha, such as  $10^9$  –  $10^{15}$  nematodes/ha, e.g., larval stage nematodes/ha or  $10^9$  –  $10^{12}$  nematodes/ha, e.g., larval stage nematodes/ha.

In one embodiment of the present invention, the ratios between a compound of formula (I) and bacteria (such as *Bacillus amyloliquefaciens*, *Bacillus subtilis*, *Bacillus firmus*, *Bacillus thuringiensis* subsp.

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*aizawai*, *Bacillus thuringiensis* subsp. *israeliensis*, *Bacillus thuringiensis* subsp. *kurstaki*, *Bacillus thuringiensis* subsp. *tenebrionis*, *Bacillus pumilus*, *Bacillus cereus*) in a combined-formulation or on or in a plant to be treated or its surrounding, habitat or storage space is between 100:1 to 1:1000, between 50:1 to 1:500 or even 5:1 to 1:100.

- 5 In one embodiment of the present invention, the ratios between a compound of formula (I) and fungi (such as *Metarhizium anisopliae*, *Paecilomyces lilacinus*, *Beauveria bassiana*, *Nomuraea rileyi*) in a combined-formulation or on or in a plant to be treated or its surrounding, habitat or storage space is between 100:1 to 1:2000, between 50:1 to 1:1000 or even 25:1 to 1:200.

- 10 In one embodiment of the present invention, the ratios between compound of formula (I) and yeast (such as *Metschnikowia fructicola*) and in a combined-formulation or on or in a plant to be treated or its surrounding, habitat or storage space is between 100:1 to 1:2000, between 50:1 to 1:1000 or even 25:1 to 1:200.

- 15 In one embodiment of the present invention, the ratios between nematodes (such as *Steinernema feltiae* and *Steinernema carpocapsae*) and compound of formula (I) in a solo- or combined-formulation or on or in a plant to be treated or its surrounding, habitat or storage space is between 125:1 to 1:125, between 100:1 to 1:25 or even 50:1 to 1:5.

The good insecticidal and acaricidal action of the inventive combinations is evident from the examples which follow. While the individual active ingredients have weaknesses in their action, the combinations exhibit an action which exceeds a simple sum of actions.

- 20 A synergistic effect in insecticides and acaricides is present whenever the action of the active ingredient combinations is greater than the sum of the actions of the active ingredients applied individually.

#### Formula for the efficacy of the combination of two compounds

The expected efficacy of a given combination of two compounds is calculated as follows (see Colby, S.R., „Calculating Synergistic and antagonistic Responses of Herbicide Combinations“, Weeds 15, pp. 20-22, 1967):

- 25 if

X is the efficacy expressed in % mortality of the untreated control for test compound A at a concentration of m ppm or m g/ha,

Y is the efficacy expressed in % mortality of the untreated control for test compound B at a concentration of n ppm or n g/ha,

E is the efficacy expressed in % mortality of the untreated control using the mixture of A and B at m and n ppm or m and n g/ha,

then is 
$$E = X + Y - \frac{X \cdot Y}{100}$$

5 If the observed insecticidal efficacy of the combination is higher than the one calculated as „E“, then the combination of the two compounds is more than additive, i.e., there is a synergistic effect.

**Examples**

**Example 1:**

**Myzus persicae - test**

- Solvent: 78.0 parts by weight acetone
- 5 1.5 parts by weight dimethylformamide
- Emulsifier: 0.5 parts by weight alkylarylpolyglycolether

To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and emulsifier, and the concentrate is diluted with emulsifier- containing water to the desired concentration. To produce a suitable preparation of a biological suspension the cells or spores are diluted with emulsifier- containing water to the desired concentration.

Chinese cabbage (*Brassica pekinensis*) leaf- discs infected with all instars of the green peach aphid (*Myzus persicae*), are sprayed with a preparation of the active ingredient at the desired concentration.

After the specified period of time mortality in % is determined. 100 % means that all aphids have been killed; 0 % means that none of the aphids have been killed.

- 15 The following combinations of compound (I) and one further active ingredient or biological control agent showed a synergistic effect according to the invention:

**Table 1: Myzus persicae – Test**

| Active ingredient/ biological control agent | Concentration<br>g ai/ha | Mortality in % after 1 <sup>d</sup> |
|---------------------------------------------|--------------------------|-------------------------------------|
| Compound (I)                                | 100                      | 0                                   |
|                                             | 20                       | 0                                   |
|                                             | 4                        | 0                                   |
| Acrinathrin                                 | 0,8                      | 80                                  |
| Compound (I) + Acrinathrin                  | 4 + 0,8                  | <u>obs.</u> * <u>cal.</u> **        |
|                                             |                          | 100 80                              |
| Imidacloprid                                | 0,8                      | 0                                   |
| Compound (I) + Imidacloprid                 | 4 + 0,8                  | <u>obs.</u> * <u>cal.</u> **        |
|                                             |                          | 70 0                                |
| Clothianidin                                | 20                       | 0                                   |
| Compound (I) + Clothianidin                 | 100 + 20                 | <u>obs.</u> * <u>cal.</u> **        |
|                                             |                          | 90 0                                |
| Dinotefuran                                 | 20                       | 0                                   |
| Compound (I) + Dinotefuran                  | 20 + 20                  | <u>obs.</u> * <u>cal.</u> **        |
|                                             |                          | 70 0                                |
| Chlorpyrifos                                | 4                        | 70                                  |

| Active ingredient/ biological control agent | Concentration<br>g ai/ha | Mortality in % after 1 <sup>d</sup>  |
|---------------------------------------------|--------------------------|--------------------------------------|
| Compound (I) + Chlorpyrifos                 | 4 + 4                    | <u>obs.*</u> <u>cal.**</u><br>100 70 |
| Sulfoxaflor                                 | 0,16                     | 0                                    |
| Compound (I) + Sulfoxaflor                  | 4 + 0,16                 | <u>obs.*</u> <u>cal.**</u><br>80 0   |
| Flupyradifurone                             | 20                       | 70                                   |
| Compound (I) + Flupyradifurone              | 100 + 20                 | <u>obs.*</u> <u>cal.**</u><br>90 70  |

| Active ingredient/ biological control agent                                 | Concentration<br>g ai/ha | Mortality in % after 6 <sup>d</sup>  |
|-----------------------------------------------------------------------------|--------------------------|--------------------------------------|
| Compound (I)                                                                | 100<br>20<br>4           | 0<br>0<br>0                          |
| Azadirachtin                                                                | 100                      | 0                                    |
| Compound (I) + Azadirachtin                                                 | 100 + 100                | <u>obs.*</u> <u>cal.**</u><br>70 0   |
| Bacillus subtilis strain GB 03<br>(Kodiak, 5.5 x 10 <sup>10</sup> spores/g) | 2000                     | 0                                    |
| Compound (I) + Bacillus subtilis                                            | 100 + 2000               | <u>obs.*</u> <u>cal.**</u><br>70 0   |
| Cydia pomonella Granuloseviren (CpGV)                                       | 1000                     | 0                                    |
| Compound (I) + CpGV                                                         | 100 + 1000               | <u>obs.*</u> <u>cal.**</u><br>100 0  |
| Chloranthraniliprole                                                        | 4                        | 80                                   |
| Compound (I) + Chloranthraniliprole                                         | 100 + 4                  | <u>obs.*</u> <u>cal.**</u><br>100 80 |
| Milbemectin                                                                 | 4                        | 70                                   |
| Compound (I) + Milbemectin                                                  | 20 + 4                   | <u>obs.*</u> <u>cal.**</u><br>90 70  |
| Pymetrozine                                                                 | 4                        | 0                                    |
| Compound (I) + Pymetrozine                                                  | 4 + 4                    | <u>obs.*</u> <u>cal.**</u><br>100 0  |
| Lambda-Cyhalothrin                                                          | 0,16                     | 0                                    |
| Compound (I) + Lambda-Cyhalothrin                                           | 4 + 0,16                 | <u>obs.*</u> <u>cal.**</u><br>100 0  |
| Dimethoate                                                                  | 20                       | 0                                    |
| Compound (I) + Dimethoate                                                   | 20 + 20                  | <u>obs.*</u> <u>cal.**</u><br>80 0   |

Example 2:

Phaedon cochleariae larvae – spray application

- Solvent:78.0parts by weight of acetone
- 1.5parts by weight of dimethylformamide
- 5Emulsifier:0.5parts by weight of alkylaryl polyglycoether

To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and emulsifier, and the concentrate is diluted with emulsifier- containing water to the desired concentration. To produce a suitable preparation of a biological suspension the cells, viruses or spores are diluted with emulsifier- containing water to the desired concentration.

- 10Chinese cabbage (*Brassica pekinensis*) leaf- discs are sprayed with a preparation of the active ingredient of the desired concentration. Once dry, the leaf discs are infested with mustard beetle larvae (*Phaedon cochleariae*).

After the specified period of time, mortality in % is determined. 100 % means that all the beetle larvae have been killed; 0 % means that none of the beetle larvae have been killed. The mortality values thus determined are

- 15recalculated using the Colby-formula.

The following combinations of compound (I) and one further active ingredient or biological control agent showed a synergistic effect according to the invention:

Table 2: Phaedon cochleariae larvae – Test

| Active ingredient/ biological control agent                                                                                                                                                                                                                                                                                | Concentration<br>g ai/ha | Mortality in % after 2 <sup>d</sup> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------------------------------|
| Compound (I)                                                                                                                                                                                                                                                                                                               | 100                      | 0                                   |
|                                                                                                                                                                                                                                                                                                                            | 20                       | 0                                   |
|                                                                                                                                                                                                                                                                                                                            | 4                        | 0                                   |
|                                                                                                                                                                                                                                                                                                                            | 0,8                      | 0                                   |
| 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl}-1H-pyrazole-5-carboxamide/<br>1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl}-1H-pyrazole-5-carboxamide                | 0.8                      | 50                                  |
| Compound (I) + 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl}-1H-pyrazole-5-carboxamide/<br>1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl}-1H-pyrazole-5-carboxamide | 20 + 0.8                 | obs.*<br>100cal.**<br>50            |

|                                   |                 |                                        |
|-----------------------------------|-----------------|----------------------------------------|
| Flupyradifurone                   | 500             | 50                                     |
| Compound (I) + Flupyradifurone    | 100 + 500       | <u>obs.</u> * <u>cal.</u> **<br>100 50 |
| Fipronil                          | 0,16            | 0                                      |
| Compound (I) + Fipronil           | 0,8 + 0,16      | <u>obs.</u> * <u>cal.</u> **<br>100 0  |
| Lambda-Cyhalothrin                | 0,8             | 67                                     |
| Compound (I) + Lambda-Cyhalothrin | 20 + 0,8        | <u>obs.</u> * <u>cal.</u> **<br>100 67 |
| Emamectin-benzoate                | 0,8             | 67                                     |
| Compound (I) + Emamectin-benzoate | 100 + 0,8       | <u>obs.</u> * <u>cal.</u> **<br>100 67 |
| Lepimectin                        | 4               | 50                                     |
| Compound (I) + Lepimectin         | 4 + 4           | <u>obs.</u> * <u>cal.</u> **<br>83 50  |
| Thiamethoxam                      | 20              | 67                                     |
| Compound (I) + Thiamethoxam       | <u>100 + 20</u> | <u>obs.</u> * <u>cal.</u> **<br>83 67  |

| Active ingredient/ biological control agent | Concentration<br>g ai/ha | Mortality in % after 6 <sup>d</sup>    |
|---------------------------------------------|--------------------------|----------------------------------------|
| Compound (I)                                | 100<br>20<br>4           | 0<br>0<br>0                            |
| Chloranthraniliprole                        | 0,8                      | <u>33</u>                              |
| Compound (I) + Chloranthraniliprole         | 20 + 0,8                 | <u>obs.</u> * <u>cal.</u> **<br>83 33  |
| Sulfoxaflor                                 | 4                        | 0                                      |
| Compound (I) + Sulfoxaflor                  | 100 + 4                  | <u>obs.</u> * <u>cal.</u> **<br>33 0   |
| Alpha-Cypermethrin                          | 4                        | 0                                      |
| Compound (I) + Alpha-Cypermethrin           | 100 + 4                  | <u>obs.</u> * <u>cal.</u> **<br>67 0   |
| Bifenthrin                                  | 0,8                      | 50                                     |
| Compound (I) + Bifenthrin                   | 20 + 0,8                 | <u>obs.</u> * <u>cal.</u> **<br>83 50  |
| Imidacloprid                                | 20                       | 0                                      |
| Compound (I) + Imidacloprid                 | 100 + 20                 | <u>obs.</u> * <u>cal.</u> **<br>50 0   |
| Thiacloprid                                 | 20                       | 33                                     |
| Compound (I) + Thiacloprid                  | 100 + 20                 | <u>obs.</u> * <u>cal.</u> **<br>83 33  |
| Clothianidin                                | 20                       | 83                                     |
| Compound (I) + Clothianidin                 | 100 + 20                 | <u>obs.</u> * <u>cal.</u> **<br>100 83 |
| Acetamiprid                                 | 20                       | 33                                     |
| Compound (I) + Acetamiprid                  | 100 + 20                 | <u>obs.</u> * <u>cal.</u> **<br>83 33  |
| Dinotefuran                                 | 20                       | 0                                      |
| Compound (I) + Dinotefuran                  | 20 + 20                  | <u>obs.</u> * <u>cal.</u> **<br>33 0   |

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| Active ingredient/ biological control agent | Concentration<br>g ai/ha | Mortality in % after 6 <sup>d</sup>    |
|---------------------------------------------|--------------------------|----------------------------------------|
| Nitenpyram                                  | 20                       | 0                                      |
| Compound (I) + Nitenpyram                   | 100 + 20                 | <u>obs.</u> * <u>cal.</u> **<br>50 0   |
| Tefluthrin                                  | 20                       | 50                                     |
| Compound (I) + Tefluthrin                   | 100 + 20                 | <u>obs.</u> * <u>cal.</u> **<br>83 50  |
| Flufenoxuron                                | 20                       | 0                                      |
| Compound (I) + Flufenoxuron                 | 100 + 20                 | <u>obs.</u> * <u>cal.</u> **<br>50 0   |
| Triflumuron                                 | 20                       | 0                                      |
| Compound (I) + Triflumuron                  | 100 + 20                 | <u>obs.</u> * <u>cal.</u> **<br>67 0   |
| Beta-Cyfluthrin                             | 0,8                      | 50                                     |
| Compound (I) + Beta-Cyfluthrin              | 20 + 0,8                 | <u>obs.</u> * <u>cal.</u> **<br>100 50 |
| Dimethoate                                  | 100                      | 0                                      |
| Compound (I) + Dimethoate                   | 100 + 100                | <u>obs.</u> * <u>cal.</u> **<br>50 0   |
| Thiodicarb                                  | 100                      | 0                                      |

| Active ingredient/ biological control agent | Concentration<br>g ai/ha | Mortality in % after 6 <sup>d</sup>  |
|---------------------------------------------|--------------------------|--------------------------------------|
| Compound (I) + Thiodicarb                   | 100 + 100                | <u>obs.</u> * <u>cal.</u> **<br>33 0 |

\* obs. = observed insecticidal efficacy, \*\* cal. = efficacy calculated with Colby-formula

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Example 3:

Spodoptera frugiperda – spray application

- Solvent: 78.0 parts by weight of acetone  
1.5 parts by weight of dimethylformamide  
5 Emulsifier: 0.5 parts by weight of alkylaryl polyglycoether

To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and emulsifier, and the concentrate is diluted with emulsifier- containing water to the desired concentration. To produce a suitable preparation of a biological suspension the cells, viruses or spores are diluted with emulsifier- containing water to the desired concentration.

- 10 Cabbage (*Brassica oleracea*) leaf- discs are sprayed with a preparation of the active ingredient at the desired concentration. Once dry, the leaf discs are infested with larvae of the fall army worm (*Spodoptera frugiperda*).

After the specified period of time, mortality in % is determined. 100 % means that all the caterpillars have been killed; 0 % means that none of the caterpillars have been killed. The mortality values thus determined are

- 15 recalculated using the Colby-formula.

The following combinations of compound (I) and one further active ingredient or biological control agent showed a synergistic effect according to the invention:

Table 3: *Spodoptera frugiperda* – Test

| Active ingredient/ biological control agent                                                                                                                                                                                                                                                               | Concentration<br>g ai/ha | Mortality in % after 2 <sup>d</sup> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------------------------------|
| Compound (I)                                                                                                                                                                                                                                                                                              | 100                      | 0                                   |
|                                                                                                                                                                                                                                                                                                           | 20                       | 0                                   |
|                                                                                                                                                                                                                                                                                                           | 4                        | 0                                   |
| 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{5-(trifluoromethyl)-1H-tetrazol-1-yl}methyl}-1H-pyrazole-5-carboxamide/<br>1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{5-(trifluoromethyl)-2H-tetrazol-2-yl}methyl}-1H-pyrazole-5-carboxamide | 0.16                     | 67                                  |
| Compound (I) + 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{5-(trifluoromethyl)-1H-tetrazol-1-yl}methyl}-1H-pyrazole-5-carboxamide/<br>1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{5-(trifluoromethyl)-2H-tetrazol-2-yl}methyl}-           | 4 + 0.16                 | obs.*<br>100<br>cal.**<br>67        |

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| Active ingredient/ biological control agent | Concentration<br>g ai/ha | Mortality in % after 2 <sup>d</sup>      |
|---------------------------------------------|--------------------------|------------------------------------------|
| 1H-pyrazole-5-carboxamide                   |                          |                                          |
| Gamma-Cyhalothrin                           | 0.16                     | 0                                        |
| Compound (I) + Gamma-Cyhalothrin            | 4 + 0.16                 | <u>obs.</u> * <u>cal.</u> **<br>50   0   |
| Chlorpyrifos                                | 100                      | 50                                       |
| Compound (I) + Chlorpyrifos                 | 20 + 20                  | <u>obs.</u> * <u>cal.</u> **<br>67   50  |
| Triflumuron                                 | 20                       | 0                                        |
| Compound (I) + Triflumuron                  | 100 + 20                 | <u>obs.</u> * <u>cal.</u> **<br>67   0   |
| Diflubenzuron                               | 100                      | 67                                       |
| Compound (I) + Diflubenzuron                | 100 + 100                | <u>obs.</u> * <u>cal.</u> **<br>100   67 |

| Active ingredient/ biological control agent | Concentration<br>g ai/ha | Mortality in % after 6 <sup>d</sup>      |
|---------------------------------------------|--------------------------|------------------------------------------|
| Compound (I)                                | 100<br>20<br>4<br>0,8    | 0<br>0<br>0<br>0                         |
| Bifenthrin                                  | 0.16                     | 0                                        |
| Compound (I) + Bifenthrin                   | 4 + 0.16                 | <u>obs.</u> * <u>cal.</u> **<br>33   0   |
| Thiacloprid                                 | 20                       | 0                                        |
| Compound (I) + Thiacloprid                  | 100 + 20                 | <u>obs.</u> * <u>cal.</u> **<br>33   0   |
| Lambda-Cyhalothrin                          | 0,16                     | 33                                       |
| Compound (I) + Lambda-Cyhalothrin           | 4 + 0,16                 | <u>obs.</u> * <u>cal.</u> **<br>50   33  |
| Milbemectin                                 | 0,8                      | 0                                        |
| Compound (I) + Milbemectin                  | 4 + 0,8                  | <u>obs.</u> * <u>cal.</u> **<br>33   0   |
| Cypermethrin                                | 0,8                      | 67                                       |
| Compound (I) + Cypermethrin                 | 4 + 0,8                  | <u>obs.</u> * <u>cal.</u> **<br>83   67  |
| Deltamethrin                                | 0,032                    | 0                                        |
| Compound (I) + Deltamethrin                 | 0,8 + 0,032              | <u>obs.</u> * <u>cal.</u> **<br>67   0   |
| Beta-Cyfluthrin                             | 0,8                      | 83                                       |
| Compound (I) + Beta-Cyfluthrin              | 20 + 0,8                 | <u>obs.</u> * <u>cal.</u> **<br>100   83 |
| Indoxacarb                                  | 0,8                      | 50                                       |
| Compound (I) + Indoxacarb                   | 4 + 0,8                  | <u>obs.</u> * <u>cal.</u> **<br>100   50 |

\* obs. = observed insecticidal efficacy, \*\* cal. = efficacy calculated with Colby-formula

Example 4:

Tetranychus urticae - test (OP – resistant)

- Solvent: 78.0 parts by weight acetone
- 1.5 parts by weight dimethylformamide
- 5 Emulsifier: 0.5 parts by weight alkylarylpolyglycolether

To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and emulsifier, and the concentrate is diluted with emulsifier- containing water to the desired concentration. To produce a suitable preparation of a biological suspension the cells or spores are diluted with emulsifier- containing water to the desired concentration.

- 10 Leaf discs of French beans (*Phaseolus vulgaris*) infected with all instars of the Two-spotted spider mite (*Tetranychus urticae*), are sprayed with a preparation of the active ingredient at the desired concentration. After the specified period of time mortality in % is determined. 100 % means that all spider mites have been killed; 0 % means that none of the spider mites have been killed.

- The following combinations of compound (I) and one further active ingredient or biological control agent
- 15 showed a synergistic effect according to the invention:

Table 4: Tetranychus urticae – Test

| Active ingredient/ biological control agent                                  | Concentration<br>g ai/ha | Mortality in % after 2 <sup>d</sup> |
|------------------------------------------------------------------------------|--------------------------|-------------------------------------|
| Compound (I)                                                                 | 20                       | 80                                  |
|                                                                              | 4                        | 30                                  |
| Azadirachtin                                                                 | 100                      | 0                                   |
| Compound (I) + Azadirachtin                                                  | 20 + 100                 | obs.* cal.**<br>100 80              |
| Fluensulfone                                                                 | 2000                     | 0                                   |
| Compound (I) + Fluensulfone                                                  | 4 + 2000                 | obs.* cal.**<br>70 30               |
| Harpin – protein                                                             | 1.5                      | 0                                   |
| Compound (I) + Harpin - protein                                              | 4 + 1.5                  | obs.* cal.**<br>70 30               |
| Metschnikowia fructicola<br>(Shemer, 2 x 10 <sup>10</sup> cells/g)           | 500                      | 0                                   |
| Compound (I) + Metschnikowia fructicola                                      | 4 + 500                  | obs.* cal.**<br>70 30               |
| Paecilomyces lilacinus strain 251<br>(BioAct, 1 x 10 <sup>10</sup> spores/g) | 4000                     | 0                                   |
| Compound (I) + Paecilomyces lilacinus                                        | 4 + 4000                 | obs.* cal.**<br>70 30               |
| Pyrethrum                                                                    | 500                      | 70                                  |
| Compound (I) + Pyrethrum                                                     | 4 + 500                  | obs.* cal.**<br>90 79               |

| Active ingredient/ biological control agent | Concentration<br>g ai/ha | Mortality in % after 2 <sup>d</sup> |
|---------------------------------------------|--------------------------|-------------------------------------|
| Buprofezin                                  | 500                      | 0                                   |
| Compound (I) + Buprofezin                   | 4 + 500                  | obs.* cal.**<br>80 30               |
| Alpha-Cypermethrin                          | 0,16                     | 0                                   |
| Compound (I) + Alpha-Cypermethrin           | 4 + 0,16                 | obs.* cal.**<br>70 30               |
| Imidacloprid                                | 0,8                      | 0                                   |
| Compound (I) + Imidacloprid                 | 4 + 0,8                  | obs.* cal.**<br>90 30               |
| Nitenpyram                                  | 0,8                      | 0                                   |
| Compound (I) + Nitenpyram                   | 4 + 0,8                  | obs.* cal.**<br>100 30              |
| Pyrifluquinazone                            | 0,8                      | 0                                   |
| Compound (I) + Pyrifluquinazone             | 4 + 0,8                  | obs.* cal.**<br>80 30               |
| Flupyradifurone                             | 0,8                      | 0                                   |
| Compound (I) + Flupyradifurone              | 4 + 0,8                  | obs.* cal.**<br>70 30               |
| Sulfoxaflor                                 | 0,16                     | 0                                   |
| Compound (I) + Sulfoxaflor                  | 4 + 0,16                 | obs.* cal.**<br>80 30               |
| Spinetoram                                  | 0,8                      | 0                                   |
| Compound (I) + Spinetoram                   | 4 + 0,8                  | obs.* cal.**<br>70 30               |
| Spinosad                                    | 0,8                      | 0                                   |
| Compound (I) + Spinosad                     | 4 + 0,8                  | obs.* cal.**<br>80 30               |
| Tefluthrin                                  | 0,8                      | 0                                   |
| Compound (I) + Tefluthrin                   | 4 + 0,8                  | obs.* cal.**<br>70 30               |
| Fipronil                                    | 0,8                      | 0                                   |
| Compound (I) + Fipronil                     | 4 + 0,8                  | obs.* cal.**<br>70 30               |
| Chlorpyrifos                                | 4                        | 0                                   |
| Compound (I) + Chlorpyrifos                 | 4 + 4                    | obs.* cal.**<br>70 30               |
| Thiodicarb                                  | 4                        | 0                                   |
| Compound (I) + Thiodicarb                   | 4 + 4                    | obs.* cal.**<br>70 30               |
| Diflubenzuron                               | 4                        | 0                                   |
| Compound (I) + Diflubenzuron                | 4 + 4                    | obs.* cal.**<br>70 30               |
| Flufenoxuron                                | 0,8                      | 0                                   |
| Compound (I) + Flufenoxuron                 | 4 + 0,8                  | obs.* cal.**<br>70 30               |
| Chlorfenapyr                                | 0,8                      | 0                                   |
| Compound (I) + Chlorfenapyr                 | 4 + 0,8                  | obs.* cal.**<br>70 0                |
| Tebufenpyrad                                | 4                        | 0                                   |
| Compound (I) + Tebufenpyrad                 |                          | obs.* cal.**                        |

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| Active ingredient/ biological control agent | Concentration<br>g ai/ha | Mortality in % after 2 <sup>d</sup>          |
|---------------------------------------------|--------------------------|----------------------------------------------|
|                                             | 4 + 4                    | 80    30                                     |
| Abamectin                                   | 0,032                    | 0                                            |
| Compound (I) + Abamectin                    | 4 + 0,032                | <u>obs.</u> * <u>cal.</u> **<br>70        30 |

| Active ingredient/ biological control agent                                | Concentration<br>g ai/ha | Mortality in % after 6 <sup>d</sup>          |
|----------------------------------------------------------------------------|--------------------------|----------------------------------------------|
| Compound (I)                                                               | 4                        | 30                                           |
| Bacillus firmus I-1582<br>(10 <sup>11</sup> spores/g)                      | 250                      | 0                                            |
| Compound (I) + Bacillus firmus                                             | 4 + 250                  | <u>obs.</u> * <u>cal.</u> **<br>70        30 |
| Thymol                                                                     | 500                      | 0                                            |
| Compound (I) + Thymol                                                      | 4 + 500                  | <u>obs.</u> * <u>cal.</u> **<br>100       30 |
| Bacillus subtilis strain GB 03<br>Kodiak, 5.5 x 10 <sup>10</sup> spores/g) | 2000                     | 0                                            |
| Compound (I) + Bacillus subtilis                                           | 4 + 2000                 | <u>obs.</u> * <u>cal.</u> **<br>80        30 |
| Metarhizium anisopliae strain F 52<br>(MET52, 9 x 10 <sup>8</sup> cfu/g)   | 100                      | 0                                            |
| Compound (I) + Metarhizium anisopliae                                      | 4 + 100                  | <u>obs.</u> * <u>cal.</u> **<br>90        30 |
| Cydia pomonella Granuloseviren (CpGV)<br>(Madex)                           | 1000                     | <u>0</u>                                     |
| (I) + CpGV                                                                 | 4 + 1000                 | <u>obs.</u> * <u>cal.</u> **<br>70        30 |

\* obs. = observed insecticidal efficacy, \*\* cal. = efficacy calculated with Colby-formula

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Example 5:

**Tetranychus urticae– test; OP-resistant; (TETRUR)**

- Solvent: 7 parts by weight of dimethylformamide
- Emulsifier: 2 parts by weight of alkylaryl polyglycoether

- 5 To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and emulsifier, and the concentrate is diluted with emulsifier-containing water to the desired concentration. Ammonium salt and/or penetration enhancer in a dosage of 1000ppm are added to the desired concentration if necessary. To produce a suitable preparation of a biological suspension the cells or spores are diluted with emulsifier- containing water to the desired concentration.
- 10 Bean plants (*Phaseolus vulgaris*) which are heavily infested with all stages of the two-spotted spider mite (*Tetranychus urticae*) are treated by being sprayed with the preparation of the active compound of the desired concentration.

After the specified period of time, mortality in % is determined. 100 % means that all the spider mites have been killed; 0 % means that none of the spider mites have been killed.

- 15 The following combinations of compound (I) and one further active ingredient or biological control agent showed a synergistic effect according to the invention:

**Table 5A:**

| Active ingredient/ biological control agent                                     | Concentration<br>ppm | Mortality in % after 3 <sup>d</sup>               |
|---------------------------------------------------------------------------------|----------------------|---------------------------------------------------|
| Compound (I)                                                                    | 0.8                  | <u>40</u>                                         |
| <i>Bacillus pumilus</i> strain QST2808<br>(Sonata, 1.0 x 10 <sup>9</sup> CFU/g) | 1000                 | <u>0</u>                                          |
| Compound (I) + <i>Bacillus pumilus</i> strain<br>QST2808                        | 0.8 + 1000           | <u>obs.*</u> <u>cal.**</u><br><u>65</u> <u>40</u> |

\* obs. = observed insecticidal efficacy, \*\* cal. = efficacy calculated with Colby-formula

**Table 5B: *Tetranychus urticae* – Test**

| Active ingredient/ biological control agent                                       | Concentration<br>ppm | Mortality in % after 5 <sup>d</sup>               |
|-----------------------------------------------------------------------------------|----------------------|---------------------------------------------------|
| Compound (I)                                                                      | 0.8                  | 40                                                |
| <i>Bacillus thuringiensis</i> spp aizawai<br>(XenTari, 1,5x10 <sup>7</sup> cfu/g) | 1000                 | 15                                                |
| Compound (I) + <i>Bacillus thuringiensis</i>                                      | 0.8 + 1000           | <u>obs.*</u> <u>cal.**</u><br><u>80</u> <u>49</u> |
| <i>Bacillus amyloliquefaciens</i> FZB42                                           | 2000                 | 0                                                 |

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|                                                     |            |                                     |
|-----------------------------------------------------|------------|-------------------------------------|
| (Rhizovital flüssig, 2.5 x 10 <sup>10</sup> cfu/ml) |            |                                     |
| Compound (I) + Bacillus amyloliquefaciens           | 0.8 + 2000 | <u>obs.*</u> <u>cal.**</u><br>60 40 |

\* obs. = observed insecticidal efficacy, \*\* cal. = efficacy calculated with Colby-formula

Example 6:

Seed treatment– germination test Soybean

Seeds of soybean (Glycine max) were treated by being mixed with the desired amount of active compound and spores and water. After drying, 25 seeds were sown into each pot filled with sandy loam.

- 5 After the specified period of time the level of activity expressed in % was determined. The level of activity was calculated on the basis of the number of soybean plants which have successfully germinated.

The following combination of compound and biological showed a superior germination effect compared to the single treatments and control:

Table 6: Germination of Soybean

| Active ingredient/ biological control agent                              | Concentration g<br>ai/kg seeds | % Germination after 3 days<br>control was set 100% |
|--------------------------------------------------------------------------|--------------------------------|----------------------------------------------------|
| Control (seeds without treatment)                                        |                                | 100                                                |
| Compound (I)                                                             | 0.15                           | 97                                                 |
| <i>Bacillus pumilus</i> QST2808<br>(Sonata, 1.0 x 10 <sup>9</sup> CFU/g) | 0.002                          | 91                                                 |
| Compound (I) + <i>Bacillus pumilus</i> QST2808                           | 0.15 + 0.002                   | 108                                                |

**Example 7**

**Shoot weight - Soybean**

Seeds of soybean (*Glycine max*) were treated by being mixed with the desired amount of active compound and spores and water. After drying, each seed was sown into a pot filled with loamy sand. The pots were  
5 placed in the greenhouse with conditions appropriate for good plant growth.

After the specified period of time the plants were harvested and the shoot weight of the plants was determined. The weight is expressed in % whereupon the weight of the control is set 100%.

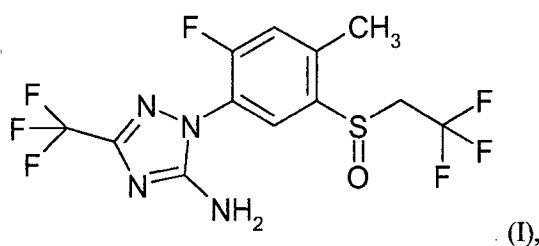
The following combinations of compound and biological showed a higher shoot weight compared to the single treatments and control:

10 **Table 7: Soybean – shoot weight**

| Active ingredient/ biological control agent                                     | Concentration g<br>ai/kg seeds | Shoot weight after 21 days<br>control was set 100% |
|---------------------------------------------------------------------------------|--------------------------------|----------------------------------------------------|
| Control (seeds without treatment)                                               |                                | 100                                                |
| Compound (I)                                                                    | 0.3                            | 98                                                 |
| <i>Bacillus subtilis</i> QST713<br>(Serenade Soil, 1.0 x 10 <sup>9</sup> CFU/g) | 0.002                          | 97                                                 |
| Compound (I) + <i>Bacillus subtilis</i> QST713                                  | 0.3 + 0.002                    | 105                                                |

**Claims**

1. Active ingredient combinations comprising a compound of the formula (I)



and one or more further insecticides and / or acaricides and / or biological control agents from the group (II), selected from

- (1) Acetylcholinesterase (AChE) inhibitors, for example

carbamates, e.g. Alanycarb (II-1-1), Aldicarb (II-1-2), Bendiocarb (II-1-3), Benfuracarb (II-1-4), Butoxycarboxim (II-1-5), Carbaryl (II-1-6), Carbofuran (II-1-7), Carbosulfan (II-1-8), Ethiofencarb (II-1-9), Fenobucarb (II-1-10), Furathiocarb (II-1-11), Isoprocarb (II-1-12), Methomyl (II-1-13), Metolcarb (II-1-14), Oxamyl (II-1-15), Pirimicarb (II-1-16), Propoxur (II-1-17), Thiodicarb (II-1-18), and XMC (II-1-19); or

organophosphates, e.g. Acephate (II-1-20), Azinphos-ethyl (II-1-21), Azinphos-methyl (II-1-22), Chlorethoxyfos (II-1-23), Chlorfenvinphos (II-1-24), Chlorpyrifos (II-1-25), Chlorpyrifos-methyl (II-1-26), Cyanophos (II-1-27), Diazinon (II-1-28), Dichlorvos/DDVP (II-1-29), Dimethoate (II-1-30), Dimethylvinphos (II-1-31), Disulfoton (II-1-32), EPN (II-1-46), Ethion (II-1-33), Ethoprophos (II-1-34), Fenamiphos (II-1-35), Fenitrothion (II-1-36), Fenthion (II-1-37), Fosthiazate (II-1-38), Isofenphos (II-1-39), Isopropyl O-(methoxyaminothio-phosphoryl) salicylate (II-1-40), Isoxathion (II-1-41), Malathion (II-1-42), Methidathion (II-1-43), Monocrotophos (II-1-44), Naled (II-1-45), Oxydemeton-methyl (II-1-46), Phenthoate (II-1-47), Phosalone (II-1-48), Phosmet (II-1-49), Pirimiphos-methyl (II-1-50), Profenofos (II-1-51), Prothiofos (II-1-52), Pyraclofos (II-1-53), Pyridaphenthion (II-1-54), Quinalphos (II-1-55), Tetrachlorvinphos (II-1-56), Thiometon (II-1-57), Triclorfon (II-1-58), and Vamidotion (II-1-59);

- (2) GABA-gated chloride channel antagonists, for example

cyclodiene organochlorines, e.g. Chlordane (II-2-1) and Endosulfan (II-2-2); or

phenylpyrazoles (fiproles), e.g. Fipronil (II-2-3) ;

- (3) Sodium channel modulators / voltage-dependent sodium channel blockers, for example

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pyrethroids, e.g. Acrinathrin (II-3-1), Allethrin (II-3-2), d-cis-trans Allethrin (II-3-3), d-trans Allethrin (II-3-4), Bifenthrin (II-3-5), Cycloprothrin (II-3-6), Cyfluthrin (II-3-7), beta-Cyfluthrin (II-3-8), Cyhalothrin (II-3-9), lambda-Cyhalothrin (II-3-10), gamma-Cyhalothrin (II-3-11), Cypermethrin (II-3-12), alpha-Cypermethrin (II-3-13), beta-Cypermethrin (II-3-14),  
5 theta-Cypermethrin (II-3-15), zeta-Cypermethrin (II-3-16), Deltamethrin (II-3-17), Etofenprox (II-3-18), Fenpropathrin (II-3-19), Fenvalerate (II-3-20), Flucythrinate (II-3-21), tau-Fluvalinate (II-3-22), Kadethrin (II-3-23), Permethrin (II-3-24), Phenothrin [(1R)-trans isomer] (II-3-25), Pyrethrine (pyrethrum) (II-3-26), Resmethrin (II-3-27), Silafluofen (II-3-28), Tefluthrin (II-3-29), Tetramethrin (II-3-30), Tetramethrin [(1R) isomers] (II-3-31), and  
10 Tralomethrin (II-3-32), or

DDT (II-3-33); or Methoxychlor (II-3-34);

(4) Nicotinic acetylcholine receptor (nAChR) agonists, for example

neonicotinoids, e.g. Acetamiprid (II-4-1), Clothianidin (II-4-2), Dinotefuran (II-4-3), Imidacloprid (II-4-4), Nitenpyram (II-4-5), Thiocloprid (II-4-6), and Thiamethoxam (II-4-7); or

15 Nicotine (II-4-8);

(5) Nicotinic acetylcholine receptor (nAChR) allosteric activators, for example

spinosyns, e.g. Spinetoram (II-5-1) and Spinosad (II-5-2);

(6) Chloride channel activators, for example

20 avermectins/milbemycins, e.g. Abamectin (II-6-1), Enamectin benzoate (II-6-2), Lepimectin (II-6-3), and Milbemectin (II-6-4);

(7) Juvenile hormone mimics, for example

juvenile hormon analogues, e.g. and Methoprene (II-7-1); or

Fenoxycarb (II-7-2); or Pyriproxyfen (II-7-3);

(8) Miscellaneous non-specific (multi-site) inhibitors, for example

25 alkyl halides, e.g. Methyl bromide (II-8-1) and other alkyl halides; or

Chloropicrin (II-8-2); or Sulfuryl fluoride (II-8-3); or Borax (II-8-4); or Tartar emetic (II-8-5);

- (9) Selective homopteran feeding blockers, e.g. Pymetrozine (II-9-1);
- (10) Mite growth inhibitors, e.g. Clofentezine (II-10-1), Hexythiazox (II-10-2), and Diflovidazin (II-10-3); or  
Ettoxazole (II-10-4);
- 5 (11) Microbial disruptors of insect midgut membranes, e.g. *Bacillus thuringiensis* subspecies *israelensis* (II-11-1), *Bacillus sphaericus* (II-11-2), *Bacillus thuringiensis* subspecies *aizawai* (II-11-3), *Bacillus thuringiensis* subspecies *kurstaki* (II-11-4), *Bacillus thuringiensis* subspecies *tenebrionis* (II-11-5), and BT crop proteins: Cry1Ab, Cry1Ac, Cry1Fa, Cry2Ab, mCry3A, Cry3Ab, Cry3Bb, Cry34/35Ab1 (II-11-6);
- 10 (12) Inhibitors of mitochondrial ATP synthase, for example Diafenthiuron (II-12-1); or  
organotin miticides, e.g. Azocyclotin (II-12-2), Cyhexatin (II-12-3), and Fenbutatin oxide (II-12-4); or  
Propargite (II-12-5); or Tetradifon (II-12-6);
- 15 (13) Uncouplers of oxidative phosphorylation via disruption of the proton gradient, for example Chlorfenapyr (II-13-1), DNOC (II-13-2), and Sulfluramid (II-13-3);
- (14) Nicotinic acetylcholine receptor (nAChR) channel blockers, for example Bensultap (II-14-1), Cartap hydrochloride (II-14-2), and Thiocyclam (II-14-3);
- 20 (15) Inhibitors of chitin biosynthesis, type 0, for example Chlorfluazuron (II-15-1), Diflubenzuron (II-15-2), Flucycloxuron (II-15-3), Flufenoxuron (II-15-4), Hexaflumuron (II-15-5), Lufenuron (II-15-6), Teflubenzuron (II-15-7), and Triflumuron (II-15-8);
- (16) Inhibitors of chitin biosynthesis, type 1, for example Buprofezin (II-16-1);
- (17) Moulting disruptors, for example Cyromazine (II-17-1);
- (18) Octopamine receptor agonists, for example Amitraz (II-18-1);
- 25 (19) Mitochondrial complex III electron transport inhibitors, for example Hydramethylnon (II-19-1); or Acequinocyl (II-19-2); or Fluacrypyrim (II-19-3);
- (20) Mitochondrial complex I electron transport inhibitors, for example

METI acaricides, e.g. Fenpyroximate (II-20-1), Pyrimidifen (II-20-2), Pyridaben (II-20-3), Tebufenpyrad (II-20-4), and Tolfenpyrad (II-20-5); or

Rotenone (Derris) (II-20-6);

(21) Voltage-dependent sodium channel blockers, e.g. Indoxacarb (II-21-1);

5 (22) Inhibitors of acetyl CoA carboxylase, for example

tetronic and tetramic acid derivatives, e.g. Spirodiclofen (II-22-1);

(23) Mitochondrial complex IV electron transport inhibitors, for example

phosphines, e.g. Aluminium phosphide (II-23-1), Calcium phosphide (II-23-2), Phosphine (II-23-3), and Zinc phosphide (II-23-4); or

10 Cyanide (II-23-5).

(24) Ryanodine receptor modulators, for example

diamides, e.g. Chlorantraniliprole (II-24-1);

further active ingredients with unknown or uncertain mode of action, for example Amidoflumet (II-25-1), Azadirachtin (II-25-2), Benclothiaz (II-25-3), Benzoximate (II-25-4), Bifenazate (II-25-5),  
 15 Bromopropylate (II-25-6), Chinomethionat (II-25-7), Cryolite (II-25-8), Cyantraniliprole (Cyazypyr) (II-25-9), Dicofof (II-25-10), Diflovidazin (II-25-11), Fluensulfone (II-25-12), Flufiprole (II-25-13), Fluopyram (II-25-14), Fufenozide (II-25-15), Imidaclothiz (II-25-16), Iprodione (II-25-17), Meperfluthrin (II-25-18), Pyrifluquinazon (II-25-19), Tetramethylfluthrin (II-25-20), and iodomethane (II-25-21); furthermore products based on *Bacillus firmus* (including but  
 20 not limited to strain CNCM I-1582, such as, for example, VOTiVO™, BioNem) (II-25-22) *Bacillus subtilis* GB03 (II-25-23) and QST 713 (II-25-24), *Bacillus subtilis* var. *amyloliquefaciens* FZB24 (II-25-25) and *Bacillus amyloliquefaciens* FZB 42 (II-25-26), *Bacillus thuringiensis* subspecies *aizawai* (II-25-27), *kurstaki* (II-25-28), *tenebrionis* (II-25-29) and *israelensis* (II-25-30), *Bacillus sphaericus*, *Acinetobacter* sp., *Pasteuria penetrans*, *Streptomyces venezuelae*, *Metarhizium anisopliae* F52 (II-25-31), *Metschnikowia fructicola* (II-25-32), *Paecilomyces lilacinus* strain 251 (II-25-33), *Paecilomyces fumosoroseus* (II-25-34), *Nomuraea rileyi* (II-25-35), *Hirsutella thompsoni*, *Beauveria bassiana*, *Beauveria brongniartii*, *Lagenidium giganteum*, *Myrothecium verrucaria*, *Tsukamurella paurometabola*, *Cydia pomonella granulosus virus* (II-25-36), *Adoxophyes orana granulosus virus*, *Helicoverpa armigera nucleopolyhedro virus*, *Spodoptera exigua*

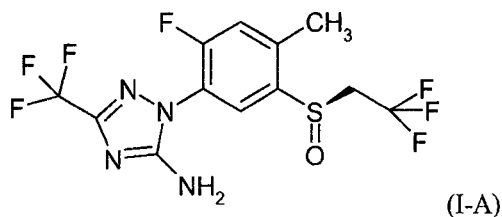
nucleopolyhedro virus, Spodoptera littoralis nucleopolyhedro virus, Spodoptera litura nucleopolyhedro virus, Neodiprion abietis nucleopolyhedro virus, Neodiprion sertifer nucleopolyhedro virus, Verticillium lecanii, Pyrethrum (II-25-37), Harpin-Protein (II-25-38), Thymol (II-25-39), Chitin, Quillaja saponaria extract, Bacillus pumilus strain GB34 and strain QST2808

or one of the following known active compounds: 3-bromo-N-{2-bromo-4-chloro-6-[(1-cyclopropylethyl)carbamoyl]phenyl}-1-(3-chloropyridin-2-yl)-1H-pyrazole-5-carboxamide (II-25-40) (known from WO2005/077934), 4-[[[(6-bromopyridin-3-yl)methyl](2-fluoroethyl)amino]furan-2(5H)-one (II-25-41) (known from WO2007/115644), 4-[[[(6-fluoropyridin-3-yl)methyl](2,2-difluoroethyl)amino]furan-2(5H)-one (II-25-42) (known from WO2007/115644), 4-[[[(2-chloro-1,3-thiazol-5-yl)methyl](2-fluoroethyl)amino]furan-2(5H)-one (II-25-43) (known from WO2007/115644), 4-[[[(6-chloropyridin-3-yl)methyl](2-fluoroethyl)amino]furan-2(5H)-one (II-25-44) (known from WO2007/115644), Flupyradifurone (II-25-45), 4-[[[(6-chloro-5-fluoropyridin-3-yl)methyl](methyl)amino]furan-2(5H)-one (II-25-46) (known from WO2007/115643), 4-[[[(5,6-dichloropyridin-3-yl)methyl](2-fluoroethyl)amino]furan-2(5H)-one (II-25-47) (known from WO2007/115646), 4-[[[(6-chloro-5-fluoropyridin-3-yl)methyl](cyclopropyl)amino]furan-2(5H)-one (II-25-48) (known from WO2007/115643), 4-[[[(6-chloropyridin-3-yl)methyl](cyclopropyl)amino]furan-2(5H)-one (II-25-49) (known from EP-A-0 539 588), 4-[[[(6-chloropyridin-3-yl)methyl](methyl)amino]furan-2(5H)-one (II-25-50) (known from EP-A-0 539 588), {[1-(6-chloropyridin-3-yl)ethyl](methyl)oxido- $\lambda^4$ -sulfanylidene]cyanamide (II-25-51) (known from WO2007/149134) and its diastereomers {[1R)-1-(6-chloropyridin-3-yl)ethyl](methyl)oxido- $\lambda^4$ -sulfanylidene]cyanamide (A) (II-25-52), and {[1S)-1-(6-chloropyridin-3-yl)ethyl](methyl)oxido- $\lambda^4$ -sulfanylidene]cyanamide (B) (II-25-53) (also known from WO2007/149134) as well as Sulfoxaflor (II-25-54) and its diastereomers [(R)-methyl(oxido){(1R)-1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}- $\lambda^4$ -sulfanylidene]cyanamide (A1) (II-25-55), and [(S)-methyl(oxido){(1S)-1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}- $\lambda^4$ -sulfanylidene]cyanamide (A2) (II-25-56), referred to as group of diastereomers A (known from WO2010/074747, WO2010/074751), [(R)-methyl(oxido){(1S)-1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}- $\lambda^4$ -sulfanylidene]cyanamide (B1) (II-25-57), and [(S)-methyl(oxido){(1R)-1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}- $\lambda^4$ -sulfanylidene]cyanamide (B2) (II-25-58), referred to as group of diastereomers B (also known from WO2010/074747, WO2010/074751), and 11-(4-chloro-2,6-dimethylphenyl)-12-hydroxy-1,4-dioxo-9-azadispiro[4.2.4.2]tetradec-11-en-10-one (II-25-59) (known from WO2006/089633), 3-(4'-fluoro-2,4-dimethylbiphenyl-3-yl)-4-hydroxy-8-oxa-1-azaspiro[4.5]dec-3-en-2-one (II-25-60) (known from WO2008/067911), 1-{2-fluoro-4-methyl-5-[(2,2,2-trifluoroethyl)sulfinyl]phenyl}-3-(trifluoromethyl)-1H-1,2,4-triazol-5-amine (II-25-61) (known from WO2006/043635),

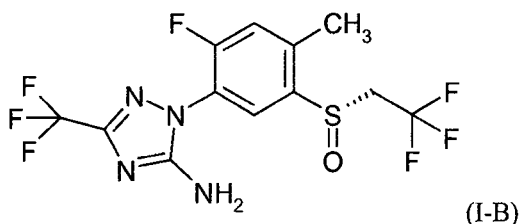
[(3S,4aR,12R,12aS,12bS)-3-[(cyclopropylcarbonyl)oxy]-6,12-dihydroxy-4,12b-dimethyl-11-oxo-9-(pyridin-3-yl)-1,3,4,4a,5,6,6a,12,12a,12b-decahydro-2H,11H-benzo[f]pyrano[4,3-b]chromen-4-yl)methyl cyclopropanecarboxylate (II-25-62) (known from WO2008/066153), 2-cyano-3-(difluoromethoxy)-N,N-dimethylbenzenesulfonamide (II-25-63) (known from WO2006/056433), 2-cyano-3-(difluoromethoxy)-N-methylbenzenesulfonamide (II-25-64) (known from WO2006/100288), 2-cyano-3-(difluoromethoxy)-N-ethylbenzenesulfonamide (II-25-65) (known from WO2005/035486), 4-(difluoromethoxy)-N-ethyl-N-methyl-1,2-benzothiazol-3-amine 1,1-dioxide (II-25-66) (known from WO2007/057407), N-[1-(2,3-dimethylphenyl)-2-(3,5-dimethylphenyl)ethyl]-4,5-dihydro-1,3-thiazol-2-amine (II-25-67) (known from WO2008/104503), {1'-[(2E)-3-(4-chlorophenyl)prop-2-en-1-yl]-5-fluorospiro[indole-3,4'-piperidin]-1(2H)-yl}(2-chloropyridin-4-yl)methanone (II-25-68) (known from WO2003/106457), 3-(2,5-dimethylphenyl)-4-hydroxy-8-methoxy-1,8-diazaspiro[4.5]dec-3-en-2-one (II-25-69) (known from WO2009/049851), 3-(2,5-dimethylphenyl)-8-methoxy-2-oxo-1,8-diazaspiro[4.5]dec-3-en-4-yl ethyl carbonate (II-25-50) (known from WO2009/049851), 4-(but-2-yn-1-yloxy)-6-(3,5-dimethylpiperidin-1-yl)-5-fluoropyrimidine (II-25-71) (known from WO2004/099160), (2,2,3,3,4,4,5,5-octafluoropentyl)(3,3,3-trifluoropropyl)malononitrile (II-25-72) (known from WO2005/063094), (2,2,3,3,4,4,5,5-octafluoropentyl)(3,3,4,4,4-pentafluorobutyl)malononitrile (II-25-73) (known from WO2005/063094), 8-[2-(cyclopropylmethoxy)-4-(trifluoromethyl)phenoxy]-3-[6-(trifluoromethyl)pyridazin-3-yl]-3-azabicyclo[3.2.1]octane (II-25-74) (known from WO2007/040280), Flometoquin (II-25-75), PF1364 (CAS-Reg.No. 1204776-60-2) (II-25-76) (known from JP2010/018586), 5-[5-(3,5-dichlorophenyl)-5-(trifluoromethyl)-4,5-dihydro-1,2-oxazol-3-yl]-2-(1H-1,2,4-triazol-1-yl)benzonitrile (II-25-77) (known from WO2007/075459), 5-[5-(2-chloropyridin-4-yl)-5-(trifluoromethyl)-4,5-dihydro-1,2-oxazol-3-yl]-2-(1H-1,2,4-triazol-1-yl)benzonitrile (II-25-78) (known from WO2007/075459), 4-[5-(3,5-dichlorophenyl)-5-(trifluoromethyl)-4,5-dihydro-1,2-oxazol-3-yl]-2-methyl-N-{2-oxo-2-[(2,2,2-trifluoroethyl)amino]ethyl}benzamide (II-25-79) (known from WO2005/085216), 4-[[6-chloropyridin-3-yl)methyl](cyclopropyl)amino]-1,3-oxazol-2(5H)-one (II-25-80), 4-[[6-chloropyridin-3-yl)methyl](2,2-difluoroethyl)amino]-1,3-oxazol-2(5H)-one (II-25-81), 4-[[6-chloropyridin-3-yl)methyl](ethyl)amino]-1,3-oxazol-2(5H)-one (II-25-82), 4-[[6-chloropyridin-3-yl)methyl](methyl)amino]-1,3-oxazol-2(5H)-one (II-25-83) (all known from WO2010/005692), NNI-0711 (Pyflubumide) (II-25-84) (known from WO2002/096882), 1-acetyl-N-[4-(1,1,1,3,3,3-hexafluoro-2-methoxypropan-2-yl)-3-isobutylphenyl]-N-isobutyryl-3,5-dimethyl-1H-pyrazole-4-carboxamide (II-25-85) (known from WO2002/096882), methyl 2-[2-([3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl)amino]-5-chloro-3-methylbenzoyl]-2-methylhydrazinecarboxylate (II-25-86) (known from WO2005/085216), methyl 2-[2-([3-bromo-1-

(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl} amino)-5-cyano-3-methylbenzoyl]-2-ethylhydrazinecarboxylate (II-25-87) (known from WO2005/085216), methyl 2-[2-([3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl} amino)-5-cyano-3-methylbenzoyl]-2-methylhydrazinecarboxylate (II-25-88) (known from WO2005/085216), methyl 2-[3,5-dibromo-2-([3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl} amino)benzoyl]-1,2-diethylhydrazinecarboxylate (II-25-89) (known from WO2005/085216), methyl 2-[3,5-dibromo-2-([3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl} amino)benzoyl]-2-ethylhydrazinecarboxylate (II-25-90) (known from WO2005/085216), (5RS,7RS;5RS,7SR)-1-(6-chloro-3-pyridylmethyl)-1,2,3,5,6,7-hexahydro-7-methyl-8-nitro-5-propoxyimidazo[1,2-a]pyridine (II-25-91) (known from WO2007/101369), 2-{6-[2-(5-fluoropyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine (II-25-92) (known from WO2010/006713), 2-{6-[2-(pyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine (II-25-93) (known from WO2010/006713), 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbonyl)phenyl]-3-{[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl}-1H-pyrazole-5-carboxamide (II-25-94) (known from WO2010/069502), 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbonyl)phenyl]-3-{[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl}-1H-pyrazole-5-carboxamide (II-25-95) (known from WO2010/069502), N-[2-(tert-butylcarbonyl)-4-cyano-6-methylphenyl]-1-(3-chloropyridin-2-yl)-3-{[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl}-1H-pyrazole-5-carboxamide (II-25-96) (known from WO2010/069502), N-[2-(tert-butylcarbonyl)-4-cyano-6-methylphenyl]-1-(3-chloropyridin-2-yl)-3-{[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl}-1H-pyrazole-5-carboxamide (II-25-97) (known from WO 2 0 1 0 / 0 6 9 5 0 2 ) , ( 1 E ) -N-[(6-chloropyridin-3-yl)methyl]-N'-cyano-N-(2,2-difluoroethyl)ethanimidamide (II-25-98) (known from WO2008/009360), N-[2-(5-amino-1,3,4-thiadiazol-2-yl)-4-chloro-6-methylphenyl]-3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazole-5-carboxamide (II-25-99) (known from CN102057925), and methyl 2-[3,5-dibromo-2-([3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl} amino)benzoyl]-2-ethyl-1-methylhydrazinecarboxylate (II-25-100) (known from WO2011/049233), Afidopyropen (II-25-101) (known from WO2008/066153), Heptafluthrin (II-25-102) (known from WO2010/043122), Pyriminostrobin (II-25-103) (known from WO2010/139271), Flufenoxystrobin (II-25-103) (known from WO2007/000098), 3-Chlor-N<sup>2</sup>-(2-cyanopropan-2-yl)-N<sup>1</sup>-[4-(1,1,1,2,3,3,3-heptafluoropropan-2-yl)-2-methylphenyl]phthalamid (II-25-104) (known from WO2012/034472)

- or further biological control agents selected from bacteria, in particular spore-forming bacteria, fungi or yeasts, protozoas, viruses.
2. Combinations according to claim 1, wherein the compound of formula (I) is compound (I-A)



3. Combinations according to claim 1, wherein the compound of the formula (I) is compound (I-B)



4. Combinations according to any of claims 1 to 3, wherein the further insecticide and / or acaricide  
5 and / or biological control agent from the group (II) is selected from  
Abamectin, Acephate, Acequinocyl, Acetamiprid, Acrinathrin, Aldicarb, Alpha-Cypermethrin,  
Amitraz, Azadirachtin, Azinphos-methyl, Benfuracarb, Beta-Cyfluthrin, Bifenazate, Bifenthrin,  
Bensultap (Nereistoxin), Buprofezin, Carbaryl, Carbofuran, Carbosulfan, Cartap hydrochloride,  
Chloranthraniliprole (Rynazypyr), Chlorfenapyr, Chlorfluazuron, Chloropicrin, Chlorpyrifos,  
10 Clothianidin, Cyantraniliprole (Cyazypyr), Cyfluthrin, Cyhalothrin, Cypermethrin, Cyromazine,  
Deltamethrin, Diafenthiuron, Diazinon, Dichloropropene, Dichlorfos, Dicofol, Diflubenzuron,  
Dimethoate, Dinotefuran, Disulfoton, Emamectin-(benzoate), Endosulfan, Ethoprophos,  
Etofenprox, Etoxazole, Fenamiphos, Fenbutatin oxide, Fenitrothion, Fenobucarb, Fenoxycarb,  
Fenpropathrin, Fenpyroximate, Fenvalerate, Fipronil, Fluacrypyrim, Fluensulfone, Flufenoxuron,  
15 Flupyradifurone, Fosthiazate, Gamma-Cyhalothrin, Hexythiazox, Hexaflumuron, Imidacloprid,  
Imidaclothiz, Indoxacarb, Lambda-Cyhalothrin, Lepimectin, Lufenuron, Malathion, Metaldehyde,  
Methidathion, Methomyl, Milbemectin, Monocrotophos, Nitenpyram, Oxamyl, Permethrin,  
Pirimicarb, Profenofos, Propargite, Pymetrozine, Pyrafluprole, Pyrethrin, Pyridaben,  
Pyrifluquinazone, Pyrimethanil, Pyrimidifen, Pyriprole, Pyriproxifen, Quinalphos, Resmethrin,  
20 Spinetoram, Spinosad, Spirodiclofen, Sulfoxaflor, Tau-Fluvalinate, Tebufenpyrad, Teflubenzuron,  
Tefluthrin, Thiocloprid, Thiamethoxam, Thiodicarb, Trichlorfon, Triflumuron; Zeta-Cypermethrin,  
1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-[[5-  
(trifluoromethyl)-1H-tetrazol-1-yl]methyl]-1H-pyrazole-5-carboxamide/ 1-(3-chloropyridin-2-yl)-  
N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-[[5-(trifluoromethyl)-2H-tetrazol-2-  
25 yl]methyl]-1H-pyrazole-5-carboxamid, 2-{6-[2-(5-fluoropyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-  
yl} pyrimidine, 2-{6-[2-(pyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine, (1E)-N-[(6-  
chloropyridin-3-yl)methyl]-N'-cyano-N-(2,2-difluoroethyl)ethanimidamide, Bacillus firmus I-1582,  
Bacillus subtilis GB03 and QST 713, Bacillus subtilis var. amyloliquefaciens FZB24 and Bacillus

amyloliquefaciens FZB 42, Bacillus thuringiensis subspecies aizawai, kurstaki, tenebrionis and israelensis, Metarhizium anisopliae F52, Metschnikowia fructicola, Paecilomyces lilacinus strain 251, Paecilomyces fumosoroseus, Nomuraea rileyi, Cydia pomonella granulosus virus, Pyrethrum, Harpin-Protein and Thymol, Bacillus pumilus strain GB34 and strain QST2808.

5 5. Combinations according to any of claims 1 to 4, wherein the further insecticide and / or acaricide and / or biological control agent from the group (II) is selected from

Abamectin, Acetamiprid, Acrinathrin, Alpha-Cypermethrin, Beta-Cyfluthrin, Bifenthrin, Buprofezin, Flupyradifurone, Chlorfenapyr, Chlorpyrifos, Clothianidin, Cyantraniliprole, Cyfluthrin, Cypermethrin, Deltamethrin, Diafenthiuron, Dinotefuran, Emamectin-(benzoate),  
 10 Fenpyroximate, Fipronil, Fluensulfone, Gamma-Cyhalothrin, Imidacloprid, Indoxacarb, L-Cyhalothrin, Milbemectin, Nitenpyram, Pyrifluquinazone, Pymetrozine, Chloranthraniliprole, Spinetoram, Spinosad, Spirodiclofen, Sulfoxaflor, Tebufenpyrad, Tefluthrin, Thiacloprid, Thiamethoxam, Thiodicarb, Triflumuron; 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{5-(trifluoromethyl)-1H-tetrazol-1-yl}methyl}-1H-pyrazole-5-  
 15 carboxamide/ 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{5-(trifluoromethyl)-2H-tetrazol-2-yl}methyl}-1H-pyrazole-5-carboxamide; 2-{{6-[2-(5-fluoropyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine, 2-{{6-[2-(pyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine (1E)-N-[(6-chloropyridin-3-yl)methyl]-N'-cyano-N-(2,2-difluoroethyl)ethanimidamide, Bacillus firmus I-1582, Bacillus subtilis GB03 and QST 713,  
 20 Bacillus subtilis var. amyloliquefaciens FZB24 and Bacillus amyloliquefaciens FZB 42, Bacillus thuringiensis subspecies aizawai, kurstaki, tenebrionis and israelensis, Metarhizium anisopliae F52, Paecilomyces lilacinus strain 251, Nomuraea rileyi, Bacillus pumilus strain GB34 and strain QST2808.

25 6. Combinations according to any of claims 1 to 5, wherein the further insecticide and / or acaricide and / or biological control agent from the group (II) is selected from

Bacillus firmus I-1582, Bacillus subtilis GB03 and QST 713, Bacillus subtilis var. amyloliquefaciens FZB24 and Bacillus amyloliquefaciens FZB 42, Bacillus thuringiensis subspecies aizawai, kurstaki, tenebrionis and israelensis, Metarhizium anisopliae F52, Metschnikowia fructicola, Paecilomyces lilacinus strain 251, Paecilomyces fumosoroseus,  
 30 Nomuraea rileyi, Cydia pomonella granulosus virus, Pyrethrum, Harpin-Protein and Thymol, Bacillus pumilus strain GB34 and strain QST2808

7. Use of active ingredient combinations according to any of claims 1 to 6 comprising a compound of

the formula (I) in combination with at least one biological control agent selected from bacteria, fungi or yeasts, protozoas, viruses, and entomopathogenic nematodes, optionally in the presence of inoculants, for reducing overall damage of plants and plant parts as well as losses in harvested fruits or vegetables caused by insects, nematodes and phytopathogens.

- 5    8.    The use according to claim 7, wherein the plant part is a seed or a plant emerging from the seed.
9.    The use according to claim 8, wherein the seed is from a conventional or a transgenic plant.
10.   The use according to claim 8 or 9 wherein the plant is a horticultural crop selected from carrots, pumpkin, squash, zucchini, potato, sweet corn, onions, ornamentals, medicinal herbs, culinary herbs, tomatoes, spinach, pepper, melon, lettuce, cucumber, celery, beets, cabbage, cauliflower, 10    broccoli, Brussels sprouts, turnip cabbage, kale, radish, rutabaga, turnip, asparagus, bean, pea, apples, raspberry, strawberry, banana, mango, grapes, peaches, pears, guava, pineapple, pomegranate, garlic, capsicum, chili, radish, star fruit, tapioca, walnuts, lemon, mandarin, mangold, mushroom, olive, orange, papaya, paprika, passion fruit, peanuts, pecan nuts, prune, pistachio nuts, persimmon, pamplemousse (grapefruit), eggplant, endive, cranberry, gooseberry, 15    hazel nuts, kiwifruit, almonds, amaranth, apricot, artichoke, avocado, blackberry, cashew nut, cherry, clementine, coconut, and cantaloupes.
11.   The use according to claim 8 or 9, wherein the plant is a broad acre crop selected from cotton, corn, soybean, cereals, canola, oil seed rape, sugar cane and rice.
12.   A method for reducing overall damage of plants and plant parts as well as losses in harvested fruits or vegetables caused by insects and/or phytopathogens comprising the step of simultaneously or 20    sequentially applying a compound of formula (I) as defined in any of claims 1 to 3 and at least one biological control agent selected from bacteria, fungi or yeasts, protozoas, viruses, and optionally at least an inoculant on the plant, plant parts, harvested fruits or vegetables.
- 13    An active ingredient combination as defined in any of claims 1 to 6 comprising extenders and /or 25    surfactants.

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INTERNATIONAL SEARCH REPORT

International application No.  
PCT/EP2012/075255

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

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INTERNATIONAL SEARCH REPORT

|                                                   |
|---------------------------------------------------|
| International application No<br>PCT/EP2012/075255 |
|---------------------------------------------------|

|                                                                                                   |           |           |           |           |
|---------------------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|
| A. CLASSIFICATION OF SUBJECT MATTER                                                               |           |           |           |           |
| INV. A01N43/653                                                                                   | A01P7/00  | A01N63/00 | A01N63/04 | A01N43/90 |
| A01N47/40                                                                                         | A01N53/00 | A01N43/88 | A01N43/56 | A01N43/36 |
| A01N57/16                                                                                         | A01N51/00 | A01N47/34 | A01N57/12 | A01N47/02 |
| According to International Patent Classification (IPC) or to both national classification and IPC |           |           |           |           |

|                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------|
| B. FIELDS SEARCHED                                                                                                            |
| Minimum documentation searched (classification system followed by classification symbols)<br>A01N                             |
| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched |

|                                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)<br>EPO-Internal, CHEM ABS Data, WPI Data |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| C. DOCUMENTS CONSIDERED TO BE RELEVANT |                                                                                                                                                                                                                                                  |                       |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Category*                              | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                               | Relevant to claim No. |
| X                                      | EP 2 382 865 A1 (BAYER CROPSCIENCE AG [DE]) 2 November 2011 (2011-11-02)<br>compounds I-2; I-3; II-29-31<br>tables B-2; D-2<br>paragraphs [0061], [0071]                                                                                         | 1-5, 13               |
| X                                      | WO 2011/152320 A1 (KUMIAI CHEMICAL INDUSTRY CO [JP]; IHARA CHEMICAL IND CO [JP]; TORIYABE) 8 December 2011 (2011-12-08)<br>compounds I-III<br>paragraphs [0022], [0031], [0032], [0036] - [0055], [0057] - [0062], [0065] - [0068]<br>tables 1-4 | 1-13                  |
|                                        | -----<br>-/--                                                                                                                                                                                                                                    |                       |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                      |
| * Special categories of cited documents :<br>"A" document defining the general state of the art which is not considered to be of particular relevance<br>"E" earlier application or patent but published on or after the international filing date<br>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br>"O" document referring to an oral disclosure, use, exhibition or other means<br>"P" document published prior to the international filing date but later than the priority date claimed<br>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art<br>"&" document member of the same patent family |                                                                      |
| Date of the actual completion of the international search<br><br>11 March 2013                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Date of mailing of the international search report<br><br>20/03/2013 |
| Name and mailing address of the ISA/<br>European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040,<br>Fax: (+31-70) 340-3016                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Authorized officer<br><br>Habermann, Jörg                            |

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INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2012/075255

| C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT |                                                                                                                                                                          |                       |
|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Category*                                            | Citation of document, with indication, where appropriate, of the relevant passages                                                                                       | Relevant to claim No. |
| A                                                    | WO 2011/020567 A1 (BAYER CROPSCIENCE AG [DE]; ALIG BERND [DE]; ANTONS STEFAN [DE]; FISCHE) 24 February 2011 (2011-02-24)<br>page 25, lines 15-16<br>claim 9              | 1-5,13                |
| A                                                    | -----<br>WO 2011/029506 A1 (BAYER CROPSCIENCE AG [DE]; ALIG BERND [DE]; ANTONS STEFAN [DE]; FISCHE) 17 March 2011 (2011-03-17)<br>page 28, lines 7-8<br>claim 6<br>----- | 1-5,13                |

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2012/075255

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| EP 2382865 A1                             | 02-11-2011          | EP 2382865 A1              | 02-11-2011          |
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|                                           |                     | JP 2013502386 A            | 24-01-2013          |
|                                           |                     | KR 20120089458 A           | 10-08-2012          |
|                                           |                     | US 2011045104 A1           | 24-02-2011          |
|                                           |                     | WO 2011029506 A1           | 17-03-2011          |

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-5, 13(all partially)

Active ingredient combination comprising

a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)

and

b) a further insecticide selected from the group consisting of acetylcholinesterase inhibitors (II-1)

---

2. claims: 1-5, 13(all partially)

Active ingredient combination comprising

a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)

and

b) a further insecticide selected from the group consisting of GABA-gated chloride channel antagonists (II-2)

---

3. claims: 1-5, 13(all partially)

Active ingredient combination comprising

a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)

and

b) a further insecticide selected from the group consisting of sodium channel modulators/voltage-dependent sodium channel blockers (II-3)

---

4. claims: 1-5, 13(all partially)

Active ingredient combination comprising

a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)

and

b) a further insecticide selected from the group consisting of nicotinic acetylcholine receptor antagonists (II-4)

---

5. claims: 1-5, 13(all partially)

Active ingredient combination comprising

a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)

and

b) a further insecticide selected from the group consisting of nicotinic acetylcholine receptor allosteric activators (II-5)

---

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

6. claims: 1-5, 13(all partially)

Active ingredient combination comprising  
a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)  
and  
b) a further insecticide selected from the group consisting of chloride channel activators (II-6)  
---

7. claims: 1-4, 13(all partially)

Active ingredient combination comprising  
a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)  
and  
b) a further insecticide selected from the group consisting of juvenile hormone mimics (II-7)  
---

8. claims: 1-3, 13(all partially)

Active ingredient combination comprising  
a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)  
and  
b) a further insecticide selected from the group consisting of non-specific multi-site inhibitors (II-8)  
---

9. claims: 1-5, 13(all partially)

Active ingredient combination comprising  
a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)  
and  
b) a further insecticide selected from the group consisting of selective homopteran feeding blockers (II-9)  
---

10. claims: 1-4, 13(all partially)

Active ingredient combination comprising  
a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)  
and  
b) a further insecticide selected from the group consisting of Mite growth inhibitors (II-10)  
---

11. claims: 1-5, 13(all partially)

Active ingredient combination comprising  
a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

and  
 b) a further insecticide selected from the group consisting  
 of inhibitors of mitochondrial ATP synthase (II-12)

---

12. claims: 1-5, 13(all partially)

Active ingredient combination comprising  
 a) a compound selected from the group consisting of formula  
 (I), (I-A) and (I-B)  
 and  
 b) a further insecticide selected from the group consisting  
 of uncouplers of oxidative phosphorylation via disruption of  
 the proton gradient (II-13)

---

13. claims: 1-4, 13(all partially)

Active ingredient combination comprising  
 a) a compound selected from the group consisting of formula  
 (I), (I-A) and (I-B)  
 and  
 b) a further insecticide selected from the group consisting  
 of nicotinic acetylcholine receptor channel blockers (II-14)

---

14. claims: 1-5, 13(all partially)

Active ingredient combination comprising  
 a) a compound selected from the group consisting of formula  
 (I), (I-A) and (I-B)  
 and  
 b) a further insecticide selected from the group consisting  
 of inhibitors of chitin biosynthesis, type 0 (II-15)

---

15. claims: 1-5, 13(all partially)

Active ingredient combination comprising  
 a) a compound selected from the group consisting of formula  
 (I), (I-A) and (I-B)  
 and  
 b) a further insecticide selected from the group consisting  
 of inhibitors of chitin biosynthesis, type 1 (II-16)

---

16. claims: 1-4, 13(all partially)

Active ingredient combination comprising  
 a) a compound selected from the group consisting of formula  
 (I), (I-A) and (I-B)  
 and  
 b) a further insecticide selected from the group consisting  
 of moulting disruptors (II-17)

---

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

17. claims: 1-4, 13(all partially)

Active ingredient combination comprising

a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)

and

b) a further insecticide selected from the group consisting of octopamine receptor agonists (II-18)

---

18. claims: 1-4, 13(all partially)

Active ingredient combination comprising

a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)

and

b) a further insecticide selected from the group consisting of mitochondrial complex III electron transport inhibitors (II-19)

---

19. claims: 1-5, 13(all partially)

Active ingredient combination comprising

a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)

and

b) a further insecticide selected from the group consisting of mitochondrial complex I electron transport inhibitors (II-20)

---

20. claims: 1-5, 13(all partially)

Active ingredient combination comprising

a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)

and

b) a further insecticide selected from the group consisting of voltage-dependent sodium channel blockers (II-21)

---

21. claims: 1-5, 13(all partially)

Active ingredient combination comprising

a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)

and

b) a further insecticide selected from the group consisting of inhibitors of acetyl CoA carboxylase (II-22)

---

22. claims: 1-3, 13(all partially)

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Active ingredient combination comprising  
a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)  
and  
b) a further insecticide selected from the group consisting of mitochondrial complex IV electron transport inhibitors(II-23)  
---

23. claims: 1-5, 13(all partially)

Active ingredient combination comprising  
a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)  
and  
b) a further insecticide selected from the group consisting of ryanodine receptor modulators (II-24)  
---

24. claims: 1-6, 13(all partially)

Active ingredient combination comprising  
a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)  
and  
b) a further insecticide selected from the group consisting of active ingredients with unknown or uncertain mode of action (II-25) excluding biological control agents  
---

25. claims: 7-12(completely); 1-6, 13(partially)

Active ingredient combination comprising  
a) a compound selected from the group consisting of formula (I), (I-A) and (I-B)  
and  
b) a further biological insecticide selected from the group consisting of bacteria(e.g. II-11), fungi, yeasts, protozoas and viruses  
---

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**DOCUMENT MADE AVAILABLE UNDER THE  
PATENT COOPERATION TREATY (PCT)**

|                                              |                                                   |
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Bescheinigung

Certificate

Attestation

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The attached documents are  
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Patentanmeldung Nr.

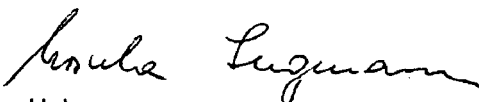
Patent application No.

Demande de brevet n°

11193829.6 / EP11193829

The organization code and number of your priority application, to be used for filing abroad under the Paris Convention, is EP11193829.

Der Präsident des Europäischen Patentamts;  
Im Auftrag  
For the President of the European Patent Office  
Le Président de l'Office européen des brevets  
p.o.

  
U. Ingmann

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Anmeldung Nr:  
Application no.: 11193829.6  
Demande no :

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40789 Monheim am Rhein/DE

Bezeichnung der Erfindung / Title of the invention / Titre de l'invention:  
(Falls die Bezeichnung der Erfindung nicht angegeben ist, siehe Beschreibung.  
If no title is shown please refer to the description.  
Si aucun titre n'est indiqué se référer à la description.)

Active ingredient combinations having insecticidal and acaricidal properties

In Anspruch genommene Priorität(en) / Priority(Priorities) claimed / Priorité(s) revendiquée(s)  
Staat/Tag/Aktenzeichen / State/Date/File no. / Pays/Date/Numéro de dépôt:

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AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL  
PT RO RS SE SI SK SM TR

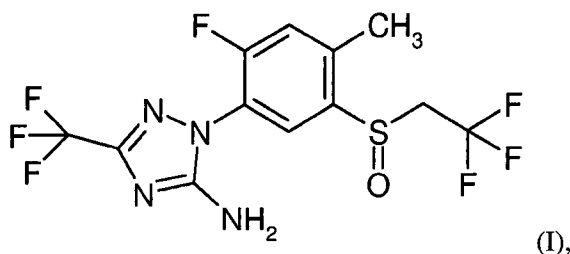
**Active ingredient combinations having insecticidal and acaricidal properties**

The present invention relates to novel active ingredient combinations which comprise a compound of the formula (I) in combination with further active insecticidal ingredients or biological control agents and are very suitable for control of animal pests such as insects and / or unwanted acarids and indirectly improve plant growth. The present invention further relates to the use of a compound of the formula (I) in combination with further active insecticidal ingredients or biological control agents for reducing overall damage of plants and plant parts as well as losses in harvested fruits or vegetables caused by insects, nematodes and phytopathogens.

The compound of the formula (I) is known from WO 1999/055668 and WO 2006/043635) and its insecticidal action has been described. The active ingredients specified in this description by their common name are known, for example, from "The Pesticide Manual" 14th ed., British Crop Protection Council 2006, and the website <http://www.alanwood.net/pesticides>.

However, the acaricidal and/or insecticidal efficacy and/or the activity spectrum and/or the compatibility of the known compounds with plants, especially with respect to crop plants, is not always adequate.

It has now been found that active ingredient combinations comprising a compound of the formula (I)



and one or more further insecticides and / or acaricides and / or biological control agents from the group (II), selected from

(1) Acetylcholinesterase (AChE) inhibitors, for example

carbamates, e.g. Alanycarb (II-1-1), Aldicarb (II-1-2), Bendiocarb (II-1-3), Benfuracarb (II-1-4), Butoxycarboxim (II-1-5), Carbaryl (II-1-6), Carbofuran (II-1-7), Carbosulfan (II-1-8), Ethiofencarb (II-1-9), Fenobucarb (II-1-10), Furathiocarb (II-1-11), Isoprocarb (II-1-12), Methomyl (II-1-13), Metolcarb (II-1-14), Oxamyl (II-1-15), Pirimicarb (II-1-16), Propoxur (II-1-17), Thiodicarb (II-1-18), and XMC (II-1-19);

or

organophosphates, e.g. Acephate (II-1-20), Azinphos-ethyl (II-1-21), Azinphos-methyl (II-1-22), Chlorethoxyfos (II-1-23), Chlorfenvinphos (II-1-24), Chlorpyrifos (II-1-25), Chlorpyrifos-methyl (II-1-26), Cyanophos (II-1-27), Diazinon (II-1-28), Dichlorvos/DDVP (II-1-29), Dimethoate (II-1-30),

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Dimethylvinphos (II-1-31), Disulfoton (II-1-32), EPN (II-1-46), Ethion (II-1-33), Ethoprophos (II-1-34), Fenamiphos (II-1-35), Fenitrothion (II-1-36), Fenthion (II-1-37), Fosthiazate (II-1-38), Isofenphos (II-1-39), Isopropyl O-(methoxyaminothio-phosphoryl) salicylate (II-1-40), Isoxathion (II-1-41), Malathion (II-1-42), Methidathion (II-1-43), Monocrotophos (II-1-44), Naled (II-1-45), Oxydemeton-methyl (II-1-46),  
5 Phenthoate (II-1-47), Phosalone (II-1-48), Phosmet (II-1-49), Pirimiphos-methyl (II-1-50), Profenofos (II-1-51), Prothiofos (II-1-52), Pyraclofos (II-1-53), Pyridaphenthion (II-1-54), Quinalphos (II-1-55), Tetrachlorvinphos (II-1-56), Thiometon (II-1-57), Triclorfon (II-1-58), and Vamidothion (II-1-59);

(2) GABA-gated chloride channel antagonists, for example

cyclodiene organochlorines, e.g. Chlordane (II-2-1) and Endosulfan (II-2-2); or

10 phenylpyrazoles (fiproles), e.g. Fipronil (II-2-3) ;

(3) Sodium channel modulators / voltage-dependent sodium channel blockers, for example

pyrethroids, e.g. Acrinathrin (II-3-1), Allethrin (II-3-2), d-cis-trans Allethrin (II-3-3), d-trans Allethrin (II-3-4), Bifenthrin (II-3-5), Cycloprothrin (II-3-6), Cyfluthrin (II-3-7), beta-Cyfluthrin (II-3-8), Cyhalothrin (II-3-9), lambda-Cyhalothrin (II-3-10), gamma-Cyhalothrin (II-3-11), Cypermethrin (II-3-12), alpha-

15 Cypermethrin (II-3-13), beta-Cypermethrin (II-3-14), theta-Cypermethrin (II-3-15), zeta-Cypermethrin (II-3-16), Deltamethrin (II-3-17), Etofenprox (II-3-18), Fenpropathrin (II-3-19), Fenvalerate (II-3-20), Flucythrinate (II-3-21), tau-Fluvalinate (II-3-22), Kadethrin (II-3-23), Permethrin (II-3-24), Phenothrin [(1R)-trans isomer] (II-3-25), Pyrethrine (pyrethrum) (II-3-26), Resmethrin (II-3-27), Silafluofen (II-3-28), Tefluthrin (II-3-29), Tetramethrin (II-3-30), Tetramethrin [(1R) isomers] (II-3-31), and Tralomethrin (II-3-20  
20 32), or

DDT (II-3-33); or Methoxychlor (II-3-34);

(4) Nicotinic acetylcholine receptor (nAChR) agonists, for example

neonicotinoids, e.g. Acetamiprid (II-4-1), Clothianidin (II-4-2), Dinotefuran (II-4-3), Imidacloprid (II-4-4), Nitenpyram (II-4-5), Thiacloprid (II-4-6), and Thiamethoxam (II-4-7); or

25 Nicotine (II-4-8);

(5) Nicotinic acetylcholine receptor (nAChR) allosteric activators, for example

spinosyns, e.g. Spinetoram (II-5-1) and Spinosad (II-5-2);

(6) Chloride channel activators, for example

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avermectins/milbemycins, e.g. Abamectin (II-6-1), Enamectin benzoate (II-6-2), Lepimectin (II-6-3), and Milbemectin (II-6-4);

(7) Juvenile hormone mimics, for example

juvenile hormone analogues, e.g. and Methoprene (II-7-1); or

5 Fenoxycarb (II-7-2); or Pyriproxyfen (II-7-3);

(8) Miscellaneous non-specific (multi-site) inhibitors, for example

alkyl halides, e.g. Methyl bromide (II-8-1) and other alkyl halides; or

Chloropicrin (II-8-2); or Sulfuryl fluoride (II-8-3); or Borax (II-8-4); or Tartar emetic (II-8-5);

(9) Selective homopteran feeding blockers, e.g. Pymetrozine (II-9-1);

10 (10) Mite growth inhibitors, e.g. Clofentezine (II-10-1), Hexythiazox (II-10-2), and Diflovidazin (II-10-3);  
or

Etoxazole (II-10-4);

(11) Microbial disruptors of insect midgut membranes, e.g. *Bacillus thuringiensis* subspecies *israelensis* (II-11-1), *Bacillus sphaericus* (II-11-2), *Bacillus thuringiensis* subspecies *aizawai* (II-11-3), *Bacillus*

15 *thuringiensis* subspecies *kurstaki* (II-11-4), *Bacillus thuringiensis* subspecies *tenebrionis* (II-11-5), and BT  
crop proteins: Cry1Ab, Cry1Ac, Cry1Fa, Cry2Ab, mCry3A, Cry3Ab, Cry3Bb, Cry34/35Ab1 (II-11-6);

(12) Inhibitors of mitochondrial ATP synthase, for example Diafenthiuron (II-12-1); or

organotin miticides, e.g. Azocyclotin (II-12-2), Cyhexatin (II-12-3), and Fenbutatin oxide (II-12-4); or

Propargite (II-12-5); or Tetradifon (II-12-6);

20 (13) Uncouplers of oxidative phosphorylation via disruption of the proton gradient, for example  
Chlorfenapyr (II-13-1), DNOC (II-13-2), and Sulfluramid (II-13-3);

(14) Nicotinic acetylcholine receptor (nAChR) channel blockers, for example Bensultap (II-14-1), Cartap  
hydrochloride (II-14-2), and Thiocyclam (II-14-3);

(15) Inhibitors of chitin biosynthesis, type 0, for example Chlorfluazuron (II-15-1), Diflubenzuron (II-15-

25 2), Flucycloxuron (II-15-3), Flufenoxuron (II-15-4), Hexaflumuron (II-15-5), Lufenuron (II-15-6),  
Teflubenzuron (II-15-7), and Triflumuron (II-15-8);

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(16) Inhibitors of chitin biosynthesis, type 1, for example Buprofezin (II-16-1);

(17) Moulting disruptors, for example Cyromazine (II-17-1);

(18) Octopamine receptor agonists, for example Amitraz (II-18-1);

(19) Mitochondrial complex III electron transport inhibitors, for example Hydramethylnon (II-19-1); or

5 Acequinocyl (II-19-2); or Fluacrypyrim (II-19-3);

(20) Mitochondrial complex I electron transport inhibitors, for example

METI acaricides, e.g. Fenpyroximate (II-20-1), Pyrimidifen (II-20-2), Pyridaben (II-20-3), Tebufenpyrad (II-20-4), and Tolfenpyrad (II-20-5); or

Rotenone (Derris) (II-20-6);

10 (21) Voltage-dependent sodium channel blockers, e.g. Indoxacarb (II-21-1);

(22) Inhibitors of acetyl CoA carboxylase, for example

tetronic and tetramic acid derivatives, e.g. Spirodiclofen (II-22-1);

(23) Mitochondrial complex IV electron transport inhibitors, for example

phosphines, e.g. Aluminium phosphide (II-23-1), Calcium phosphide (II-23-2), Phosphine (II-23-3), and

15 Zinc phosphide (II-23-4); or

Cyanide (II-23-5).

(24) Ryanodine receptor modulators, for example

diamides, e.g. Chlorantraniliprole (II-24-1);

further active ingredients with unknown or uncertain mode of action, for example Amidoflumet (II-25-

20 1), Azadirachtin (II-25-2), Benclotiaz (II-25-3), Benzoximate (II-25-4), Bifenazate (II-25-5), Bromopropylate (II-25-6), Chinomethionat (II-25-7), Cryolite (II-25-8), Cyantraniliprole (Cyazypyr) (II-25-9), Dicofol (II-25-10), Diflovidazin (II-25-11), Fluensulfone (II-25-12), Flufiprole (II-25-13), Fluopyram (II-25-14), Fufenozide (II-25-15), Imidaclothiz (II-25-16), Iprodione (II-25-17), Meperfluthrin (II-25-18), Pyrifluquinazon (II-25-19), Tetramethylfluthrin (II-25-20), and iodomethane  
25 (II-25-21); furthermore products based on Bacillus firmus (including but not limited to strain CNCM I-1582, such as, for example, VOTiVO™, BioNem) (II-25-22) Bacillus subtilis GB03 (II-25-23) and QST 713 (II-25-24), Bacillus amyloliquefaciens FZB24 (II-25-25) and FZB 42 (II-25-26), Bacillus

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thuringiensis subspecies aizawai (II-25-27), kurstaki (II-25-28), tenebrionis (II-25-29) and israelensis (II-25-30), *Bacillus sphaericus*, *Acinetobacter* sp., *Pasteuria penetrans*, *Streptomyces venezuelae*, *Metarhizium anisopliae* F52 (II-25-31), *Metschnikowia fructicola* (II-25-32), *Paecilomyces lilacinus* strain 251 (II-25-33), *Paecilomyces fumosoroseus* (II-25-34), *Nomuraea rileyi* (II-25-35), *Hirsutella thompsoni*, *Beauveria bassiana*, *Beauveria brongniartii*, *Lagenidium giganteum*, *Myrothecium verrucaria*, *Tsukamurella paurometabola*, *Cydia pomonella* granulosus virus (II-25-36), *Adoxophyes orana* granulosus virus, *Helicoverpa armigera* nucleopolyhedro virus, *Spodoptera exigua* nucleopolyhedro virus, *Spodoptera littoralis* nucleopolyhedro virus, *Spodoptera litura* nucleopolyhedro virus, *Neodiprion abietis* nucleopolyhedro virus, *Neodiprion sertifer* nucleopolyhedro virus, 10 *Verticillium lecanii*, *Pyrethrum* (II-25-37), *Harpin-Protein* (II-25-38), *Thymol* (II-25-39), *Chitin*, *Quillaja saponaria* extract.

or one of the following known active compounds: 3-bromo-N-{2-bromo-4-chloro-6-[(1-cyclopropylethyl)carbamoyl]phenyl}-1-(3-chloropyridin-2-yl)-1H-pyrazole-5-carboxamide (II-25-40) (known from WO2005/077934), 4-[[[(6-bromopyridin-3-yl)methyl](2-fluoroethyl)amino]furan-2(5H)-one (II-25-41) (known from WO2007/115644), 4-[[[(6-fluoropyridin-3-yl)methyl](2,2-difluoroethyl)amino]furan-2(5H)-one (II-25-42) (known from WO2007/115644), 4-[[[(2-chloro-1,3-thiazol-5-yl)methyl](2-fluoroethyl)amino]furan-2(5H)-one (II-25-43) (known from WO2007/115644), 4-[[[(6-chloropyridin-3-yl)methyl](2-fluoroethyl)amino]furan-2(5H)-one (II-25-44) (known from WO2007/115644), *Flupyradifurone* (II-25-45), 4-[[[(6-chloro-5-fluoropyridin-3-yl)methyl](methyl)amino]furan-2(5H)-one (II-25-46) (known from WO2007/115643), 4-[[[(5,6-dichloropyridin-3-yl)methyl](2-fluoroethyl)amino]furan-2(5H)-one (II-25-47) (known from WO2007/115646), 4-[[[(6-chloro-5-fluoropyridin-3-yl)methyl](cyclopropyl)amino]furan-2(5H)-one (II-25-48) (known from WO2007/115643), 4-[[[(6-chloropyridin-3-yl)methyl](cyclopropyl)amino]furan-2(5H)-one (II-25-49) (known from EP-A-0 539 588), 4-[[[(6-chloropyridin-3-yl)methyl](methyl)amino]furan-2(5H)-one (II-25-50) (known from EP-A-0 539 588), [[1-(6-chloropyridin-3-yl)ethyl](methyl)oxido- $\lambda^4$ -sulfanylidene]cyanamide (II-25-51) (known from WO2007/149134) and its diastereomers [[(1R)-1-(6-chloropyridin-3-yl)ethyl](methyl)oxido- $\lambda^4$ -sulfanylidene]cyanamide (A) (II-25-52), and [[(1S)-1-(6-chloropyridin-3-yl)ethyl](methyl)oxido- $\lambda^4$ -sulfanylidene]cyanamide (B) (II-25-53) (also known from WO2007/149134) as well as *Sulfoxaflor* (II-25-54) and its diastereomers [(R)-methyl(oxido){(1R)-1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}- $\lambda^4$ -sulfanylidene]cyanamide (A1) (II-25-55), and [(S)-methyl(oxido){(1S)-1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}- $\lambda^4$ -sulfanylidene]cyanamide (A2) (II-25-56), referred to as group of diastereomers A (known from WO2010/074747, WO2010/074751), [(R)-methyl(oxido){(1S)-1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}- $\lambda^4$ -sulfanylidene]cyanamide (B1) (II-25-57), and [(S)-methyl(oxido){(1R)-1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}- $\lambda^4$ -sulfanylidene]cyanamide (B2) (II-25-58), referred to as group of

diastereomers B (also known from WO2010/074747, WO2010/074751), and 11-(4-chloro-2,6-dimethylphenyl)-12-hydroxy-1,4-dioxo-9-azadispiro[4.2.4.2]tetradec-11-en-10-one (II-25-59) (known from WO2006/089633), 3-(4'-fluoro-2,4-dimethylbiphenyl-3-yl)-4-hydroxy-8-oxa-1-azaspiro[4.5]dec-3-en-2-one (II-25-60) (known from WO2008/067911), 1-{2-fluoro-4-methyl-5-[(2,2,2-trifluoroethyl)sulfinyl]phenyl}-3-(trifluoromethyl)-1H-1,2,4-triazol-5-amine (II-25-61) (known from WO2006/043635), [(3S,4aR,12R,12aS,12bS)-3-[(cyclopropylcarbonyl)oxy]-6,12-dihydroxy-4,12b-dimethyl-11-oxo-9-(pyridin-3-yl)-1,3,4,4a,5,6,6a,12,12a,12b-decahydro-2H,11H-benzo[f]pyrano[4,3-b]chromen-4-yl]methyl cyclopropanecarboxylate (II-25-62) (known from WO2008/066153), 2-cyano-3-(difluoromethoxy)-N,N-dimethylbenzenesulfonamide (II-25-63) (known from WO2006/056433), 2-cyano-3-(difluoromethoxy)-N-methylbenzenesulfonamide (II-25-64) (known from WO2006/100288), 2-cyano-3-(difluoromethoxy)-N-ethylbenzenesulfonamide (II-25-65) (known from WO2005/035486), 4-(difluoromethoxy)-N-ethyl-N-methyl-1,2-benzothiazol-3-amine 1,1-dioxide (II-25-66) (known from WO2007/057407), N-[1-(2,3-dimethylphenyl)-2-(3,5-dimethylphenyl)ethyl]-4,5-dihydro-1,3-thiazol-2-amine (II-25-67) (known from WO2008/104503), {1'-[(2E)-3-(4-chlorophenyl)prop-2-en-1-yl]-5-fluorospiro[indole-3,4'-piperidin]-1(2H)-yl}(2-chloropyridin-4-yl)methanone (II-25-68) (known from WO2003/106457), 3-(2,5-dimethylphenyl)-4-hydroxy-8-methoxy-1,8-diazaspiro[4.5]dec-3-en-2-one (II-25-69) (known from WO2009/049851), 3-(2,5-dimethylphenyl)-8-methoxy-2-oxo-1,8-diazaspiro[4.5]dec-3-en-4-yl ethyl carbonate (II-25-50) (known from WO2009/049851), 4-(but-2-yn-1-yloxy)-6-(3,5-dimethylpiperidin-1-yl)-5-fluoropyrimidine (II-25-71) (known from WO2004/099160), (2,2,3,3,4,4,5,5-octafluoropentyl)(3,3,3-trifluoropropyl)malononitrile (II-25-72) (known from WO2005/063094), (2,2,3,3,4,4,5,5-octafluoropentyl)(3,3,4,4,4-pentafluorobutyl)malononitrile (II-25-73) (known from WO2005/063094), 8-[2-(cyclopropylmethoxy)-4-(trifluoromethyl)phenoxy]-3-[6-(trifluoromethyl)pyridazin-3-yl]-3-azabicyclo[3.2.1]octane (II-25-74) (known from WO2007/040280), Flometoquin (II-25-75), PF1364 (CAS-Reg.No. 1204776-60-2) (II-25-76) (known from JP2010/018586), 5-[5-(3,5-dichlorophenyl)-5-(trifluoromethyl)-4,5-dihydro-1,2-oxazol-3-yl]-2-(1H-1,2,4-triazol-1-yl)benzonitrile (II-25-77) (known from WO2007/075459), 5-[5-(2-chloropyridin-4-yl)-5-(trifluoromethyl)-4,5-dihydro-1,2-oxazol-3-yl]-2-(1H-1,2,4-triazol-1-yl)benzonitrile (II-25-78) (known from WO2007/075459), 4-[5-(3,5-dichlorophenyl)-5-(trifluoromethyl)-4,5-dihydro-1,2-oxazol-3-yl]-2-methyl-N-{2-oxo-2-[(2,2,2-trifluoroethyl)amino]ethyl}benzamide (II-25-79) (known from WO2005/085216), 4-[[[(6-chloropyridin-3-yl)methyl](cyclopropyl)amino]-1,3-oxazol-2(5H)-one (II-25-80), 4-[[[(6-chloropyridin-3-yl)methyl](2,2-difluoroethyl)amino]-1,3-oxazol-2(5H)-one (II-25-81), 4-[[[(6-chloropyridin-3-yl)methyl](ethyl)amino]-1,3-oxazol-2(5H)-one (II-25-82), 4-[[[(6-chloropyridin-3-yl)methyl](methyl)amino]-1,3-oxazol-2(5H)-one (II-25-83) (all known from WO2010/005692), NNI-0711 (II-25-84) (known from WO2002/096882), 1-acetyl-N-[4-(1,1,1,3,3,3-hexafluoro-2-methoxypropan-2-yl)-3-isobutylphenyl]-N-isobutyryl-3,5-dimethyl-1H-pyrazole-4-carboxamide (II-25-85) (known from WO2002/096882), methyl 2-[2-([3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-

yl]carbonyl}amino)-5-chloro-3-methylbenzoyl]-2-methylhydrazinecarboxylate (II-25-86) (known from WO2005/085216), methyl 2-[2-([3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl}amino)-5-cyano-3-methylbenzoyl]-2-ethylhydrazinecarboxylate (II-25-87) (known from WO2005/085216), methyl 2-[2-([3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl}amino)-5-cyano-3-methylbenzoyl]-2-methylhydrazinecarboxylate (II-25-88) (known from WO2005/085216), methyl 2-[3,5-dibromo-2-([3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl}amino)benzoyl]-1,2-diethylhydrazinecarboxylate (II-25-89) (known from WO2005/085216), methyl 2-[3,5-dibromo-2-([3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl}amino)benzoyl]-2-ethylhydrazinecarboxylate (II-25-90) (known from WO2005/085216), (5RS,7RS;5RS,7SR)-1-(6-chloro-3-pyridylmethyl)-1,2,3,5,6,7-hexahydro-7-methyl-8-nitro-5-propoxyimidazo[1,2-a]pyridine (II-25-91) (known from WO2007/101369), 2-{6-[2-(5-fluoropyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine (II-25-92) (known from WO2010/006713), 2-{6-[2-(pyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine (II-25-93) (known from WO2010/006713), 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl}-1H-pyrazole-5-carboxamide (II-25-94) (known from WO2010/069502), 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl}-1H-pyrazole-5-carboxamide (II-25-95) (known from WO2010/069502), N-[2-(tert-butylcarbamoyl)-4-cyano-6-methylphenyl]-1-(3-chloropyridin-2-yl)-3-{[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl}-1H-pyrazole-5-carboxamide (II-25-96) (known from WO2010/069502), N-[2-(tert-butylcarbamoyl)-4-cyano-6-methylphenyl]-1-(3-chloropyridin-2-yl)-3-{[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl}-1H-pyrazole-5-carboxamide (II-25-97) (known from WO2010/069502), (1E)-N-[(6-chloropyridin-3-yl)methyl]-N'-cyano-N-(2,2-difluoroethyl)ethanimidamide (II-25-98) (known from WO2008/009360), N-[2-(5-amino-1,3,4-thiadiazol-2-yl)-4-chloro-6-methylphenyl]-3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazole-5-carboxamide (II-25-99) (known from CN102057925), and methyl 2-[3,5-dibromo-2-([3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl}amino)benzoyl]-2-ethyl-1-methylhydrazinecarboxylate (II-25-100) (known from WO2011/049233),

or further biological control agents selected from bacteria, in particular spore-forming bacteria, fungi or yeasts, protozoas, viruses, optionally in the presence of inoculants,

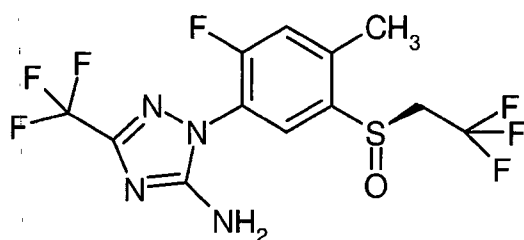
are very suitable for control of animal pests such as insects and/or acaricides and indirectly improve plant health. Further, the compound of the formula (I) in combination with further active insecticidal ingredients or biological control agents can be used for reducing overall damage of plants and plant parts as well as losses in harvested fruits or vegetables caused by insects, nematodes and phytopathogens.

The active ingredients of group (II) are, in accordance with the IRAC classification, assigned to

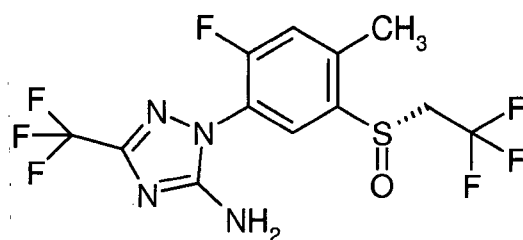
different classes and groups according to their mechanism of action.

If, within this description, the short form of the common name of an active ingredient is used, this in each case encompasses all common derivatives, such as the esters and salts, and isomers, especially optical isomers, especially the commercial form or forms. If an ester or salt is referred to by the common name, this also refers in each case to all other common derivatives, such as other esters and salts, the free acids and neutral compounds, and isomers, especially optical isomers, especially the commercial form or forms. The chemical compound names mentioned refer to at least one of the compounds encompassed by the common name, frequently a preferred compound.

The compound of the formula (I) has a chiral sulfoxide group so that it forms two enantiomers having R or S configuration at the sulphur:



(I-A), R enantiomer,



(I-B), S enantiomer

In the synthesis from achiral starting materials the two enantiomers are formed in equal amounts so that a racemate is present. The separation of the racemate known from the literature (cf. WO 1999/055668 and WO 2006/043635) into the individual enantiomers can be carried out by preparative HPLC on a chiral stationary phase. The separation may take place, for example, on a Daical Chiralpak AD-H 250 mm x 30 mm column using a mobile phase of n-heptane/ethanol/methanol 60:20:20 (v/v/V), a flow rate of 30 ml/min and UV detection at 220 nm. The two enantiomers can then be characterized by methods known from the literature, for example by X-ray structural analysis or by determining the optical rotation.

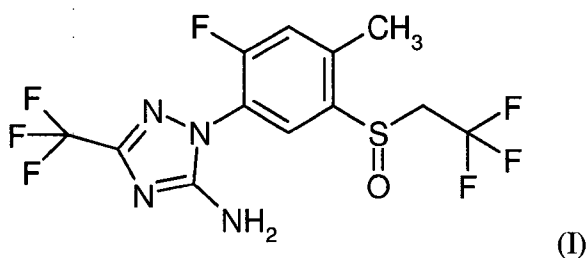
Accordingly, the present invention provides novel active compound combinations comprising the racemate or the R or S enantiomer of the compound of the formula (I) and at least one further insecticidally active compound of group (II).

Surprisingly, the insecticidal and/or acaricidal action of the inventive active ingredient combinations is much higher than the total of the actions of the individual active ingredients. There is an unforeseeable

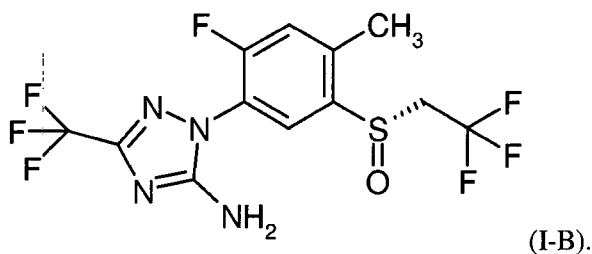
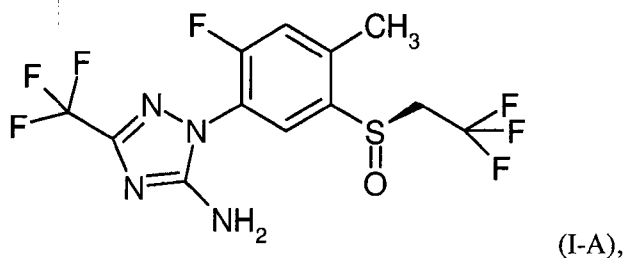
true synergistic effect and not just complementary action.

Preferred combinations comprise one of the preferred compounds of the formula (I) as specified below and at least one preferred active ingredient selected from the group (II).

Preferred compound is the racemate of the formula (I)



Likewise preferred are the respective R or S enantiomers of the formulae (I-A),(I-B):



Preferred mixing partners from group (II) are the following ones selected from

- 10 Abamectin, Acephate, Acequinocyl, Acetamiprid, Acrinathrin, Aldicarb, Alpha-Cypermethrin, Amitraz, Azadirachtin, Azinphos-methyl, Benfuracarb, Beta-Cyfluthrin, Bifenazate, Bifenthrin, Bensultap (Nereistoxin), Buprofezin, Carbaryl, Carbofuran, Carbosulfan, Cartap hydrochloride, Chloranthraniliprole (Rynazypyr), Chlorfenapyr, Chlorfluazuron, Chloropicrin, Chlorpyrifos, Clothianidin, Cyantraniliprole (Cyazypyr), Cyfluthrin, Cyhalothrin, Cypermethrin, Cyromazine,
- 15 Deltamethrin, Diafenthiuron, Diazinon, Dichloropropene, Dichlorfos, Dicofol, Diflubenzuron, Dimethoate, Dinotefuran, Disulfoton, Enamectin-(benzoate), Endosulfan, Ethoprophos, Etofenprox, Etoxazole, Fenamiphos, Fenbutatin oxide, Fenitrothion, Fenobucarb, Fenoxycarb, Fenpropathrin, Fenpyroximate, Fenvalerate, Fipronil, Fluacrypyrim, Fluensulfone, Flufenoxuron, Flupyradifurone, Fosthiazate, Gamma-Cyhalothrin, Hexythiazox, Hexaflumuron, Imidacloprid, Imidaclothiz, Indoxacarb,
- 20 Lambda-Cyhalothrin, Lepimectin, Lufenuron, Malathion, Metaldehyde, Methidathion, Methomyl, Milbemectin, Monocrotophos, Nitenpyram, Oxamyl, Permethrin, Pirimicarb, Profenofos, Propargite, Pymetrozine, Pyrafluprole, Pyrethrin, Pyridaben, Pyrifluquinazone, Pyrimethanil, Pyrimidifen,

Pyriprole, Pyriproxyfen, Quinalphos, Resmethrin, Spinetoram, Spinosad, Spirodiclofen, Sulfoxaflor, Tau-Fluvalinate, Tebufenpyrad, Teflubenzuron, Tefluthrin, Thiacloprid, Thiamethoxam, Thiodicarb, Trichlorfon, Triflumuron; Zeta-Cypermethrin, 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl}-1H-pyrazole-5-

- 5 carboxamide/ 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl}-1H-pyrazole-5-carboxamid, 2-{{6-[2-(5-fluoropyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine, 2-{{6-[2-(pyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine, (1E)-N-[(6-chloropyridin-3-yl)methyl]-N'-cyano-N-(2,2-difluoroethyl)ethanimidamide, Bacillus firmus I-1582, Bacillus subtilis GB03 and QST 713, Bacillus amyloliquefaciens FZB24 and  
10 FZB 42, Bacillus thuringiensis subspecies aizawai, kurstaki, tenebrionis and israelensis, Metarhizium anisopliae F52, Metschnikowia fructicola, Paecilomyces lilacinus strain 251, Paecilomyces fumosoroseus, Nomuraea rileyi, Cydia pomonella granulosus virus, Pyrethrum, Harpin-Protein and Thymol.

- More preferred are combinations comprising one preferred compound of the formula (I) and at least one  
15 more preferred active ingredient of group (II), selected from

- Abamectin, Acetamiprid, Acrinathrin, Alpha-Cypermethrin, Beta-Cyfluthrin, Bifenthrin, Buprofezin, Flupyradifurone, Chlorfenapyr, Chlorpyrifos, Clothianidin, Cyantraniliprole, Cyfluthrin, Cypermethrin, Deltamethrin, Diafenthiuron, Dinotefuran, Enamectin-(benzoate), Fenpyroximate, Fipronil, Fluensulfone, Gamma-Cyhalothrin, Imidacloprid, Indoxacarb, L-Cyhalothrin, Milbemectin,  
20 Nitenpyram, Pyrifluquinazone, Pymetrozine, Chloranthraniliprole, Spinetoram, Spinosad, Spirodiclofen, Sulfoxaflor, Tebufenpyrad, Tefluthrin, Thiacloprid, Thiamethoxam, Thiodicarb, Triflumuron; 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl}-1H-pyrazole-5-carboxamide/ 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl}-1H-  
25 pyrazole-5-carboxamide; 2-{{6-[2-(5-fluoropyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine, 2-{{6-[2-(pyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine (1E)-N-[(6-chloropyridin-3-yl)methyl]-N'-cyano-N-(2,2-difluoroethyl)ethanimidamide, Bacillus firmus I-1582, Bacillus subtilis GB03 and QST 713, Bacillus amyloliquefaciens FZB24 and FZB 42, Bacillus thuringiensis subspecies aizawai, kurstaki, tenebrionis and israelensis, Metarhizium anisopliae F52, Paecilomyces lilacinus strain 251,  
30 Nomuraea rileyi.

Even more preferred are combinations comprising one preferred compound of formula (I) and one even more preferred active ingredient from group (II), selected from

Abamectin, Acetamiprid, Acrinathrin, Beta-Cyfluthrin, Bifenthrin, Buprofezin, Flupyradifurone,

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Chlorfenapyr, Chlorpyrifos, Clothianidin, Cyantraniliprole, Cyfluthrin, Deltamethrin, Diafenthiuron, Dinotefuran, Enamectin-(benzoate), Fenpyroximate, Fipronil, Fluensulfone, Imidacloprid, Indoxacarb, L-Cyhalothrin, Milbemectin, Nitenpyram, Pyriproxyzone, Pymetrozine, Chloranthraniliprole, Spinetoram, Spinosad, Spirodiclofen, Sulfoxaflor, Tebufenpyrad, Thiacloprid, Thiamethoxam, 5 Thiodicarb, Triflumuron; 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-[[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl]-1H-pyrazole-5-carboxamide/ 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-[[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl]-1H-pyrazole-5-carboxamide; 2-{6-[2-(5-fluoropyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine, 2-{6-[2-(pyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine (1E)-N-[(6-chloropyridin-3-yl)methyl]-N'-10 cyano-N-(2,2-difluoroethyl)ethanimidamide, Bacillus firmus I-1582, Bacillus subtilis GB03 and QST 713, Bacillus amyloliquefaciens FZB24 and FZB 42, Bacillus thuringiensis subspecies aizawai, kurstaki, tenebrionis and israelensis, Metarhizium anisopliae F52, Paecilomyces lilacinus strain 251, Nomuraea rileyi.

Epecially preferred are combinations comprising the compound (I) and exactly one active ingredient 15 from group II in the mixing ratios specified in Table 1.

Epecially preferred are combinations comprising the compound (I-A) and exactly one active ingredient from group II in the mixing ratios specified in Table 1.

Epecially preferred are combinations comprising the compound (I-B) and exactly one active ingredient from group II in the mixing ratios specified in Table 1.

20 The active ingredient combinations may additionally also comprise further fungicidally, acaricidally or insecticidally active mixture components.

When the active ingredients are present in particular weight ratios in the inventive active ingredient combinations, the improved effect is manifested. However, the weight ratios of the active ingredients in the active ingredient combinations can be varied within a relatively wide range. In general, the inventive 25 combinations comprise active ingredient of the formula (I) to the mixing partner from group (II) in a ratio of 625:1 to 1: 625; whereas for inventive combinations comprising the active ingredient of the formula (I) and a biological control agent selected from group (II), the ratio is typically 100:1 to 1:2000. Preferred and more preferred mixing ratios are specified in Table 1 below.

the mixing ratios are based on weight ratios. The ratio should be understood as the active ingredient of the formula (I):mixing partner of the group (II) to active ingredient of the formula (I):mixing partner of the group (II).

| Nr. | Mixing partner                     | Preferred mixing ratio | More preferred mixing ratio | Most preferred mixing ratio |
|-----|------------------------------------|------------------------|-----------------------------|-----------------------------|
| 1.  | Abamectin                          | 625:1 bis 1:625        | 125:1 bis 1:125             | 25:1 bis 1:25               |
| 2.  | Acephate                           | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 3.  | Acequinocyl                        | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 4.  | Acetamiprid                        | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 5.  | Acrinathrin                        | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 6.  | Aldicarb                           | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 7.  | alpha-Cypermethrin                 | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 8.  | Amitraz                            | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 9.  | Azinphos-methyl                    | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 10. | Bacillus amyloliquefaciens FZB24   | 100:1 bis 1:1000       | 50:1 bis 1:500              | 5:1 bis 1:100               |
| 11. | Bacillus amyloliquefaciens FZB42   | 100:1 bis 1:1000       | 50:1 bis 1:500              | 5:1 bis 1:100               |
| 12. | Bacillus firmus I-1582             | 100:1 bis 1:1000       | 50:1 bis 1:500              | 5:1 bis 1:100               |
| 13. | Bacillus subtilis GB03             | 100:1 bis 1:1000       | 50:1 bis 1:500              | 5:1 bis 1:100               |
| 14. | Bacillus subtilis QST 713          | 100:1 bis 1:1000       | 50:1 bis 1:500              | 5:1 bis 1:100               |
| 15. | Bacillus thuringiensis aizawai     | 100:1 bis 1:1000       | 50:1 bis 1:500              | 5:1 bis 1:100               |
| 16. | Bacillus thuringiensis israelensis | 100:1 bis 1:1000       | 50:1 bis 1:500              | 5:1 bis 1:100               |
| 17. | Bacillus thuringiensis kurstaki    | 100:1 bis 1:1000       | 50:1 bis 1:500              | 5:1 bis 1:100               |
| 18. | Bacillus thuringiensis tenebrionis | 100:1 bis 1:1000       | 50:1 bis 1:500              | 5:1 bis 1:100               |
| 19. | Benfuracarb                        | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 20. | beta-Cyfluthrin                    | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 21. | Bifenazate                         | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 22. | Bifenthrin                         | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 23. | Bensultap (Nereistoxin)            | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 24. | Buprofezin                         | 625:1 bis 1:625        | 125:1 bis 1:125             | 25:1 bis 1:25               |
| 25. | Carbaryl                           | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 26. | Carbofuran                         | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 27. | Carbosulfan                        | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 28. | Cartap hydrochloride               | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 29. | Chlorantraniliprole (Rynaxypyr)    | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 30. | Chlorfenapyr                       | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 31. | Chloropicrin                       | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 32. | Chlorpyrifos                       | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 33. | Clothianidin                       | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 34. | Cyantraniliprole (Cyazypyr)        | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 35. | Cyfluthrin                         | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 36. | Cyhalothrin                        | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 37. | Cypermethrin                       | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 38. | Cyromazine                         | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 39. | Deltamethrin                       | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 40. | Diafenthiuron                      | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 41. | Diazinon                           | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 42. | Dichloropropene                    | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 43. | Dichlorvos                         | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 44. | Dicofol                            | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 45. | Diflubenzuron                      | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |

| Nr. | Mixing partner        | Preferred mixing ratio | More preferred mixing ratio | Most preferred mixing ratio |
|-----|-----------------------|------------------------|-----------------------------|-----------------------------|
| 46. | Dimethoate            | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 47. | Dinotefuran           | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 48. | Disulfoton            | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 49. | Emamectin (-benzoate) | 625:1 bis 1:625        | 125:1 bis 1:125             | 25:1 bis 1:25               |
| 50. | Endosulfan            | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 51. | Ethoprophos           | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 52. | Etofenprox            | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 53. | Etoxazole             | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 54. | Fenamiphos            | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 55. | Fenbutatin oxide      | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 56. | Fenitrothion          | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 57. | Fenobucarb            | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 58. | Fenoxycarb            | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 59. | Fenpropathrin         | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 60. | Fenpyroximate         | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 61. | Fenvalerate           | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 62. | Fipronil              | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 63. | Fluacrypyrim          | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 64. | Fluensulfone          | 625:1 bis 1:625        | 500:1 bis 1:500             | 100:1 bis 1:100             |
| 65. | Flufenoxuron          | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 66. | Flupyradifurone       | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 67. | Fosthiazate           | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 68. | gamma-Cyhalothrin     | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 69. | Hexythiazox           | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 70. | Imidacloprid          | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 71. | Imidaclothiz          | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 72. | Indoxacarb            | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 73. | Lambda-Cyhalothrin    | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 74. | Lepimectin            | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 75. | Lufenuron             | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 76. | Malathion             | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 77. | Metaldehyde           | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 78. | Methidathion          | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 79. | Methomyl              | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 80. | Milbemectin           | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 81. | Monocrotophos         | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 82. | Nitenpyram            | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 83. | Oxamyl                | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 84. | Permethrin            | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 85. | Pirimicarb            | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 86. | Profenofos            | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 87. | Propargite            | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 88. | Pymetrozine           | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 89. | Pyrafluprole          | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 90. | Pyrethrin             | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 91. | Pyridaben             | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 92. | Pyrifluquinazone      | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 93. | Pyrimethanil          | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 94. | Pyrimidifen           | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 95. | Pyriprole             | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |

| Nr.  | Mixing partner                                                                                                                                                                                                                                                                                            | Preferred mixing ratio | More preferred mixing ratio | Most preferred mixing ratio |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------------------|-----------------------------|
| 96.  | Pyriproxyfen                                                                                                                                                                                                                                                                                              | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 97.  | Quinalphos                                                                                                                                                                                                                                                                                                | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 98.  | Resmethrin                                                                                                                                                                                                                                                                                                | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 99.  | Spinetoram                                                                                                                                                                                                                                                                                                | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 100. | Spinosad                                                                                                                                                                                                                                                                                                  | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 101. | Spirodiclofen                                                                                                                                                                                                                                                                                             | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 102. | Sulfoxaflor                                                                                                                                                                                                                                                                                               | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 103. | Tau-Fluvalinate                                                                                                                                                                                                                                                                                           | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 104. | Tebufenpyrad                                                                                                                                                                                                                                                                                              | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 105. | Teflubenzuron                                                                                                                                                                                                                                                                                             | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 106. | Tefluthrin                                                                                                                                                                                                                                                                                                | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 107. | Thiacloprid                                                                                                                                                                                                                                                                                               | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 108. | Thiamethoxam                                                                                                                                                                                                                                                                                              | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 109. | Thiodicarb                                                                                                                                                                                                                                                                                                | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 110. | Trichlorfon                                                                                                                                                                                                                                                                                               | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 111. | Triflumuron                                                                                                                                                                                                                                                                                               | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 112. | Zeta-Cypermethrin                                                                                                                                                                                                                                                                                         | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 113. | 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-[[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl]-1H-pyrazole-5-carboxamide/<br>1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-[[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl]-1H-pyrazole-5-carboxamide | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 114. | 2-{6-[2-(5-fluoropyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine                                                                                                                                                                                                                                   | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 115. | 2-{6-[2-(pyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine                                                                                                                                                                                                                                           | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 116. | Metarhizium anisopliae F52                                                                                                                                                                                                                                                                                | 100:1 bis 1:2000       | 50:1 bis 1:1000             | 25:1 bis 1:200              |
| 117. | Metschnikowia fructicola                                                                                                                                                                                                                                                                                  | 100:1 bis 1:2000       | 50:1 bis 1:1000             | 25:1 bis 1:200              |
| 118. | Paecilomyces lilacinus 251                                                                                                                                                                                                                                                                                | 100:1 bis 1:2000       | 50:1 bis 1:1000             | 25:1 bis 1:200              |
| 119. | Azadirachtin                                                                                                                                                                                                                                                                                              | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 120. | Pyrethrum                                                                                                                                                                                                                                                                                                 | 625:1 bis 1:625        | 125:1 bis 1:125             | 25:1 bis 1:25               |
| 121. | (1E)-N-[(6-chloropyridin-3-yl)methyl]-N'-cyano-N-(2,2-difluoroethyl)ethanimidamide                                                                                                                                                                                                                        | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 122. | Harpin-Protein                                                                                                                                                                                                                                                                                            | 125:1 bis 1:125        | 25:1 bis 1:25               | 5:1 bis 1:5                 |
| 123. | Cydia pomonella granulosus virus (CpGV)                                                                                                                                                                                                                                                                   | 100:1 bis 1:2000       | 50:1 bis 1:1000             | 25:1 bis 1:200              |
| 124. | Thymol                                                                                                                                                                                                                                                                                                    | 625:1 bis 1:625        | 125:1 bis 1:125             | 25:1 bis 1:25               |

The active ingredient combinations according to the invention, in combination with good plant tolerance and favourable toxicity to warm-blooded animals and being tolerated well by the environment,

are suitable for protecting plants and plant organs, for increasing harvest yields, for improving the quality of the harvested material and for controlling animal pests, in particular insects, arachnids, helminths, nematodes and molluscs, which are encountered in agriculture, in horticulture, in animal husbandry, in forests, in gardens and leisure facilities, in protection of stored products and of materials, and in the hygiene sector. They can be preferably used as plant protection agents. They are active against normally sensitive and resistant species and against all or some stages of development. The abovementioned pests include:

- pests from the phylum Arthropoda, especially from the class Arachnida, for example, *Acarus* spp., *Aceria sheldoni*, *Aculops* spp., *Aculus* spp., *Amblyomma* spp., *Amphitetranychus viennensis*, *Argas* spp., *Boophilus* spp., *Brevipalpus* spp., *Bryobia graminum*, *Bryobia praetiosa*, *Centruroides* spp., *Choriotptes* spp., *Dermanyssus gallinae*, *Dermatophagoides pteronyssinus*, *Dermatophagoides farinae*, *Dermacentor* spp., *Eotetranychus* spp., *Epitrimerus pyri*, *Eutetranychus* spp., *Eriophyes* spp., *Glycyphagus domesticus*, *Halotydeus destructor*, *Hemitarsonemus* spp., *Hyalomma* spp., *Ixodes* spp., *Latrodectus* spp., *Loxosceles* spp., *Metatetranychus* spp., *Neutrombicula autumnalis*, *Nuphessa* spp., *Oligonychus* spp., *Ornithodoros* spp., *Ornithonyssus* spp., *Panonychus* spp., *Phyllocoptruta oleivora*, *Polyphagotarsonemus latus*, *Psoroptes* spp., *Rhipicephalus* spp., *Rhizoglyphus* spp., *Sarcoptes* spp., *Scorpio maurus*, *Steneotarsonemus* spp., *Steneotarsonemus spinki*, *Tarsonemus* spp., *Tetranychus* spp., *Trombicula alfreddugesi*, *Vaejovis* spp., *Vasates lycopersici*;

from the class Chilopoda, for example, *Geophilus* spp., *Scutigera* spp.;

- from the order or the class Collembola, for example, *Onychiurus armatus*;

from the class Diplopoda, for example, *Blaniulus guttulatus*;

from the class Insecta, e.g. from the order Blattodea, for example, *Blattella asahinai*, *Blattella germanica*, *Blatta orientalis*, *Leucophaea maderae*, *Panchlora* spp., *Parcoblatta* spp., *Periplaneta* spp., *Supella longipalpa*;

- from the order Coleoptera, for example, *Acalymma vittatum*, *Acanthoscelides obtectus*, *Adoretus* spp., *Agelastica alni*, *Agriotes* spp., *Alphitobius diaperinus*, *Amphimallon solstitialis*, *Anobium punctatum*, *Anoplophora* spp., *Anthonomus* spp., *Anthrenus* spp., *Apion* spp., *Apogonia* spp., *Atomaria* spp., *Attagenus* spp., *Bruchidius obtectus*, *Bruchus* spp., *Cassida* spp., *Cerotoma trifurcata*, *Ceutorrhynchus* spp., *Chaetocnema* spp., *Cleonus mendicus*, *Conoderus* spp., *Cosmopolites* spp., *Costelytra zealandica*, *Ctenicera* spp., *Curculio* spp., *Cryptolestes ferrugineus*, *Cryptorhynchus lapathi*, *Cylindrocopturus* spp., *Dermestes* spp., *Diabrotica* spp., *Dichocrocis* spp., *Dicladyspa armigera*, *Diloboderus* spp., *Epilachna* spp., *Epitrix* spp., *Faustinus* spp., *Gibbium psylloides*, *Gnathocerus cornutus*, *Hellula undalis*, *Heteronychus arator*, *Heteronyx* spp., *Hylamorphia elegans*, *Hylotrupes bajulus*, *Hypera postica*,

- Hypomeces squamosus, Hypothenemus spp., Lachnosterna consanguinea, Lasioderma serricorne, Latheticus oryzae, Lathridius spp., Lema spp., Leptinotarsa decemlineata, Leucoptera spp., Lissorhoptrus oryzophilus, Lixus spp., Luperodes spp., Lyctus spp., Megascelis spp., Melanotus spp., Meligethes aeneus, Melolontha spp., Migdolus spp., Monochamus spp., Naupactus xanthographus, 5 Necrobia spp., Niptus hololeucus, Oryctes rhinoceros, Oryzaephilus surinamensis, Oryzaphagus oryzae, Otiorrhynchus spp., Oxycetonia jucunda, Phaedon cochleariae, Phyllophaga spp., Phyllophaga helleri, Phyllotreta spp., Popillia japonica, Premnotrypes spp., Prostephanus truncatus, Psylliodes spp., Ptinus spp., Rhizobius ventralis, Rhizopertha dominica, Sitophilus spp., Sitophilus oryzae, Sphenophorus spp., Stegobium paniceum, Sternechus spp., Symphyletes spp., Tanymericus spp., Tenebrio molitor, 10 Tenebrioides mauretanicus, Tribolium spp., Trogoderma spp., Tychius spp., Xylotrechus spp., Zabrus spp.;

- from the order Diptera, for example, Aedes spp., Agomyza spp., Anastrepha spp., Anopheles spp., Asphondylia spp., Bactrocera spp., Bibio hortulanus, Calliphora erythrocephala, Calliphora vicina, Ceratitis capitata, Chironomus spp., Chrysomyia spp., Chrysops spp., Chrysozona pluvialis, 15 Cochliomyia spp., Contarinia spp., Cordylobia anthropophaga, Cricotopus sylvestris, Culex spp., Culicoides spp., Culiseta spp., Cuterebra spp., Dacus oleae, Dasyneura spp., Delia spp., Dermatobia hominis, Drosophila spp., Echinocnemus spp., Fannia spp., Gasterophilus spp., Glossina spp., Haematopota spp., Hydrellia spp., Hydrellia griseola, Hylemya spp., Hippobosca spp., Hypoderma spp., Liriomyza spp., Lucilia spp., Lutzomyia spp., Mansonia spp., Musca spp., Oestrus spp., Oscinella frit, 20 Paratanytarsus spp., Paralauterborniella subcincta, Pegomyia spp., Phlebotomus spp., Phorbia spp., Phormia spp., Piophilidae casei, Prodiptosis spp., Psila rosae, Rhagoletis spp., Sarcophaga spp., Simulium spp., Stomoxys spp., Tabanus spp., Tetanops spp., Tipula spp.;

- from the order Heteroptera, for example, Anasa tristis, Antestiopsis spp., Boisea spp., Blissus spp., Calocoris spp., Campylomma livida, Cavelerius spp., Cimex spp., Collaria spp., Creontiades dilutus, 25 Dasynus piperis, Dichelops furcatus, Diconocoris hewetti, Dysdercus spp., Euschistus spp., Eurygaster spp., Heliopeltis spp., Horcias nobilellus, Leptocoris spp., Leptocoris varicornis, Leptoglossus phyllopus, Lygus spp., Macropes excavatus, Miridae, Monalonion atratum, Nezara spp., Oebalus spp., Pentomidae, Piesma quadrata, Piezodorus spp., Psallus spp., Pseudacysta perseae, Rhodnius spp., Sahlbergella singularis, Scaptocoris castanea, Scotinophora spp., Stephanitis nashi, Tibraca spp., 30 Triatoma spp.;

from the order Homoptera, for example, Acizzia acaciaebaileyanae, Acizzia dodonaeae, Acizzia uncatoides, Acrida turrita, Acyrthosipon spp., Acrogonia spp., Aeneolamia spp., Agonosцена spp., Aleyrodes proletella, Aleurolobus barodensis, Aleurothrixus floccosus, Allocaridara malayensis, Amrasca spp., Anuraphis cardui, Aonidiella spp., Aphanostigma piri, Aphis spp., Arboridia apicalis,

- Arytainilla spp., Aspidiella spp., Aspidiotus spp., Atanus spp., Aulacorthum solani, Bemisia tabaci, Blastopsylla occidentalis, Boreioglycaspis melaleucae, Brachycaudus helichrysi, Brachycolus spp., Brevicoryne brassicae, Cacopsylla spp., Calligypona marginata, Carnecephala fulgida, Ceratovacuna lanigera, Cercopidae, Ceroplastes spp., Chaetosiphon fragaefolii, Chionaspis tegalensis, Chlorita onukii,
- 5 Chondracris rosea, Chromaphis juglandicola, Chrysomphalus ficus, Cicadulina mbila, Cocomytilus halli, Coccus spp., Cryptomyzus ribis, Cryptoneossa spp., Ctenarytaina spp., Dalbulus spp., Dialeurodes citri, Diaphorina citri, Diaspis spp., Drosicha spp., Dysaphis spp., Dysmicoccus spp., Empoasca spp., Eriosoma spp., Erythroneura spp., Eucalyptolyma spp., Euphyllura spp., Euscelis bilobatus, Ferrisia spp., Geococcus coffeae, Glycaspis spp., Heteropsylla cubana, Heteropsylla spinulosa, Homalodisca
- 10 coagulata, Hyalopterus arundinis, Icerya spp., Idiocerus spp., Idioscopus spp., Laodelphax striatellus, Lecanium spp., Lepidosaphes spp., Lipaphis erysimi, Macrosiphum spp., Macrosteles facifrons, Mahanarva spp., Melanaphis sacchari, Metcalfiella spp., Metopolophium dirhodum, Monellia costalis, Monelliopsis pecanis, Myzus spp., Nasonovia ribisnigri, Nephotettix spp., Nettigoniclla spectra, Nilaparvata lugens, Oncometopia spp., Orthezia praelonga, Oxya chinensis, Pachyopsylla spp.,
- 15 Parabemisia myricae, Paratrioza spp., Parlatoria spp., Pemphigus spp., Peregrinus maidis, Phenacoccus spp., Phloeomyzus passerinii, Phorodon humuli, Phylloxera spp., Pinnaspis aspidistrae, Planococcus spp., Prosopidopsylla flava, Protopulvinaria pyriformis, Pseudaulacaspis pentagona, Pseudococcus spp., Psyllopsis spp., Psylla spp., Pteromalus spp., Pyrilla spp., Quadraspidiotus spp., Quesada gigas, Rastrococcus spp., Rhopalosiphum spp., Saissetia spp., Scaphoideus titanus, Schizaphis graminum,
- 20 Selenaspis articulatus, Sogata spp., Sogatella furcifera, Sogatodes spp., Stictocephala festina, Siphoninus phillyreae, Tenalaphara malayensis, Tetragonocephala spp., Tinocallis caryaefoliae, Tomaspis spp., Toxoptera spp., Trialeurodes vaporariorum, Trioza spp., Typhlocyba spp., Unaspis spp., Viteus vitifolii, Zyginia spp.;

- from the order Hymenoptera, for example, Acromyrmex spp., Athalia spp., Atta spp., Diprion spp.,
- 25 Hoplocampa spp., Lasius spp., Monomorium pharaonis, Sirex spp., Solenopsis invicta, Tapinoma spp., Urocerus spp., Vespa spp., Xeris spp.;

from the order Isopoda, for example, Armadillidium vulgare, Oniscus asellus, Porcellio scaber;

from the order Isoptera, for example, Coptotermes spp., Cornitermes cumulans, Cryptotermes spp., Incisitermes spp., Microtermes obesi, Odontotermes spp., Reticulitermes spp.;

- 30 from the order Lepidoptera, for example, Achroia grisella, Acronicta major, Adoxophyes spp., Aedia leucomelas, Agrotis spp., Alabama spp., Amyelois transitella, Anarsia spp., Anticarsia spp., Argyroploce spp., Barathra brassicae, Borbo cinnara, Bucculatrix thurberiella, Bupalus piniarius, Busseola spp., Cacoecia spp., Caloptilia theivora, Capua reticulana, Carpocapsa pomonella, Carposina

- niponensis, Cheimatobia brumata, Chilo spp., Choristoneura spp., Clysia ambiguella, Cnaphalocerus spp., Cnaphalocrocis medinalis, Cnephasia spp., Conopomorpha spp., Conotrachelus spp., Copitarsia spp., Cydia spp., Dalaca noctuides, Diaphania spp., Diatraea saccharalis, Earias spp., Ecdytolopha aurantium, Elasmopalpus lignosellus, Eldana saccharina, Ephestia spp., Epinotia spp., Epiphyas postvittana, Etiella spp., Eulia spp., Eupoecilia ambiguella, Euproctis spp., Euxoa spp., Feltia spp., Galleria mellonella, Gracillaria spp., Grapholitha spp., Hedylepta spp., Helicoverpa spp., Heliothis spp., Hofmannophila pseudospretella, Homoeosoma spp., Homona spp., Hyponomeuta padella, Kakivoria flavofasciata, Laphygma spp., Laspeyresia molesta, Leucinodes orbonalis, Leucoptera spp., Lithocolletis spp., Lithophane antennata, Lobesia spp., Loxagrotis albicosta, Lymantria spp., Lyonetia spp., Malacosoma neustria, Maruca testulalis, Mamstra brassicae, Melanitis leda, Mocis spp., Monopis obviella, Mythimna separata, Nemapogon cloacellus, Nymphula spp., Oiketicus spp., Oria spp., Orthaga spp., Ostrinia spp., Oulema oryzae, Panolis flammea, Parnara spp., Pectinophora spp., Perileucoptera spp., Phthorimaea spp., Phyllocnistis citrella, Phyllonorycter spp., Pieris spp., Platynota stultana, Plodia interpunctella, Plusia spp., Plutella xylostella, Prays spp., Prodenia spp., Protoparce spp., Pseudaletia spp., Pseudaletia unipuncta, Pseudoplusia includens, Pyrausta nubilalis, Rachiplusia nu, Schoenobius spp., Scirpophaga spp., Scirpophaga innotata, Scotia segetum, Sesamia spp., Sesamia inferens, Sparganothis spp., Spodoptera spp., Spodoptera praefica, Stathmopoda spp., Stomopteryx subsecivella, Synanthedon spp., Tecia solanivora, Thermesia gemmatilis, Tinea cloacella, Tinea pellionella, Tineola bisselliella, Tortrix spp., Trichophaga tapetzella, Trichoplusia spp., Tryporyza incertulas, Tuta absoluta, Virachola spp.;

from the order Orthoptera or Saltatoria, for example, Acheta domesticus, Dichroplus spp., Gryllotalpa spp., Hieroglyphus spp., Locusta spp., Melanoplus spp., Schistocerca gregaria;

from the order Phthiraptera, for example, Damalinia spp., Haematopinus spp., Linognathus spp., Pediculus spp., Ptilus pubis, Trichodectes spp.;

- 25 from the order Psocoptera for example Lepinatus spp., Liposcelis spp.;

from the order Siphonaptera, for example, Ceratophyllus spp., Ctenocephalides spp., Pulex irritans, Tunga penetrans, Xenopsylla cheopsis;

- 30 from the order Thysanoptera, for example, Anaphothrips obscurus, Baliothrips biformis, Drepanothrips reuteri, Enneothrips flavens, Frankliniella spp., Heliothrips spp., Hercinothrips femoralis, Rhipiphorothrips cruentatus, Scirtothrips spp., Taeniothrips cardamomi, Thrips spp.;

from the order Zygentoma (=Thysanura), for example, Ctenolepisma spp., Lepisma saccharina, Lepismodes inquilinus, Thermobia domestica;

from the class Symphyla, for example, *Scutigera* spp.;

pests from the phylum Mollusca, especially from the class Bivalvia, for example, *Dreissena* spp., and from the class Gastropoda, for example, *Arion* spp., *Biomphalaria* spp., *Bulinus* spp., *Deroceras* spp., *Galba* spp., *Lymnaea* spp., *Oncomelania* spp., *Pomacea* spp., *Succinea* spp.;

- 5 animal pests from the phyla Plathelminthes and Nematoda, for example, *Ancylostoma duodenale*, *Ancylostoma ceylanicum*, *Ancylostoma braziliense*, *Ancylostoma* spp., *Ascaris* spp., *Brugia malayi*, *Brugia timori*, *Bunostomum* spp., *Chabertia* spp., *Clonorchis* spp., *Cooperia* spp., *Dicrocoelium* spp., *Dictyocaulus filaria*, *Diphyllbothrium latum*, *Dracunculus medinensis*, *Echinococcus granulosus*, *Echinococcus multilocularis*, *Enterobius vermicularis*, *Fasciola* spp., *Haemonchus* spp., *Heterakis* spp.,
- 10 *Hymenolepis nana*, *Hyostrongylus* spp., *Loa Loa*, *Nematodirus* spp., *Oesophagostomum* spp., *Opisthorchis* spp., *Onchocerca volvulus*, *Ostertagia* spp., *Paragonimus* spp., *Schistosoma* spp., *Strongyloides fuelleborni*, *Strongyloides stercoralis*, *Strongyloides* spp., *Taenia saginata*, *Taenia solium*, *Trichinella spiralis*, *Trichinella nativa*, *Trichinella britovi*, *Trichinella nelsoni*, *Trichinella pseudospiralis*, *Trichostrongylus* spp., *Trichuris trichuria*, *Wuchereria bancrofti*;
- 15 phytoparasitic pests from the phylum Nematoda, for example, *Aphelenchoides* spp., *Bursaphelenchus* spp., *Ditylenchus* spp., *Globodera* spp., *Heterodera* spp., *Longidorus* spp., *Meloidogyne* spp., *Pratylenchus* spp., *Radopholus* spp., *Trichodorus* spp., *Tylenchulus* spp., *Xiphinema* spp., *Helicotylenchus* spp., *Tylenchorhynchus* spp., *Scutellonema* spp., *Paratrichodorus* spp., *Meloinema* spp., *Paraphelenchus* spp., *Aglencus* spp., *Belonolaimus* spp., *Nacobbus* spp., *Rotylenchulus* spp.,
- 20 *Rotylenchus* spp., *Neotylenchus* spp., *Paraphelenchus* spp., *Dolichodorus* spp., *Hoplolaimus* spp., *Punctodera* spp., *Criconemella* spp., *Quinisulcius* spp., *Hemicycliophora* spp., *Anguina* spp., *Subanguina* spp., *Hemicriconemoides* spp., *Psilenchus* spp., *Pseudohalenchus* spp., *Criconemoides* spp., *Cacopaurus* spp.

- 25 It is furthermore possible to control organisms from the subphylum Protozoa, especially from the order Coccidia, such as *Eimeria* spp.

The active ingredient combinations can be converted to the customary formulations, such as solutions, emulsions, wettable powders, suspensions, powders, dusts, pastes, soluble powders, granules, suspoemulsion concentrates, natural products impregnated with active ingredient, synthetic substances impregnated with active ingredient, and also microencapsulations in polymeric substances.

- 30 These formulations are produced in a known manner, for example by mixing the active ingredients with extenders, i.e. liquid solvents, and/or solid carriers, optionally with the use of surfactants, i.e. emulsifiers and/or dispersants, and/or foam formers.

If the extender used is water, it is also possible to use, for example, organic solvents as auxiliary solvents. Useful liquid solvents essentially include: aromatics such as xylene, toluene or alkylnaphthalenes, chlorinated aromatics and chlorinated aliphatic hydrocarbons such as chlorobenzenes, chloroethylenes or methylene chloride, aliphatic hydrocarbons such as cyclohexane or paraffins, for example mineral oil fractions, mineral and vegetable oils, alcohols such as butanol or glycol and their ethers and esters, ketones such as acetone, methyl ethyl ketone, methyl isobutyl ketone or cyclohexanone, strongly polar solvents such as dimethylformamide and dimethyl sulfoxide, and also water.

Useful solid carriers include:

for example ammonium salts and ground natural minerals, such as kaolins, clays, talc, chalk, quartz, attapulgite, montmorillonite or diatomaceous earth, and ground synthetic minerals, such as finely divided silica, alumina and silicates; suitable solid carriers for granules are for example crushed and fractionated natural rocks, such as calcite, marble, pumice, sepiolite, dolomite and synthetic granules of inorganic and organic meals, and granules of organic material, such as sawdust, coconut shells, maize cobs and tobacco stalks; suitable emulsifiers and/or foam formers are for example nonionic and anionic emulsifiers, such as polyoxyethylene fatty acid esters, polyoxyethylene fatty alcohol ethers, for example alkylaryl polyglycol ethers, alkylsulphonates, alkyl sulphates, arylsulphonates and protein hydrolysates; suitable dispersants are for example lignosulphite waste liquors and methylcellulose.

In the formulations it is possible to use tackifiers such as carboxymethylcellulose, natural and synthetic polymers in the form of powders, granules or latices, such as gum arabic, polyvinyl alcohol and polyvinyl acetate, or else natural phospholipids such as cephalins and lecithins and synthetic phospholipids. Further additives may be mineral and vegetable oils.

It is possible to use dyes such as inorganic pigments, for example iron oxide, titanium oxide and Prussian Blue, and organic dyes such as alizarin dyes, azo dyes and metal phthalocyanine dyes, and trace nutrients such as salts of iron, manganese, boron, copper, cobalt, molybdenum and zinc.

The formulations contain generally between 0.1 and 95% by weight of active ingredient, preferably between 0.5 and 90%.

The inventive active ingredient combinations may be present in commercially available formulations and in the use forms, prepared from these formulations, as a mixture with other active ingredients, such as insecticides, attractants, sterilants, bactericides, acaricides, nematocides, fungicides, growth regulators or herbicides. The insecticides include, for example, phosphoric esters, carbamates, carboxylic esters, chlorinated hydrocarbons, phenylureas, substances produced by microorganisms, etc.

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A mixture with other known active ingredients, such as herbicides, or with fertilizers and growth regulators, is also possible.

When used as insecticides, the inventive active ingredient combinations may also be present in their commercially available formulations and in the use forms, prepared from these formulations, as a mixture with synergists. Synergists are compounds which enhance the action of the active ingredients, without any need for the synergist added to be active itself.

The active ingredient content of the use forms prepared from the commercially available formulations may vary within wide limits. The active ingredient concentration of the application forms may be from 0.0000001 to 95% by weight of active ingredient, preferably between 0.0001 and 1% by weight.

10 The compounds are applied in a customary manner appropriate for the use forms.

All plants and plant parts can be treated in accordance with the invention. Plants are understood here to mean all plants and plant populations, such as desired and undesired wild plants or crop plants (including naturally occurring crop plants). Crop plants may be plants which can be obtained by conventional breeding and optimization methods or by biotechnological and genetic engineering methods or combinations of these methods, including the transgenic plants and including the plant varieties which are protectable and non-protectable by plant breeders' rights. Plant parts are understood to mean all parts and organs of plants above and below the ground, such as shoot, leaf, flower and root, examples of which include leaves, needles, stalks, stems, flowers, fruit bodies, fruits, seeds, roots, tubers and rhizomes. The plant parts also include harvested material and vegetative and generative propagation material, for example cuttings, tubers, rhizomes, slips and seeds.

The inventive treatment of the plants and plant parts with the active ingredient combinations is effected directly or by allowing them to act on the surroundings, habitat or storage space thereof by the customary treatment methods, for example by dipping, spraying, vaporizing, pouring on, nebulizing, scattering, painting on, and, in the case of propagation material, especially in the case of seeds, also by applying one or more coats.

As already mentioned above, it is possible to treat all plants and their parts in accordance with the invention. In a preferred embodiment, wild plant species and plant cultivars, or those obtained by conventional biological breeding methods, such as crossing or protoplast fusion, and also parts thereof, are treated. In a further preferred embodiment, transgenic plants and plant cultivars obtained by genetic engineering, if appropriate in combination with conventional methods (Genetically Modified Organisms), and parts thereof are treated. The term "parts" or "parts of plants" or "plant parts" has been explained above.

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More preferably, plants of the plant cultivars which are each commercially available or in use are treated in accordance with the invention.

Depending on the plant species or plant cultivars, and the location and growth conditions (soils, climate, vegetation period, diet) thereof, the inventive treatment may also result in superadditive ("synergistic") effects. For example, possibilities include reduced application rates and/or broadening of the activity spectrum and/or an increase in the activity of the compounds and compositions usable in accordance with the invention, better plant growth, increased tolerance to high or low temperatures, increased tolerance to drought or to levels of water or soil salinity, enhanced flowering performance, easier harvesting, accelerated ripening, higher yields, higher quality and/or higher nutritional value of the harvested products, increased storage life and/or processibility of the harvested products, which exceed the effects normally to be expected.

The transgenic plants or plant cultivars (those obtained by genetic engineering) which are to be treated with preference in accordance with the invention include all plants which, through the genetic modification, received genetic material which imparts particular advantageous useful properties ("traits") to these plants. Examples of such properties are better plant growth, increased tolerance to high or low temperatures, increased tolerance to drought or to levels of water or soil salinity, enhanced flowering performance, easier harvesting, accelerated ripening, higher yields, higher quality and/or a higher nutritional value of the harvested products, better storage life and/or processibility of the harvested products. Further and particularly emphasized examples of such properties are an improved defence of the plants against animal and microbial pests, such as against insects, mites, phytopathogenic fungi, bacteria and/or viruses, and also increased tolerance of the plants to certain herbicidally active ingredients. Examples of transgenic plants which may be mentioned are the important crop plants, such as cereals (wheat, rice), maize, soya beans, potatoes, cotton, oilseed rape and also fruit plants (with the fruits apples, pears, citrus fruits and grapes), and particular emphasis is given to maize, soya beans, potatoes, cotton and oilseed rape. Traits that are emphasized are in particular increased defence of the plants against insects by toxins formed in the plants, in particular those formed in the plants by the genetic material from *Bacillus thuringiensis* (for example by the genes CryIA(a), CryIA(b), CryIA(c), CryIIA, CryIIIA, CryIIIB2, Cry9c Cry2Ab, Cry3Bb and CryIF and also combinations thereof) (hereinbelow referred to as "Bt plants"). Traits that are additionally particularly emphasized are the increased tolerance of the plants to certain active herbicidal ingredients, for example imidazolinones, sulphonylureas, glyphosate or phosphinothricin (for example the "PAT" gene). The genes which impart the desired traits in question may also be present in combinations with one another in the transgenic plants. Examples of "Bt plants" include maize varieties, cotton varieties, soya varieties and potato varieties which are sold under the trade names YIELD GARD® (for example maize, cotton, soya), KnockOut® (for example maize), StarLink® (for example maize), Bollgard® (cotton), Nucotn®

(cotton) and NewLeaf® (potato). Examples of herbicide-tolerant plants include maize varieties, cotton varieties and soya varieties which are sold under the trade names Roundup Ready® (tolerance to glyphosate, for example maize, cotton, soya), Liberty Link® (tolerance to phosphinothricin, for example oilseed rape), IMI® (tolerance to imidazolinones) and STS® (tolerance to sulphonylureas, for example maize). Herbicide-resistant plants (plants bred in a conventional manner for herbicide tolerance) also include the varieties sold under the Clearfield® name (for example maize). Of course, these statements also apply to plant cultivars which have these genetic traits or genetic traits which are still to be developed and will be developed and/or marketed in the future.

The plants listed can be treated according to the invention in a particularly advantageous manner with the active compound mixture according to the invention. The preferred ranges stated above for the mixtures also apply to the treatment of these plants. Particular emphasis is given to the treatment of plants with the mixtures specifically mentioned in the present text.

Using a compound of formula (I) and at least one biological control agent selected from bacteria, in particular spore-forming bacteria, fungi or yeasts, protozoas, viruses, and entomopathogenic nematodes and optionally an inoculant, as a combination is particularly suitable for treating seed. A large part of the damage to crop plants caused by harmful agricultural pests and/or plant diseases is triggered by an infection of the seed during storage or after sowing as well as during and after germination of the plant. This phase is particularly critical since the roots and shoots of the growing plant are particularly sensitive, and even small damage may result in a weak plant (unhealthy plant), reduced yield and even in the death of the plant.

The control of pests and/or phytopathogens by treating the seed of plants has been known for a long time and is the subject of continuous improvements. However, the treatment of seed entails a series of problems which cannot always be solved in a satisfactory manner. Thus, it is desirable to develop methods for protecting the seed and the germinating plant which dispense with the additional application of crop protection agents after sowing or after the emergence of the plants or which at least considerably reduce additional application. It is furthermore desirable to optimize the amount of agrochemicals employed in such a way as to provide maximum protection for the seed and the germinating plant from attack by agricultural pests, but without damaging the plant itself by the active compound employed. In particular, methods for the treatment of seed should also take into consideration the intrinsic insecticidal properties of plants in order to achieve optimum protection of the seed and the germinating plant with a minimum of agrochemicals being employed.

As already mentioned, the compound of formula (I) and the biological control agent selected from bacteria, in particular spore-forming bacteria, fungi or yeasts, protozoas, viruses, and entomopathogenic nematodes and optionally an inoculant can be employed or used according to the invention as a solo- or

a combined-formulation. Such formulations may include agriculturally suitable auxiliaries, solvents, carriers, surfactants and/or extenders.

According to the invention biological control agents which are summarized under the term "bacteria" include spore-forming, root-colonizing bacteria, or bacteria useful as biofungicide. Examples of such bacteria to be used or employed according to the invention are:

(1.1) *Bacillus agri*, (1.2) *Bacillus aizawai*, (1.3) *Bacillus albolactis*, (1.4) *Bacillus amyloliquefaciens*, in particular the strain IN937a, or strain FZB42 (product known as RhizoVital®), (1.5) *Bacillus cereus*, in particular spores of *Bacillus cereus* strain CNCM I-1562 (cf. US 6,406,690), (1.6) *Bacillus coagulans*, (1.7) *Bacillus endoparasiticus*, (1.8) *Bacillus endorhythmos*, (1.9) *Bacillus azotoformans*, (1.10) *Bacillus kurstaki*, (1.11) *Bacillus lacticola*, (1.12) *Bacillus lactimorbus*, (1.13) *Bacillus lactis*, (1.14) *Bacillus laterosporus*, (1.15) *Bacillus lentimorbus*, (1.16) *Bacillus licheniformis*, (1.17) *Bacillus medusa*, (1.18) *Bacillus megaterium*, (1.19) *Bacillus metiens*, (1.20) *Bacillus natto*, (1.21) *Bacillus nigrificans*, (1.22) *Bacillus popillae*, (1.23) *Bacillus pumilus*, in particular strain GB34 (products known as Yield Shield®, Sonata QST 2808®), (1.24) *Bacillus siamensis*, (1.25) *Bacillus sphaericus* (products known as VectoLexs®), (1.26) *Bacillus subtilis*, in particular strain GB03 (products known as Kodiak®) and strain QST 713 (products known as Serenade QST 713®), or *Bacillus subtilis* var. *amyloliquefaciens* strain FZB24 (products known as Taegro®), (1.27) *Bacillus thuringiensis*, in particular *Bacillus thuringiensis* var. *israelensis* (products known as VectoBac®) or *Bacillus thuringiensis* subsp. *aizawai* strain ABTS-1857 (products known as XenTari®), or *Bacillus thuringiensis* subsp. *kurstaki* strain HD-1 (products known as Dipel® ES) or *Bacillus thuringiensis* subsp. *tenebrionis* strain NB 176 (products known as Novodor® FC), (1.28) *Bacillus uniflagellatus*, (1.29) *Delftia acidovorans*, in particular strain RAY209 (products known as BioBoost®), (1.30) *Lysobacter antibioticus*, in particular strain 13-1 (cf. Biological Control 2008, 45, 288-296), (1.31) *Pasteuria penitans*, (1.32) *Pseudomonas chlororaphis*, in particular strain MA 342 (products known as Cedomon), (1.33) *Pseudomonas proradix* (products known as Proradix®), (1.34) *Streptomyces galbus*, in particular strain K61 (products known as Mycostop®, cf. Crop Protection 2006, 25, 468-475), (1.35) *Streptomyces griseoviridis* (products known as Mycostop®), (1.36) *Bacillus lautus*, (1.37) *Bacillus atrophaeus*, (1.38) *Bacillus anthracis*, (1.39) *Bacillus mycoides*, (1.40) *Bacillus acidoterrestris*, (1.41) *Bacillus fastidiosus*, (1.42) *Bacillus megaterium*, (1.43) *Bacillus psychrosaccharolyticus*, (1.44) *Bacillus maroccanus*, (1.45) *Bacillus megaterium* C, (1.46) *Bacillus pantothenicus*, (1.47) *Bacillus lentus*, (1.48) *Bacillus badius*, (1.49) *Bacillus smithi* and (1.50) *Bacillus firmus*, in particular strain I-1582.

*Bacillus* (abbreviation: B.) is a genus of rod-shaped, gram-positive bacteria, which can produce endospores under stressful environmental conditions. The single species of this genus differ strongly

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with respect to their useability in the area of plant protection. *Bacillus firmus*, strain I-1582, is known as nematocide with a high potential to increase plant growth and health. It can be used for soil application and seed treatment.

5 *Bacillus subtilis*, for example the strains GBO3 and QST 713, as well as *Bacillus amyloliquefaciens*, strain FZB 24 and 42, are species with phytopathogenic properties. These bacteria are applied to the soil and/or to the leaves.

10 *Bacillus thuringiensis* with its different subspecies produces endotoxin containing crystals which have high insect pathogenic specificity. *Bacillus thuringiensis* subsp. *kurstaki*, strain HD-1, is used for control of lepidopteran larvae, but without noctuidae. *Bacillus thuringiensis* subsp. *aizawai*, for example the strains SAN 401 I, ABG-6305 and ABG-6346, is effective against different lepidopteran species including also noctuidae. *Bacillus thuringiensis* subsp. *tenebrionis*, for example the strains SAN 418 I and ABG-6479, protects plants against leaf beetle larvae. *Bacillus thuringiensis* subsp. *israelensis*, for example the strains SAN 402 I and ABG-6164, is applied against larvae of various dipteran pests, e.g. mosquitoes and nematoceres.

15 From the given bacteria (1.1) to (1.50), such bacteria or mutants thereof that have an insecticidal or plant growth promoting activity are preferred to be used or employed in the present invention, in one embodiment in combination with compound (I), optionally in the presence of an inoculant.

20 From the given bacteria (1.1) to (1.50), such bacteria or mutants thereof that have a fungicidal activity are preferred to be used or employed in the present invention, in one embodiment in combination with compound (I), optionally in the presence of an inoculant.

In one embodiment, from the given bacteria (1.1) to (1.50), the bacteria given under the numbers (1.4), (1.5), (1.6), (1.15), (1.16), (1.17), (1.22), (1.23), (1.26), (1.27), (1.50) and (1.36) to (1.45) are to be used or employed in the present invention, such as in combination with compound (I), optionally in the presence of an inoculant. These bacteria belong to the class of group 1 bacteria as disclosed in Ash et al., 1991, Lett Appl Microbiology 13, 202-206. The genealogy of group 1 bacteria is also shown in Figure 1. Notably, Group 1 bacteria can be divided into subgroups depending on the ramification within the group. Thus, subgroup (1) consists of *B. pantothenicus*, *B. lentus*, *B. badius*, and *B. smithi*; subgroup (2) consists of *B. azotoformans*, *B. firmus*, *B. circulans*, *B. benzoovorans*, *B. simplex*, *B. marrocanus*, *B. psychrosaccharolyticus*, *B. megaterium* and *B. fastidiosus*; and subgroup (3) consists of 30 *B. lautus*, *B. licheniformis*, *B. subtilis*, *B. amyloliquifaciens*, *B. lentimorbus*, *B. popilliae*, *B. atrophaeus*, *B. pumilus*, *B. cereus*, *B. anthracis*, *B. thuringiensis*, *B. medusa*, *B. mycoides*, *B. coagulans*, and *B. acidoterrestris*. Subgroup (3) can be further divided into subgroup (3a) consisting of *B. lautus*, *B. licheniformis*, *B. subtilis*, *B. amyloliquifaciens*, *B. lentimorbus*, *B. popilliae*, and *B. atrophaeus*; subgroup (3b) consisting of *B. pumilus*, *B. cereus*, *B. anthracis*, *B. thuringiensis*, *B. medusa*, and *B.*

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*mycoides*; and subgroup (3c) consisting of *B. coagulans*, and *B. acidoterrestris*. Subgroup (4) consists of *B. firmus*.

In one embodiment, the bacteria of subgroup (3), (3a), (3b) or (3c) or (4) are to be used or employed in the present invention, such as in combination with compound (I), optionally in the presence of an  
5 inoculant.

In another embodiment, the bacteria of subgroup (1) are to be used or employed in the present invention, such as in combination with compound (I), optionally in the presence of an inoculant.

In another embodiment, the bacteria given under the numbers (1.4), (1.5), (1.23), and (1.26) are to be used or employed in the present invention, such as in combination with compound (I), optionally in the  
10 presence of an inoculant.

From the given bacteria (1.4), the bacteria (1.4a) *Bacillus amyloliquefaciens* strain IN937a, and (1.4b) *Bacillus amyloliquefaciens* strain FZB42 are used or employed in the present invention, in one embodiment in combination with compound (I), optionally in the presence of an inoculant.

From the given bacteria (1.5), the bacterium (1.5a) *Bacillus cereus* strain CNCM I-1562 especially  
15 spores are used or employed in the present invention, in one embodiment in combination with compound (I), optionally in the presence of an inoculant.

From the given bacteria (1.23), the bacterium (1.23a) *Bacillus pumilus* strain GB34 is used or employed in the present invention, in one embodiment in combination with compound (I), optionally in the presence of an inoculant.

20 From the given bacteria (1.26), the bacteria (1.26a) *Bacillus subtilis* strain GB03 and (1.26b) *Bacillus subtilis* var. *amyloliquefaciens* strain FZB24 are used or employed in the present invention in one embodiment in combination with compound (I), optionally in the presence of an inoculant.

From the given bacteria (1.27), the bacteria (1.27a) *Bacillus thuringiensis* subsp. *tenebrionis* NB 176, (1.27b) *Bacillus thuringiensis* subsp. *aizawai* strain ABTS-1857, (1.27c) *Bacillus thuringiensis* subsp. *israelensis* strain AM 65-52 and (1.27d) *Bacillus thuringiensis* subsp. *kurstaki* HD-1 are used or  
25 employed in the present invention in one embodiment in combination with compound (I), optionally in the presence of an inoculant.

In another embodiment, the bacteria of subgroup (4) are to be used or employed in the present invention, such as in combination with compound (I), optionally in the presence of an inoculant.

30 From the given bacteria (1.50), the bacterium (1.50a) *Bacillus firmus* strain I-1582 especially spores are used or employed in the present invention, in one embodiment in combination with compound (I), optionally in the presence of an inoculant.

According to the invention biological control agents that are summarized under the term "fungi" or "yeasts" are:

- 5 (2.1) *Ampelomyces quisqualis*, in particular strain AQ 10 (product known as AQ 10<sup>®</sup>), (2.2) *Aureobasidium pullulans*, in particular blastospores of strain DSM14940 or blastospores of strain DSM 14941 or mixtures thereof (product known as Blossom Protect<sup>®</sup>), (2.3) *Beauveria bassiana*, in particular strain ATCC 74040 (products known as Naturalis<sup>®</sup>), (2.4) *Candida oleophila*, in particular strain O (products known as Nexy<sup>®</sup>), (2.6) *Coniothyrium minitans*, in particular strain CON/M/91-8 (products known as Contans<sup>®</sup>), (2.7) *Dilophosphora alopecuri* (products known as Twist Fungus<sup>®</sup>), (2.8) *Gliocladium catenulatum*, in particular strain J1446 (products known as Prestop<sup>®</sup>), (2.9) *Lecanicillium lecanii* (formerly known as *Verticillium lecanii*), in particular conidia of strain KV01 (products known as Mycotal<sup>®</sup>, Vertalec<sup>®</sup>), (2.10) *Metarhizium anisopliae*, in particular strain F52 (products known as BIO 1020), (2.11) *Metschnikovia fructicola*, in particular the strain NRRL Y-30752 (products known as Shemer<sup>®</sup>), (2.12) *Microsphaeropsis ochracea* (products known as Microx<sup>®</sup>), (2.13) *Muscodor albus*, in particular strain QST 20799 (products known as QRD300), (2.14) *Nomuraea rileyi*, in particular strains SA86101, GU87401, SR86151, CG128 and VA9101, (2.15) *Paecilomyces lilacinus*, in particular spores of *P. lilacinus* strain 251 (products known as BioAct<sup>®</sup>, cf. *Crop Protection* **2008**, 27, 352-361), or *Paecilomyces fumosoroseus*, (2.16) *Penicillium bilaii*, in particular strain ATCC22348 (products known as JumpStart<sup>®</sup>, PB-50, Provide), (2.17) *Pichia anomala*, in particular strain WRL-076, (2.18) *Pseudozyma flocculosa*, in particular strain PF-A22 UL (products known as Sporodex<sup>®</sup> L), (2.19) *Pythium oligandrum* DV74 (products known as Polyversum), (2.20) *Trichoderma asperellum*, in particular strain ICC 012 (products known as Bioten<sup>®</sup>), (2.21) *Trichoderma harzianum*, in particular *T. harzianum* T39 (products known as Trichodex<sup>®</sup>), and (2.22) *Beauveria brongniartii*.

25 In one embodiment, from the given fungi and yeasts (2-1) to (2-22), the fungi and yeasts given under the numbers (2.10), (2.11), and (2.15) are to be used or employed in the present invention, in one embodiment in combination with compound (I), optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (2.9) *Lecanicillium lecanii*, optionally in the presence of an inoculant.

30 It is preferred to use or employ in the present invention the compound of formula (I) in combination with (2.9a) *Lecanicillium lecanii* strain KV01, optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (2.10) *Metarhizium anisopliae*, in particular strain F 52, optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (2.11) *Metschnikovia fructicola*, in particular strain NRRL Y-30752, optionally in the presence of an inoculant.

5 It is preferred to use or employ in the present invention the compound of formula (I) in combination with (2.15) *Paecilomyces lilacinus*, in particular spores of *P. lilacinus* strain 251, optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (2.14) *Nomuraea rileyi*, optionally in the presence of an inoculant.

10 According to the invention biological control agents that are summarized under the term "protozoas" are:

- (3.1) *Nosema locustae*, and (3.2) *Vairimorpha*.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (3.1) *Nosema locustae*, optionally in the presence of an inoculant.

15 It is preferred to use or employ in the present invention the compound of formula (I) in combination with (3.2) *Vairimorpha*, optionally in the presence of an inoculant.

According to the invention biological control agents that are summarized under the term "viruses" are:

- (4.1) Gypsy moth (*Lymantria dispar*) nuclear polyhedrosis virus (NPV), (4.2) Tussock moth (*Lymantriidae*) NPV, (4.3) *Heliothis* NPV, (4.4) Pine sawfly (*Neodiprion*) NPV, and (4.5) Codling moth (*Cydia pomonella*) granulosis virus (GV).

20 It is preferred to use or employ in the present invention the compound of formula (I) in combination with (4.1) Gypsy moth nuclear polyhedrosis virus (NPV), optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (4.2) Tussock moth NPV, optionally in the presence of an inoculant.

25 It is preferred to use or employ in the present invention the compound of formula (I) in combination with (4.3) *Heliothis* NPV, optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (4.4) Pine sawfly NPV, optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (4.5) Codling moth granulosis virus (GV), optionally in the presence of an inoculant.

30 According to the invention biological control agents that are summarized under the term "entomopathogenic nematode" are:

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(5.1) *Steinernema scapterisci*, (5.2) *Steinernema feltiae*, (5.3) *Steinernema carpocapsae*, (5.4) *Heterorhabditis heliothidis*, and (5.5) *Xenorhabdus luminescence*.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (5.1) *Steinernema scapterisci*, optionally in the presence of an inoculant.

- 5 It is preferred to use or employ in the present invention the compound of formula (I) in combination with (5.2) *Steinernema feltiae*, optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (5.3) *Steinernema carpocapsae*, optionally in the presence of an inoculant.

- 10 It is preferred to use or employ in the present invention the compound of formula (I) in combination with (5.4) *Heterorhabditis heliothidis*, optionally in the presence of an inoculant.

It is preferred to use or employ in the present invention the compound of formula (I) in combination with (5.5) *Xenorhabdus luminescence*, optionally in the presence of an inoculant.

- 15 Examples for inoculants which may be used or employed according to the invention are bacteria of the genus *Rhizobium leguminosarum*, *Rhizobium tropici*, *Rhizobium loti*, *Rhizobium trifolii*, *Rhizobium meliloti*, *Rhizobium fredii*, *Azorhizobium caulinodans*, *Pseudomonas*, *Azospirillum*, *Azotobacter*, *Streptomyces*, *Burkholdia*, *Agrobacterium*, Endo-, Ecto-, Vesicular-Arbuscular (VA) Mycorrhizza. It is preferred to use soil-inoculants.

- 20 The amount of the biological control agent selected from bacteria, in particular spore-forming bacteria, fungi or yeasts, protozoas, viruses, and entomopathogenic which is used or employed in combination with a compound of formula (I), preferably with a compound (I), optionally in the presence of an inoculant, depends on the final formulation as well as size or type of the plant, plant parts, seeds, harvested fruits and vegetables to be treated. Usually, the biological control agent to be employed or used according to the invention is present in about 2 % to about 80 % (w/w), preferably in about 5 % to about 75 % (w/w), more preferably about 10 % to about 70 % (w/w) of its solo-formulation or  
25 combined- formulation with the compound of formula (I), and optionally the inoculant.

- If bacteria, fungi or yeasts are selected as biological control agent, in particular those who are named as being preferred, namely (2.10), (2.11), and (2.15), it is preferred that they are present in a solo-formulation or the combined-formulation in a concentration in excess of  $10^5 - 10^{12}$  cfu/g (colony forming units per gram), preferably in excess of  $10^6 - 10^{11}$  cfu/g, more preferably  $10^7 - 10^{10}$  cfu/g and most  
30 preferably about  $10^9$  cfu/g.

Also the amount of compound of formula (I) which is used or employed in combination with the biological control agent selected from bacteria, in particular spore-forming bacteria, fungi or yeasts, protozoas, viruses, and entomopathogenic nematodes, optionally in the presence of an inoculant,

depends on the final formulation as well as size or type of the plant, plant parts, seeds, harvested fruit or vegetable to be treated. Usually, the compound of formula (I) to be employed or used according to the invention is present in about 0.1 % to about 80 % (w/w), preferably 1 % to about 60 % (w/w), more preferably about 10 % to about 50 % (w/w) of its solo-formulation or combined-formulation with the biological control agent selected from bacteria, in particular spore-forming bacteria, fungi or yeasts, protozoas, viruses, and entomopathogenic nematodes, and optionally the inoculant.

It is preferred to employ or use the compound of formula (I) and the biological control agent selected from bacteria, in particular spore-forming bacteria, fungi or yeasts, protozoas, viruses, and entomopathogenic nematodes, and if present also the inoculant in an synergistic weight ratio. The skilled person is able to find out the synergistic weight ratios for the present invention by routine methods. The skilled person understands that these ratios refer to the ratio within a combined-formulation as well as to the calculative ratio of compound of formula (I) and the biological control agent described herein when both components are applied as mono-formulations to a plant to be treated. The skilled person can calculate this ratio by simple mathematics since the volume and the amount of compound of formula (I) and the biological control agent, respectively, in a mono-formulation is known to the skilled person. In one embodiment, the said ratio refer to the ratio of the both components after both components, i.e. compound of formula (I) and the biological control agent, respectively, were applied to a plant to be treated independently whether the components were applied to a plant to be treated in form of solo-applications or in form of a combined-formulation.

In particular, the synergistic weight ratio of the compound of formula (I) to the bacteria, in particular spore forming bacteria, as biological control agent lies in the range of 100 : 1 and 1 : 1000 (wt/wt), preferably in the range of 50 : 1 and 1 : 500 (wt/wt). It has to be noted that before mentioned ratios ranges are based on the assumption that the spore preparation of the bacterium contains around  $10^{11}$  spores per gram. If spore preparations vary in density, the ratios have to be adapted accordingly to match the above-listed ratio ranges. A ratio of 1:100 means 100 weight parts of the spore preparations of the spore forming bacteria to 1 weight part of the compound of formula (I).

In particular, the synergistic weight ratio of the compound of formula (I) to the fungi or yeasts lies in the range of 100 : 1 to 1 : 20.000, preferably in the range of 50:1 to 1:10.000.

In one embodiment of the present invention, a biological control agent is a fungus and the concentration of the fungus after dispersal is at least 50 g/ha, such as 50 – 7500 g/ha, 50 – 2500 g/ha, 50 – 1500 g/ha; at least 250 g/ha (hectare), at least 500 g/ha or at least 800 g/ha.

In one embodiment of the present invention, a biological control agent is a fungus, such as *Paecilomyces lilacinus*, e.g., strain 251, and the concentration of the fungus after dispersal is at least 50

g/ha; at least 100 g/ha; at least 1000 g/ha; at least 2500 g/ha, such as 2500 – 7500 g/ha, 2500 – 6000 g/ha; or at least 4000 g/ha, such as 4000 – 6000 g/ha.

In one embodiment of the present invention, a biological control agent is a fungus, such as *Metarhizium anisopliae*, e.g., strain F52 and the concentration of the fungus after dispersal is at least 50 g/ha, such as 50 – 7500 g/ha, 50 – 2500 g/ha, 50 – 250 g/ha; or at least 100 g/ha, such as 100 g/ha – 1000 g/ha or 100 – 250 g/ha.

In one embodiment of the present invention, a biological control agent is yeast, such as *Metschnikowia fructicola*, and the concentration of the yeast after dispersal is at least 50 g/ha, such as 50 – 5000 g/ha, 50 – 2000 g/ha; at least 1000 g/ha; at least 1500 g/ha, such as 500 – 5000 g/ha, 500 – 2500 g/ha, 500 – 2000 g/ha.

In one embodiment of the present invention, a biological control agent is a bacterium and the concentration of the bacteria after dispersal is at least 50 g/ha, at least 100 g/ha or at least 150 g/ha.

In one embodiment of the present invention, a biological control agent is a bacterium, such as *B. thuringiensis* and the concentration of the bacteria after dispersal is at least 50 g/ha (hectare), such as 50 – 7500 g/ha, 50 – 2500 g/ha, 50 – 1500 g/ha; at least 250 g/ha; at least 100 g/ha, such as 100 – 5000 g/ha, 100 – 2500 g/ha, 100 – 1500 g/ha or 100 – 250 g/ha; or at least 800 g/ha, such as 800 – 5000 g/ha or 800 – 2500 g/ha.

In another embodiment of the present invention, a biological control agent is a bacterium, such as *B. subtilis*, e.g., strain GB 03, and the concentration of the bacteria after dispersal is at least 50 g/ha such as 50 – 5000 g/ha, 50 – 2500 g/ha, 50 – 200 g/ha; at least 100 g/ha, at least 500 g/ha, at least 800 g/ha, such as 800 – 5000 g/ha or 800 – 2500 g/ha.

In another embodiment of the present invention, a biological control agent is a bacterium, such as *B. firmus*, e.g., strain I-1582, and the concentration of the bacteria after dispersal is at least 50 g/ha such as 50 – 5000 g/ha, 50 – 2500 g/ha, 50 – 200 g/ha; at least 100 g/ha, at least 500 g/ha, at least 800 g/ha, such as 800 – 5000 g/ha or 800 – 2500 g/ha.

In another embodiment of the present invention, a biological control agent is a bacterium, such as *B. amyloliquefaciens* and the concentration of the bacteria after dispersal is at least 500 g/ha, such as 500 – 5000 g/ha, 500 – 2500 g/ha.

In one embodiment of the present invention, a biological control agent is a virus and the concentration of the virus after dispersal is at least 50 g/ha such as 50 – 7500 g/ha, 50 – 2500 g/ha, 50 – 1500 g/ha; at least 100 g/ha or at least 150 g/ha.

In one embodiment of the present invention, a biological control agent is a virus, such as Codling moth (*Cydia pomonella*) granulosis virus and the concentration of the virus after dispersal is at least 50 g/ha

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(hectare) such as 50 – 5000 g/ha, 50 – 2500 g/ha, 50 – 1500 g/ha or 50 – 250 g/ha; or at least 100 g/ha, such as 100 – 1000 g/ha, 100 – 500 g/ha or 100 – 250 g/ha.

In one embodiment of the present invention, a biological control agent is a nematode and the concentration of the nematodes is at least  $10^6$  nematodes/ha, e.g., larval stage nematodes/ha, such as  $10^6$  –  $10^{15}$  nematodes/ha, e.g., larval stage nematodes/ha,  $10^6$  –  $10^{12}$  nematodes/ha, e.g., larval stage nematodes/ha, at least  $10^8$  nematodes/ha, e.g., larval stage nematodes/ha such as  $10^8$  –  $10^{15}$  nematodes/ha, e.g., larval stage nematodes/ha,  $10^8$  –  $10^{12}$  nematodes/ha, e.g., larval stage nematodes/ha; or at least  $10^9$  nematodes/ha, e.g., larval stage nematodes/ha, such as  $10^9$  –  $10^{15}$  nematodes/ha, e.g., larval stage nematodes/ha or  $10^9$  –  $10^{12}$  nematodes/ha, e.g., larval stage nematodes/ha.

- 10 In one embodiment of the present invention, the ratios between a compound of formula (I) and bacteria (such as *Bacillus amyloliquefaciens*, *Bacillus subtilis*, *Bacillus firmus*, *Bacillus thuringiensis subsp. aizawai*, *Bacillus thuringiensis subsp. israeliensis*, *Bacillus thuringiensis subsp. kurstaki*, *Bacillus thuringiensis subsp. tenebrionis*, *Bacillus pumilus*, *Bacillus cereus*) in a combined-formulation or on or in a plant to be treated or its surrounding, habitat or storage space is between 100:1 to 1:1000, between 50:1 to 1:500 or even 5:1 to 1:100.

In one embodiment of the present invention, the ratios between a compound of formula (I) and fungi (such as *Metarhizium anisopliae*, *Paecilomyces lilacinus*, *Beauveria bassiana*, *Nomuraea rileyi*) in a combined-formulation or on or in a plant to be treated or its surrounding, habitat or storage space is between 100:1 to 1:2000, between 50:1 to 1:1000 or even 25:1 to 1:200.

- 20 In one embodiment of the present invention, the ratios between compound of formula (I) and yeast (such as *Metschnikowia fructicola*) and in a combined-formulation or on or in a plant to be treated or its surrounding, habitat or storage space is between 100:1 to 1:2000, between 50:1 to 1:1000 or even 25:1 to 1:200.

- 25 In one embodiment of the present invention, the ratios between nematodes (such as *Steinernema feltiae* and *Steinernema carpocapsae*) and compound of formula (I) in a solo- or combined-formulation or on or in a plant to be treated or its surrounding, habitat or storage space is between 125:1 to 1:125, between 100:1 to 1:25 or even 50:1 to 1:5.

- 30 The good insecticidal and acaricidal action of the inventive combinations is evident from the examples which follow. While the individual active ingredients have weaknesses in their action, the combinations exhibit an action which exceeds a simple sum of actions.

A synergistic effect in insecticides and acaricides is present whenever the action of the active ingredient combinations is greater than the sum of the actions of the active ingredients applied individually.

**Formula for the efficacy of the combination of two compounds**

The expected efficacy of a given combination of two compounds is calculated as follows (see Colby, S.R., „Calculating Synergistic and antagonistic Responses of Herbicide Combinations“, Weeds 15, pp. 20-22, 1967):

5 if

X is the efficacy expressed in % mortality of the untreated control for test compound A at a concentration of m ppm or m g/ha,

Y is the efficacy expressed in % mortality of the untreated control for test compound B at a concentration of n ppm or n g/ha,

10

E is the efficacy expressed in % mortality of the untreated control using the mixture of A and B at m and n ppm or m and n g/ha,

then is 
$$E = X + Y - \frac{X \cdot Y}{100}$$

If the observed insecticidal efficacy of the combination is higher than the one calculated as „E“, then the combination of the two compounds is more than additive, i.e., there is a synergistic effect.

15

**Examples**

**Example 1:**

**Myzus persicae - test**

|    |             |      |                                          |
|----|-------------|------|------------------------------------------|
| 20 | Solvent:    | 78.0 | parts by weight acetone                  |
|    |             | 1.5  | parts by weight dimethylformamide        |
|    | Emulsifier: | 0.5  | parts by weight alkylaryl polyglycoether |

To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and emulsifier, and the concentrate is diluted with emulsifier- containing water to the desired concentration. To produce a suitable preparation of a biological suspension the cells or spores are diluted with emulsifier- containing water to the desired concentration.

25

Chinese cabbage (*Brassica pekinensis*) leaf- discs infected with all instars of the green peach aphid (*Myzus persicae*), are sprayed with a preparation of the active ingredient at the desired concentration. After the specified period of time mortality in % is determined. 100 % means that all aphids have been

killed; 0 % means that none of the aphids have been killed.

The following combinations of compound (I) and one further active ingredient or biological control agent showed a synergistic effect according to the invention:

**Table 1: Myzus persicae – Test**

| Active ingredient/ biological control agent | Concentration<br>g ai/ha | Mortality in % after 1 <sup>d</sup> |
|---------------------------------------------|--------------------------|-------------------------------------|
| Compound (I)                                | 100<br>20<br>4           | 0<br>0<br>0                         |
| Acrinathrin                                 | 0,8                      | 80                                  |
| Compound (I) + Acrinathrin                  | 4 + 0,8                  | obs.* cal.**<br>100 80              |
| Imidacloprid                                | 0,8                      | 0                                   |
| Compound (I) + Imidacloprid                 | 4 + 0,8                  | obs.* cal.**<br>70 0                |
| Clothianidin                                | 20                       | 0                                   |
| Compound (I) + Clothianidin                 | 100 + 20                 | obs.* cal.**<br>90 0                |
| Dinotefuran                                 | 20                       | 0                                   |
| Compound (I) + Dinotefuran                  | 20 + 20                  | obs.* cal.**<br>70 0                |
| Chlorpyrifos                                | 4                        | 70                                  |
| Compound (I) + Chlorpyrifos                 | 4 + 4                    | obs.* cal.**<br>100 70              |
| Sulfoxaflor                                 | 0,16                     | 0                                   |
| Compound (I) + Sulfoxaflor                  | 4 + 0,16                 | obs.* cal.**<br>80 0                |
| Flupyradifurone                             | 20                       | 70                                  |
| Compound (I) + Flupyradifurone              | 100 + 20                 | obs.* cal.**<br>90 70               |

5

| Active ingredient/ biological control agent | Concentration<br>g ai/ha | Mortality in % after 6 <sup>d</sup> |
|---------------------------------------------|--------------------------|-------------------------------------|
| Compound (I)                                | 100<br>20<br>4           | 0<br>0<br>0                         |
| Azadirachtin                                | 100                      | 0                                   |
| Compound (I) + Azadirachtin                 | 100 + 100                | obs.* cal.**<br>70 0                |
| Bacillus subtilis strain GB 03              | 2000                     | 0                                   |
| Compound (I) + Bacillus subtilis            | 100 + 2000               | obs.* cal.**<br>70 0                |
| Cydia pomonella Granuloseviren (CpGV)       | 1000                     | 0                                   |
| Compound (I) + CpGV                         | 100 + 1000               | obs.* cal.**<br>100 0               |
| Chloranthraniliprole                        | 4                        | 80                                  |
| Compound (I) + Chloranthraniliprole         | 100 + 4                  | obs.* cal.**<br>100 80              |
| Milbemectin                                 | 4                        | 70                                  |

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| Active ingredient/ biological control agent | Concentration<br>g ai/ha | Mortality in % after 6 <sup>d</sup> |                     |
|---------------------------------------------|--------------------------|-------------------------------------|---------------------|
| Compound (I) + Milbemectin                  | 20 + 4                   | <u>obs.*</u><br>90                  | <u>cal.**</u><br>70 |
| Pymetrozine                                 | 4                        | 0                                   |                     |
| Compound (I) + Pymetrozine                  | 4 + 4                    | <u>obs.*</u><br>100                 | <u>cal.**</u><br>0  |
| Lambda-Cyhalothrin                          | 0,16                     | 0                                   |                     |
| Compound (I) + Lambda-Cyhalothrin           | 4 + 0,16                 | <u>obs.*</u><br>100                 | <u>cal.**</u><br>0  |
| Dimethoate                                  | 20                       | 0                                   |                     |
| Compound (I) + Dimethoate                   | 20 + 20                  | <u>obs.*</u><br>80                  | <u>cal.**</u><br>0  |

**Example 2:**

**Phaedon cochleariae larvae – spray application**

- Solvent: 78.0 parts by weight of acetone
- 5 1.5 parts by weight of dimethylformamide
- Emulsifier: 0.5 parts by weight of alkylaryl polyglycolether

To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and emulsifier, and the concentrate is diluted with emulsifier- containing water to the desired concentration. To produce a suitable preparation of a biological suspension the cells, viruses or spores  
10 are diluted with emulsifier- containing water to the desired concentration.

Chinese cabbage (*Brassica pekinensis*) leaf- discs are sprayed with a preparation of the active ingredient of the desired concentration. Once dry, the leaf discs are infested with mustard beetle larvae (*Phaedon cochleariae*).

After the specified period of time, mortality in % is determined. 100 % means that all the beetle larvae have  
15 been killed; 0 % means that none of the beetle larvae have been killed. The mortality values thus determined are recalculated using the Colby-formula.

The following combinations of compound (I) and one further active ingredient or biological control agent showed a synergistic effect according to the invention:

**Table 2: *Phaedon cochleariae* larvae – Test**

| Active ingredient/ biological control agent                                                                                                                                                                                                                                                                                | Concentration<br>g ai/ha | Mortality in % after 2 <sup>d</sup> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------------------------------|
| Compound (I)                                                                                                                                                                                                                                                                                                               | 100<br>20<br>4<br>0,8    | 0<br>0<br>0<br>0                    |
| 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl}-1H-pyrazole-5-carboxamide/<br>1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl}-1H-pyrazole-5-carboxamide                | 0,8                      | 50                                  |
| Compound (I) + 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl}-1H-pyrazole-5-carboxamide/<br>1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl}-1H-pyrazole-5-carboxamide | 20 + 0,8                 | obs.* 100    cal.** 50              |
| Flupyradifurone                                                                                                                                                                                                                                                                                                            | 500                      | 50                                  |
| Compound (I) + Flupyradifurone                                                                                                                                                                                                                                                                                             | 100 + 500                | obs.* 100    cal.** 50              |
| Fipronil                                                                                                                                                                                                                                                                                                                   | 0,16                     | 0                                   |
| Compound (I) + Fipronil                                                                                                                                                                                                                                                                                                    | 0,8 + 0,16               | obs.* 100    cal.** 0               |
| Lambda-Cyhalothrin                                                                                                                                                                                                                                                                                                         | 0,8                      | 67                                  |
| Compound (I) + Lambda-Cyhalothrin                                                                                                                                                                                                                                                                                          | 20 + 0,8                 | obs.* 100    cal.** 67              |
| Enamectin-benzoate                                                                                                                                                                                                                                                                                                         | 0,8                      | 67                                  |
| Compound (I) + Enamectin-benzoate                                                                                                                                                                                                                                                                                          | 100 + 0,8                | obs.* 100    cal.** 67              |
| Lepimectin                                                                                                                                                                                                                                                                                                                 | 4                        | 50                                  |
| Compound (I) + Lepimectin                                                                                                                                                                                                                                                                                                  | 4 + 4                    | obs.* 83    cal.** 50               |
| Thiamethoxam                                                                                                                                                                                                                                                                                                               | 20                       | 67                                  |
| Compound (I) + Thiamethoxam                                                                                                                                                                                                                                                                                                | 100 + 20                 | obs.* 83    cal.** 67               |

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| Active ingredient/ biological control agent | Concentration<br>g ai/ha | Mortality in % after 6 <sup>d</sup> |
|---------------------------------------------|--------------------------|-------------------------------------|
| Compound (I)                                | 100<br>20<br>4           | 0<br>0<br>0                         |
| Chloranthraniliprole                        | 0,8                      | 33                                  |
| Compound (I) + Chloranthraniliprole         | 20 + 0,8                 | obs.* cal.**<br>83 33               |
| Sulfoxaflor                                 | 4                        | 0                                   |
| Compound (I) + Sulfoxaflor                  | 100 + 4                  | obs.* cal.**<br>33 0                |
| Alpha-Cypermethrin                          | 4                        | 0                                   |
| Compound (I) + Alpha-Cypermethrin           | 100 + 4                  | obs.* cal.**<br>67 0                |
| Bifenthrin                                  | 0,8                      | 50                                  |
| Compound (I) + Bifenthrin                   | 20 + 0,8                 | obs.* cal.**<br>83 50               |
| Imidacloprid                                | 20                       | 0                                   |
| Compound (I) + Imidacloprid                 | 100 + 20                 | obs.* cal.**<br>50 0                |
| Thiacloprid                                 | 20                       | 33                                  |
| Compound (I) + Thiacloprid                  | 100 + 20                 | obs.* cal.**<br>83 33               |
| Clothianidin                                | 20                       | 83                                  |
| Compound (I) + Clothianidin                 | 100 + 20                 | obs.* cal.**<br>100 83              |
| Acetamiprid                                 | 20                       | 33                                  |
| Compound (I) + Acetamiprid                  | 100 + 20                 | obs.* cal.**<br>83 33               |
| Dinotefuran                                 | 20                       | 0                                   |
| Compound (I) + Dinotefuran                  | 20 + 20                  | obs.* cal.**<br>33 0                |
| Nitenpyram                                  | 20                       | 0                                   |
| Compound (I) + Nitenpyram                   | 100 + 20                 | obs.* cal.**<br>50 0                |
| Tefluthrin                                  | 20                       | 50                                  |
| Compound (I) + Tefluthrin                   | 100 + 20                 | obs.* cal.**<br>83 50               |
| Flufenoxuron                                | 20                       | 0                                   |
| Compound (I) + Flufenoxuron                 | 100 + 20                 | obs.* cal.**<br>50 0                |
| Triflumuron                                 | 20                       | 0                                   |
| Compound (I) + Triflumuron                  | 100 + 20                 | obs.* cal.**<br>67 0                |
| Beta-Cyfluthrin                             | 0,8                      | 50                                  |
| Compound (I) + Beta-Cyfluthrin              | 20 + 0,8                 | obs.* cal.**<br>100 50              |
| Dimethoate                                  | 100                      | 0                                   |
| Compound (I) + Dimethoate                   | 100 + 100                | obs.* cal.**<br>50 0                |
| Thiodicarb                                  | 100                      | 0                                   |

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| Active ingredient/ biological control agent | Concentration<br>g ai/ha | Mortality in % after 6 <sup>d</sup>    |
|---------------------------------------------|--------------------------|----------------------------------------|
| Compound (I) + Thiodicarb                   | 100 + 100                | <u>obs.</u> * <u>cal.</u> **<br>33   0 |

\* obs. = observed insecticidal efficacy, \*\* cal. = efficacy calculated with Colby-formula

**Example 3:**

**Spodoptera frugiperda – spray application**

- 5
- Solvent:                    78.0    parts by weight of acetone  
                                  1.5    parts by weight of dimethylformamide
- Emulsifier:                0.5    parts by weight of alkylaryl polyglycolether

To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and emulsifier, and the concentrate is diluted with emulsifier- containing water to the desired concentration. To produce a suitable preparation of a biological suspension the cells, viruses or spores are diluted with emulsifier- containing water to the desired concentration.

Cabbage (*Brassica oleracea*) leaf- discs are sprayed with a preparation of the active ingredient at the desired concentration. Once dry, the leaf discs are infested with larvae of the fall army worm (*Spodoptera frugiperda*).

- 15
- After the specified period of time, mortality in % is determined. 100 % means that all the caterpillars have been killed; 0 % means that none of the caterpillars have been killed. The mortality values thus determined are recalculated using the Colby-formula.

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The following combinations of compound (I) and one further active ingredient or biological control agent showed a synergistic effect according to the invention:

**Table 3: *Spodoptera frugiperda* – Test**

| Active ingredient/ biological control agent                                                                                                                                                                                                                                                                                | Concentration<br>g ai/ha | Mortality in % after 2 <sup>d</sup> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------------------------------|
| Compound (I)                                                                                                                                                                                                                                                                                                               | 100<br>20<br>4           | 0<br>0<br>0                         |
| 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl}-1H-pyrazole-5-carboxamide/<br>1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl}-1H-pyrazole-5-carboxamide                | 0.16                     | 67                                  |
| Compound (I) + 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl}-1H-pyrazole-5-carboxamide/<br>1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl}-1H-pyrazole-5-carboxamide | 4 + 0.16                 | obs.*<br>100 cal.**<br>67           |
| Gamma-Cyhalothrin                                                                                                                                                                                                                                                                                                          | 0.16                     | 0                                   |
| Compound (I) + Gamma-Cyhalothrin                                                                                                                                                                                                                                                                                           | 4 + 0.16                 | obs.*<br>50 cal.**<br>0             |
| Chlorpyrifos                                                                                                                                                                                                                                                                                                               | 100                      | 50                                  |
| Compound (I) + Chlorpyrifos                                                                                                                                                                                                                                                                                                | 20 + 20                  | obs.*<br>67 cal.**<br>50            |
| Triflumuron                                                                                                                                                                                                                                                                                                                | 20                       | 0                                   |
| Compound (I) + Triflumuron                                                                                                                                                                                                                                                                                                 | 100 + 20                 | obs.*<br>67 cal.**<br>0             |
| Diflubenzuron                                                                                                                                                                                                                                                                                                              | 100                      | 67                                  |
| Compound (I) + Diflubenzuron                                                                                                                                                                                                                                                                                               | 100 + 100                | obs.*<br>100 cal.**<br>67           |

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|                                   | Concentration<br>g ai/ha | Mortality in % after 6 <sup>d</sup> |
|-----------------------------------|--------------------------|-------------------------------------|
| Compound (I)                      | 100<br>20<br>4<br>0,8    | 0<br>0<br>0<br>0                    |
| Bifenthrin                        | 0.16                     | 0                                   |
| Compound (I) + Bifenthrin         | 4 + 0.16                 | obs.* cal.**<br>33 0                |
| Thiacloprid                       | 20                       | 0                                   |
| Compound (I) + Thiacloprid        | 100 + 20                 | obs.* cal.**<br>33 0                |
| Lambda-Cyhalothrin                | 0,16                     | 33                                  |
| Compound (I) + Lambda-Cyhalothrin | 4 + 0,16                 | obs.* cal.**<br>50 33               |
| Milbemectin                       | 0,8                      | 0                                   |
| Compound (I) + Milbemectin        | 4 + 0,8                  | obs.* cal.**<br>33 0                |
| Cypermethrin                      | 0,8                      | 67                                  |
| Compound (I) + Cypermethrin       | 4 + 0,8                  | obs.* cal.**<br>83 67               |
| Deltamethrin                      | 0,032                    | 0                                   |
| Compound (I) + Deltamethrin       | 0,8 + 0,032              | obs.* cal.**<br>67 0                |
| Beta-Cyfluthrin                   | 0,8                      | 83                                  |
| Compound (I) + Beta-Cyfluthrin    | 20 + 0,8                 | obs.* cal.**<br>100 83              |
| Indoxacarb                        | 0,8                      | 50                                  |
| Compound (I) + Indoxacarb         | 4 + 0,8                  | obs.* cal.**<br>100 50              |

\* obs. = observed insecticidal efficacy, \*\* cal. = efficacy calculated with Colby-formula

**Example 4:**

**Tetranychus urticae - test (OP – resistant)**

- 5

Solvent:

78.0

parts by weight acetone
- 1.5

parts by weight dimethylformamide
- Emulsifier:

0.5

parts by weight alkylarylpolyglycolether

To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and emulsifier, and the concentrate is diluted with emulsifier- containing water to the desired concentration. To produce a suitable preparation of a biological suspension the cells or spores are diluted with emulsifier- containing water to the desired concentration.

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Leaf discs of French beans (*Phaseolus vulgaris*) infected with all instars of the Two-spotted spider mite (*Tetranychus urticae*), are sprayed with a preparation of the active ingredient at the desired concentration.

5 After the specified period of time mortality in % is determined. 100 % means that all spider mites have been killed; 0 % means that none of the spider mites have been killed.

The following combinations of compound (I) and one further active ingredient or biological control agent showed a synergistic effect according to the invention:

**Table 4: *Tetranychus urticae* – Test**

| Active ingredient/ biological control agent | Concentration<br>g ai/ha | Mortality in % after 2 <sup>d</sup> |
|---------------------------------------------|--------------------------|-------------------------------------|
| Compound (I)                                | 20                       | 80                                  |
|                                             | 4                        | 30                                  |
| Azadirachtin                                | 100                      | 0                                   |
| Compound (I) + Azadirachtin                 | 20 + 100                 | obs.* cal.**<br>100 80              |
| Fluensulfone                                | 2000                     | 0                                   |
| Compound (I) + Fluensulfone                 | 4 + 2000                 | obs.* cal.**<br>70 30               |
| Harpin – protein                            | 1.5                      | 0                                   |
| Compound (I) + Harpin - protein             | 4 + 1.5                  | obs.* cal.**<br>70 30               |
| Metschnikowia fructicola                    | 500                      | 0                                   |
| Compound (I) + Metschnikowia fructicola     | 4 + 500                  | obs.* cal.**<br>70 30               |
| Paecilomyces lilacinus strain 251           | 4000                     | 0                                   |
| Compound (I) + Paecilomyces lilacinus       | 4 + 4000                 | obs.* cal.**<br>70 30               |
| Pyrethrum                                   | 500                      | 70                                  |
| Compound (I) + Pyrethrum                    | 4 + 500                  | obs.* cal.**<br>90 79               |
| Buprofezin                                  | 500                      | 0                                   |
| Compound (I) + Buprofezin                   | 4 + 500                  | obs.* cal.**<br>80 30               |
| Alpha-Cypermethrin                          | 0,16                     | 0                                   |
| Compound (I) + Alpha-Cypermethrin           | 4 + 0,16                 | obs.* cal.**<br>70 30               |
| Imidacloprid                                | 0,8                      | 0                                   |
| Compound (I) + Imidacloprid                 | 4 + 0,8                  | obs.* cal.**<br>90 30               |
| Nitenpyram                                  | 0,8                      | 0                                   |
| Compound (I) + Nitenpyram                   | 4 + 0,8                  | obs.* cal.**<br>100 30              |
| Pyrifluquinazone                            | 0,8                      | 0                                   |
| Compound (I) + Pyrifluquinazone             | 4 + 0,8                  | obs.* cal.**<br>80 30               |
| Flupyradifurone                             | 0,8                      | 0                                   |
| Compound (I) + Flupyradifurone              | 4 + 0,8                  | obs.* cal.**<br>70 30               |

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| Active ingredient/ biological control agent | Concentration<br>g ai/ha | Mortality in % after 2 <sup>d</sup> |
|---------------------------------------------|--------------------------|-------------------------------------|
| Sulfoxaflor                                 | 0,16                     | 0                                   |
| Compound (I) + Sulfoxaflor                  | 4 + 0,16                 | <u>obs.*</u> <u>cal.**</u><br>80 30 |
| Spinetoram                                  | 0,8                      | 0                                   |
| Compound (I) + Spinetoram                   | 4 + 0,8                  | <u>obs.*</u> <u>cal.**</u><br>70 30 |
| Spinosad                                    | 0,8                      | 0                                   |
| Compound (I) + Spinosad                     | 4 + 0,8                  | <u>obs.*</u> <u>cal.**</u><br>80 30 |
| Tefluthrin                                  | 0,8                      | 0                                   |
| Compound (I) + Tefluthrin                   | 4 + 0,8                  | <u>obs.*</u> <u>cal.**</u><br>70 30 |
| Fipronil                                    | 0,8                      | 0                                   |
| Compound (I) + Fipronil                     | 4 + 0,8                  | <u>obs.*</u> <u>cal.**</u><br>70 30 |
| Chlorpyrifos                                | 4                        | 0                                   |
| Compound (I) + Chlorpyrifos                 | 4 + 4                    | <u>obs.*</u> <u>cal.**</u><br>70 30 |
| Thiodicarb                                  | 4                        | 0                                   |
| Compound (I) + Thiodicarb                   | 4 + 4                    | <u>obs.*</u> <u>cal.**</u><br>70 30 |
| Diflubenzuron                               | 4                        | 0                                   |
| Compound (I) + Diflubenzuron                | 4 + 4                    | <u>obs.*</u> <u>cal.**</u><br>70 30 |
| Flufenoxuron                                | 0,8                      | 0                                   |
| Compound (I) + Flufenoxuron                 | 4 + 0,8                  | <u>obs.*</u> <u>cal.**</u><br>70 30 |
| Chlorfenapyr                                | 0,8                      | 0                                   |
| Compound (I) + Chlorfenapyr                 | 4 + 0,8                  | <u>obs.*</u> <u>cal.**</u><br>70 0  |
| Tebufenpyrad                                | 4                        | 0                                   |
| Compound (I) + Tebufenpyrad                 | 4 + 4                    | <u>obs.*</u> <u>cal.**</u><br>80 30 |
| Abamectin                                   | 0,032                    | 0                                   |
| Compound (I) + Abamectin                    | 4 + 0,032                | <u>obs.*</u> <u>cal.**</u><br>70 30 |

| Active ingredient/ biological control agent | Concentration<br>g ai/ha | Mortality in % after 6 <sup>d</sup>  |
|---------------------------------------------|--------------------------|--------------------------------------|
| Compound (I)                                | 4                        | 30                                   |
| Bacillus firmus I-1582                      | 250                      | 0                                    |
| Compound (I) + Bacillus firmus              | 4 + 250                  | <u>obs.*</u> <u>cal.**</u><br>70 30  |
| Thymol                                      | 500                      | 0                                    |
| Compound (I) + Thymol                       | 4 + 500                  | <u>obs.*</u> <u>cal.**</u><br>100 30 |
| Bacillus subtilis strain GB 03              | 2000                     | 0                                    |
| Compound (I) + Bacillus subtilis            | 4 + 2000                 | <u>obs.*</u> <u>cal.**</u><br>80 30  |
| Metarhizium anisopliae strain F 52          | 100                      | 0                                    |

| Active ingredient/ biological control agent | Concentration<br>g ai/ha | Mortality in % after 6 <sup>d</sup> |
|---------------------------------------------|--------------------------|-------------------------------------|
| Compound (I) + Metarhizium anisopliae       | 4 + 100                  | obs.* cal.**<br>90 30               |
| Cydia pomonella Granuloseviren (CpGV)       | 1000                     | 0                                   |
| (I) + CpGV                                  | 4 + 1000                 | obs.* cal.**<br>70 30               |

\* obs. = observed insecticidal efficacy, \*\* cal. = efficacy calculated with Colby-formula

**Example 5:**

**Tetranychus urticae– test; OP-resistant; (TETRUR)**

- 5 Solvent: 7 parts by weight of dimethylformamide
- Emulsifier: 2 parts by weight of alkylaryl polyglycoether

To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and emulsifier, and the concentrate is diluted with emulsifier-containing water to the desired concentration. Ammonium salt and/or penetration enhancer in a dosage of 1000ppm are added to the desired concentration if necessary. To produce a suitable preparation of a biological suspension the cells or spores are diluted with emulsifier- containing water to the desired concentration.

Bean plants (*Phaseolus vulgaris*) which are heavily infested with all stages of the two-spotted spider mite (*Tetranychus urticae*) are treated by being sprayed with the preparation of the active compound of the desired concentration.

- 15 After the specified period of time, mortality in % is determined. 100 % means that all the spider mites have been killed; 0 % means that none of the spider mites have been killed.

The following combinations of compound (I) and one further active ingredient or biological control agent showed a synergistic effect according to the invention:

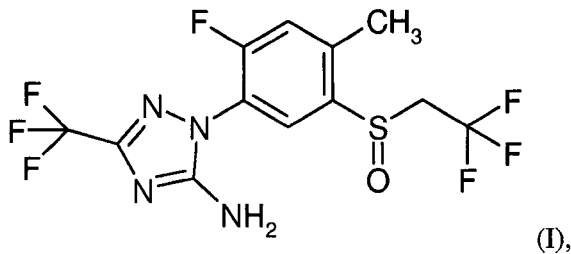
**Table 5: Tetranychus urticae – Test**

| Active ingredient/ biological control agent | Concentration<br>ppm | Mortality in % after 5 <sup>d</sup> |
|---------------------------------------------|----------------------|-------------------------------------|
| Compound (I)                                | 0.8                  | 40                                  |
| Bacillus thuringiensis spp aizawai          | 1000                 | 15                                  |
| Compound (I) + Bacillus thuringiensis       | 0.8 + 1000           | obs.* cal.**<br>80 49               |
| Bacillus amyloliquefaciens FZB42            | 2000                 | 0                                   |
| Compound (I) + Bacillus amyloliquefaciens   | 0.8 + 2000           | obs.* cal.**<br>60 40               |

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**Claims**

1. Active ingredient combinations comprising a compound of the formula (I)



and one or more further insecticides and / or acaricides and / or biological control agents from the group (II), selected from

(1) Acetylcholinesterase (AChE) inhibitors, for example

carbamates, e.g. Alanycarb (II-1-1), Aldicarb (II-1-2), Bendiocarb (II-1-3), Benfuracarb (II-1-4), Butoxycarboxim (II-1-5), Carbaryl (II-1-6), Carbofuran (II-1-7), Carbosulfan (II-1-8), Ethiofencarb (II-1-9), Fenobucarb (II-1-10), Furathiocarb (II-1-11), Isoprocarb (II-1-12), Methomyl (II-1-13), Metolcarb (II-1-14), Oxamyl (II-1-15), Pirimicarb (II-1-16), Propoxur (II-1-17), Thiodicarb (II-1-18), and XMC (II-1-19); or

organophosphates, e.g. Acephate (II-1-20), Azinphos-ethyl (II-1-21), Azinphos-methyl (II-1-22), Chlorethoxyfos (II-1-23), Chlorfenvinphos (II-1-24), Chlorpyrifos (II-1-25), Chlorpyrifos-methyl (II-1-26), Cyanophos (II-1-27), Diazinon (II-1-28), Dichlorvos/DDVP (II-1-29), Dimethoate (II-1-30), Dimethylvinphos (II-1-31), Disulfoton (II-1-32), EPN (II-1-46), Ethion (II-1-33), Ethoprophos (II-1-34), Fenamiphos (II-1-35), Fenitrothion (II-1-36), Fenthion (II-1-37), Fosthiazate (II-1-38), Isofenphos (II-1-39), Isopropyl O-(methoxyaminothio-phosphoryl) salicylate (II-1-40), Isoxathion (II-1-41), Malathion (II-1-42), Methidathion (II-1-43), Monocrotophos (II-1-44), Naled (II-1-45), Oxydemeton-methyl (II-1-46), Phenthoate (II-1-47), Phosalone (II-1-48), Phosmet (II-1-49), Pirimiphos-methyl (II-1-50), Profenofos (II-1-51), Prothiofos (II-1-52), Pyraclofos (II-1-53), Pyridaphenthion (II-1-54), Quinalphos (II-1-55), Tetrachlorvinphos (II-1-56), Thiometon (II-1-57), Triclorfon (II-1-58), and Vamidothion (II-1-59);

(2) GABA-gated chloride channel antagonists, for example

cyclodiene organochlorines, e.g. Chlordane (II-2-1) and Endosulfan (II-2-2); or

phenylpyrazoles (fiproles), e.g. Fipronil (II-2-3) ;

(3) Sodium channel modulators / voltage-dependent sodium channel blockers, for example

- pyrethroids, e.g. Acrinathrin (II-3-1), Allethrin (II-3-2), d-cis-trans Allethrin (II-3-3), d-trans Allethrin (II-3-4), Bifenthrin (II-3-5), Cycloprothrin (II-3-6), Cyfluthrin (II-3-7), beta-Cyfluthrin (II-3-8), Cyhalothrin (II-3-9), lambda-Cyhalothrin (II-3-10), gamma-Cyhalothrin (II-3-11), Cypermethrin (II-3-12), alpha-Cypermethrin (II-3-13), beta-Cypermethrin (II-3-14), theta-Cypermethrin (II-3-15), zeta-Cypermethrin (II-3-16), Deltamethrin (II-3-17), Etofenprox (II-3-18), Fenpropathrin (II-3-19), Fenvalerate (II-3-20), Flucythrinate (II-3-21), tau-Fluvalinate (II-3-22), Kadethrin (II-3-23), Permethrin (II-3-24), Phenothrin [(1R)-trans isomer] (II-3-25), Pyrethrine (pyrethrum) (II-3-26), Resmethrin (II-3-27), Silafluofen (II-3-28), Tefluthrin (II-3-29), Tetramethrin (II-3-30), Tetramethrin [(1R) isomers] (II-3-31), and Tralomethrin (II-3-32), or
- DDT (II-3-33); or Methoxychlor (II-3-34);
- (4) Nicotinic acetylcholine receptor (nAChR) agonists, for example
- neonicotinoids, e.g. Acetamiprid (II-4-1), Clothianidin (II-4-2), Dinotefuran (II-4-3), Imidacloprid (II-4-4), Nitenpyram (II-4-5), Thiacloprid (II-4-6), and Thiamethoxam (II-4-7); or
- Nicotine (II-4-8);
- (5) Nicotinic acetylcholine receptor (nAChR) allosteric activators, for example
- spinosyns, e.g. Spinetoram (II-5-1) and Spinosad (II-5-2);
- (6) Chloride channel activators, for example
- avermectins/milbemycins, e.g. Abamectin (II-6-1), Enamectin benzoate (II-6-2), Lepimectin (II-6-3), and Milbemectin (II-6-4);
- (7) Juvenile hormone mimics, for example
- juvenile hormone analogues, e.g. Methoprene (II-7-1); or
- Fenoxycarb (II-7-2); or Pyriproxyfen (II-7-3);
- (8) Miscellaneous non-specific (multi-site) inhibitors, for example
- alkyl halides, e.g. Methyl bromide (II-8-1) and other alkyl halides; or
- Chloropicrin (II-8-2); or Sulfuryl fluoride (II-8-3); or Borax (II-8-4); or Tartar emetic (II-8-4);
- (9) Selective homopteran feeding blockers, e.g. Pymetrozine (II-9-1);

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(10) Mite growth inhibitors, e.g. Clofentezine (II-10-1), Hexythiazox (II-10-2), and Diflovidazin (II-10-3); or

Etoxazole (II-10-4);

5 (11) Microbial disruptors of insect midgut membranes, e.g. *Bacillus thuringiensis* subspecies israelensis (II-11-1), *Bacillus sphaericus* (II-11-2), *Bacillus thuringiensis* subspecies aizawai (II-11-3), *Bacillus thuringiensis* subspecies kurstaki (II-11-4), *Bacillus thuringiensis* subspecies tenebrionis (II-11-5), and BT crop proteins: Cry1Ab, Cry1Ac, Cry1Fa, Cry2Ab, mCry3A, Cry3Ab, Cry3Bb, Cry34/35Ab1 (II-11-6);

(12) Inhibitors of mitochondrial ATP synthase, for example Diafenthiuron (II-12-1); or

10 organotin miticides, e.g. Azocyclotin (II-12-2), Cyhexatin (II-12-3), and Fenbutatin oxide (II-12-4); or

Propargite (II-12-5); or Tetradifon (II-12-6);

(13) Uncouplers of oxidative phosphorylation via disruption of the proton gradient, for example Chlorfenapyr (II-13-1), DNOC (II-13-2), and Sulfluramid (II-13-3);

15 (14) Nicotinic acetylcholine receptor (nAChR) channel blockers, for example Bensultap (II-14-1), Cartap hydrochloride (II-14-2), and Thiocyclam (II-14-3);

(15) Inhibitors of chitin biosynthesis, type 0, for example Chlorfluazuron (II-15-1), Diflubenzuron (II-15-2), Flucycloxuron (II-15-3), Flufenoxuron (II-15-4), Hexaflumuron (II-15-5), Lufenuron (II-15-6), Teflubenzuron (II-15-7), and Triflumuron (II-15-8);

20 (16) Inhibitors of chitin biosynthesis, type 1, for example Buprofezin (II-16-1);

(17) Moulting disruptors, for example Cyromazine (II-17-1);

(18) Octopamine receptor agonists, for example Amitraz (II-18-1);

(19) Mitochondrial complex III electron transport inhibitors, for example Hydramethylnon (II-19-1); or Acequinocyl (II-19-2); or Fluacrypyrim (II-19-3);

25 (20) Mitochondrial complex I electron transport inhibitors, for example

METI acaricides, e.g. Fenpyroximate (II-20-1), Pyrimidifen (II-20-2), Pyridaben (II-20-3), Tebufenpyrad (II-20-4), and Tolfenpyrad (II-20-5); or

Rotenone (Derris) (II-20-6);

(21) Voltage-dependent sodium channel blockers, e.g. Indoxacarb (II-21-1);

(22) Inhibitors of acetyl CoA carboxylase, for example

tetronic and tetramic acid derivatives, e.g. Spirodiclofen (II-22-1);

5 (23) Mitochondrial complex IV electron transport inhibitors, for example

phosphines, e.g. Aluminium phosphide (II-23-1), Calcium phosphide (II-23-2), Phosphine (II-23-3), and Zinc phosphide (II-23-4); or

Cyanide (II-23-5).

(24) Ryanodine receptor modulators, for example

10 diamides, e.g. Chlorantraniliprole (II-24-1);

further active ingredients with unknown or uncertain mode of action, for example Amidoflumet (II-25-1), Azadirachtin (II-25-2), Benclothiaz (II-25-3), Benzoximate (II-25-4), Bifenazate (II-25-5), Bromopropylate (II-25-6), Chinomethionat (II-25-7), Cryolite (II-25-8), Cyantraniliprole (Cyazypyr) (II-25-9), Dicofol (II-25-10), Diflovidazin (II-25-11), Fluensulfone (II-25-12),  
15 Flufiprole (II-25-13), Fluopyram (II-25-14), Fufenozide (II-25-15), Imidaclothiz (II-25-16), Iprodione (II-25-17), Meperfluthrin (II-25-18), Pyrifluquinazon (II-25-19), Tetramethylfluthrin (II-25-20), and iodomethane (II-25-21); furthermore products based on *Bacillus firmus* (including but not limited to strain CNCM I-1582, such as, for example, VOTiVO™, BioNem) (II-25-22) *Bacillus subtilis* GB03 (II-25-23) and QST 713 (II-25-24), *Bacillus amyloliquefaciens* FZB24 (II-25-25) and FZB 42 (II-25-26), *Bacillus thuringiensis* subspecies *aizawai* (II-25-27), *kurstaki* (II-25-28), *tenebrionis* (II-25-29) and *israelensis* (II-25-30), *Metarhizium anisopliae* F52 (II-25-31), *Metschnikowia fructicola* (II-25-32), *Paecilomyces lilacinus* strain 251 (II-25-33), *Paecilomyces fumosoroseus* (II-25-34), *Nomuraea rileyi* (II-25-35), *Cydia pomonella* granulosis virus (II-25-36), Pyrethrum (II-25-37), Harpin-Protein (II-25-38), Thymol (II-25-39),

25 or one of the following known active compounds: 3-bromo-N-{2-bromo-4-chloro-6-[(1-cyclopropylethyl)carbamoyl]phenyl}-1-(3-chloropyridin-2-yl)-1H-pyrazole-5-carboxamide (II-25-40) (known from WO2005/077934), 4-[[[(6-bromopyridin-3-yl)methyl](2-fluoroethyl)amino}furan-2(5H)-one (II-25-41) (known from WO2007/115644), 4-[[[(6-fluoropyridin-3-yl)methyl](2,2-difluoroethyl)amino}furan-2(5H)-one (II-25-42) (known from  
30 WO2007/115644), 4-[[[(2-chloro-1,3-thiazol-5-yl)methyl](2-fluoroethyl)amino}furan-2(5H)-one

(II-25-43) (known from WO2007/115644), 4-[[6-chloropyridin-3-yl)methyl](2-fluoroethyl)amino}furan-2(5H)-one (II-25-44) (known from WO2007/115644), Flupyradifurone (II-25-45), 4-[[[(6-chlor-5-fluoropyridin-3-yl)methyl](methyl)amino}furan-2(5H)-one (II-25-46) (known from WO2007/115643), 4-[[[(5,6-dichloropyridin-3-yl)methyl](2-fluoroethyl)amino}furan-2(5H)-one (II-25-47) (known from WO2007/115646), 4-[[[(6-chloro-5-fluoropyridin-3-yl)methyl](cyclopropyl)amino}furan-2(5H)-one (II-25-48) (known from WO2007/115643), 4-[[[(6-chloropyridin-3-yl)methyl](cyclopropyl)amino}furan-2(5H)-one (II-25-49) (known from EP-A-0 539 588), 4-[[[(6-chloropyridin-3-yl)methyl](methyl)amino}furan-2(5H)-one (II-25-50) (known from EP-A-0 539 588), {[1-(6-chloropyridin-3-yl)ethyl](methyl)oxido- $\lambda^4$ -sulfanylidene}cyanamide (II-25-51) (known from WO2007/149134) and its diastereomers {[1(R)-1-(6-chloropyridin-3-yl)ethyl](methyl)oxido- $\lambda^4$ -sulfanylidene}cyanamide (A) (II-25-52), and {[1(S)-1-(6-chloropyridin-3-yl)ethyl](methyl)oxido- $\lambda^4$ -sulfanylidene}cyanamide (B) (II-25-53) (also known from WO2007/149134) as well as Sulfoxaflor (II-25-54) and its diastereomers [(R)-methyl(oxido){1(R)-1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}- $\lambda^4$ -sulfanylidene]cyanamide (A1) (II-25-55), and [(S)-methyl(oxido){1(S)-1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}- $\lambda^4$ -sulfanylidene]cyanamide (A2) (II-25-56), referred to as group of diastereomers A (known from WO2010/074747, WO2010/074751), [(R)-methyl(oxido){1(S)-1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}- $\lambda^4$ -sulfanylidene]cyanamide (B1) (II-25-57), and [(S)-methyl(oxido){1(R)-1-[6-(trifluoromethyl)pyridin-3-yl]ethyl}- $\lambda^4$ -sulfanylidene]cyanamide (B2) (II-25-58), referred to as group of diastereomers B (also known from WO2010/074747, WO2010/074751), and 11-(4-chloro-2,6-dimethylphenyl)-12-hydroxy-1,4-dioxo-9-azadispiro[4.2.4.2]tetradec-11-en-10-one (II-25-59) (known from WO2006/089633), 3-(4'-fluoro-2,4-dimethylbiphenyl-3-yl)-4-hydroxy-8-oxa-1-azaspiro[4.5]dec-3-en-2-one (II-25-60) (known from WO2008/067911), 1-{2-fluoro-4-methyl-5-[(2,2,2-trifluoroethyl)sulfinyl]phenyl}-3-(trifluoromethyl)-1H-1,2,4-triazol-5-amine (II-25-61) (known from WO2006/043635), [(3S,4aR,12R,12aS,12bS)-3-[(cyclopropylcarbonyl)oxy]-6,12-dihydroxy-4,12b-dimethyl-11-oxo-9-(pyridin-3-yl)-1,3,4,4a,5,6,6a,12,12a,12b-decahydro-2H,11H-benzof[f]pyrano[4,3-b]chromen-4-yl)methyl cyclopropanecarboxylate (II-25-62) (known from WO2008/066153), 2-cyano-3-(difluoromethoxy)-N,N-dimethylbenzenesulfonamide (II-25-63) (known from WO2006/056433), 2-cyano-3-(difluoromethoxy)-N-methylbenzenesulfonamide (II-25-64) (known from WO2006/100288), 2-cyano-3-(difluoromethoxy)-N-ethylbenzenesulfonamide (II-25-65) (known from WO2005/035486), 4-(difluoromethoxy)-N-ethyl-N-methyl-1,2-benzothiazol-3-amine 1,1-dioxide (II-25-66) (known from WO2007/057407), N-[1-(2,3-dimethylphenyl)-2-(3,5-dimethylphenyl)ethyl]-4,5-dihydro-1,3-thiazol-2-amine (II-25-67) (known from WO2008/104503), {1'-[(2E)-3-(4-chlorophenyl)prop-2-en-1-yl]-5-fluorospiro[indole-3,4'-piperidin]-1(2H)-yl}(2-chloropyridin-4-yl)methanone (II-25-68) (known from WO2003/106457), 3-(2,5-dimethylphenyl)-4-hydroxy-8-methoxy-1,8-diazaspiro[4.5]dec-3-

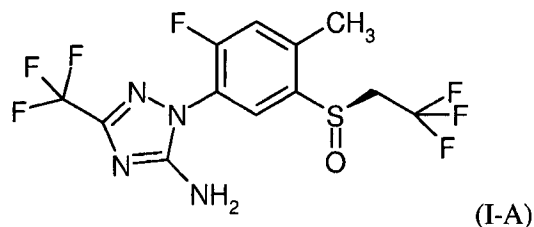
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en-2-one (II-25-69) (known from WO2009/049851), 3-(2,5-dimethylphenyl)-8-methoxy-2-oxo-1,8-diazaspiro[4.5]dec-3-en-4-yl ethyl carbonate (II-25-50) (known from WO2009/049851), 4-(but-2-yn-1-yloxy)-6-(3,5-dimethylpiperidin-1-yl)-5-fluoropyrimidine (II-25-71) (known from WO2004/099160), (2,2,3,3,4,4,5,5-octafluoropentyl)(3,3,3-trifluoropropyl)malononitrile (II-25-72) (known from WO2005/063094), (2,2,3,3,4,4,5,5-octafluoropentyl)(3,3,4,4,4-pentafluorobutyl)malononitrile (II-25-73) (known from WO2005/063094), 8-[2-(cyclopropylmethoxy)-4-(trifluoromethyl)phenoxy]-3-[6-(trifluoromethyl)pyridazin-3-yl]-3-azabicyclo[3.2.1]octane (II-25-74) (known from WO2007/040280), Flometoquin (II-25-75), PF1364 (CAS-Reg.No. 1204776-60-2) (II-25-76) (known from JP2010/018586), 5-[5-(3,5-dichlorophenyl)-5-(trifluoromethyl)-4,5-dihydro-1,2-oxazol-3-yl]-2-(1H-1,2,4-triazol-1-yl)benzonitrile (II-25-77) (known from WO2007/075459), 5-[5-(2-chloropyridin-4-yl)-5-(trifluoromethyl)-4,5-dihydro-1,2-oxazol-3-yl]-2-(1H-1,2,4-triazol-1-yl)benzonitrile (II-25-78) (known from WO2007/075459), 4-[5-(3,5-dichlorophenyl)-5-(trifluoromethyl)-4,5-dihydro-1,2-oxazol-3-yl]-2-methyl-N-[2-oxo-2-[(2,2,2-trifluoroethyl)amino]ethyl]benzamide (II-25-79) (known from WO2005/085216), 4-[[[(6-chloropyridin-3-yl)methyl](cyclopropyl)amino]-1,3-oxazol-2(5H)-one (II-25-80), 4-[[[(6-chloropyridin-3-yl)methyl](2,2-difluoroethyl)amino]-1,3-oxazol-2(5H)-one (II-25-81), 4-[[[(6-chloropyridin-3-yl)methyl](ethyl)amino]-1,3-oxazol-2(5H)-one (II-25-82), 4-[[[(6-chloropyridin-3-yl)methyl](methyl)amino]-1,3-oxazol-2(5H)-one (II-25-83) (all known from WO2010/005692), NNI-0711 (II-25-84) (known from WO2002/096882), 1-acetyl-N-[4-(1,1,1,3,3,3-hexafluoro-2-methoxypropan-2-yl)-3-isobutylphenyl]-N-isobutyryl-3,5-dimethyl-1H-pyrazole-4-carboxamide (II-25-85) (known from WO2002/096882), methyl 2-[2-([3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl)amino]-5-chloro-3-methylbenzoyl]-2-methylhydrazinecarboxylate (II-25-86) (known from WO2005/085216), methyl 2-[2-([3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl)amino]-5-cyano-3-methylbenzoyl]-2-ethylhydrazinecarboxylate (II-25-87) (known from WO2005/085216), methyl 2-[2-([3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl)amino]-5-cyano-3-methylbenzoyl]-2-methylhydrazinecarboxylate (II-25-88) (known from WO2005/085216), methyl 2-[3,5-dibromo-2-([3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl)amino]benzoyl]-1,2-diethylhydrazinecarboxylate (II-25-89) (known from WO2005/085216), methyl 2-[3,5-dibromo-2-([3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl)amino]benzoyl]-2-ethylhydrazinecarboxylate (II-25-90) (known from WO2005/085216), (5RS,7RS;5RS,7SR)-1-(6-chloro-3-pyridylmethyl)-1,2,3,5,6,7-hexahydro-7-methyl-8-nitro-5-propoxyimidazo[1,2-a]pyridine (II-25-91) (known from WO2007/101369), 2-[6-[2-(5-fluoropyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl]pyrimidine (II-25-92) (known from WO2010/006713), 2-[6-[2-(pyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl]pyrimidine (II-25-93) (known from WO2010/006713), 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl]-1H-

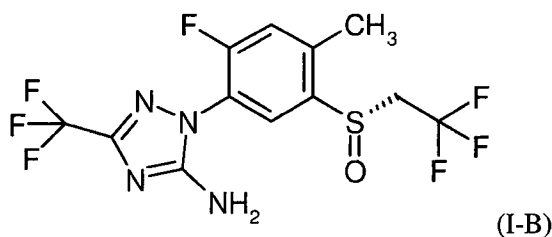
pyrazole-5-carboxamide (II-25-94) (known from WO2010/069502), 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{{5-(trifluoromethyl)-2H-tetrazol-2-yl)methyl}-1H-pyrazole-5-carboxamide (II-25-95) (known from WO2010/069502), N-[2-(tert-butylcarbamoyl)-4-cyano-6-methylphenyl]-1-(3-chloropyridin-2-yl)-3-{{5-(trifluoromethyl)-1H-tetrazol-1-yl)methyl}-1H-pyrazole-5-carboxamide (II-25-96) (known from WO2010/069502), N-[2-(tert-butylcarbamoyl)-4-cyano-6-methylphenyl]-1-(3-chloropyridin-2-yl)-3-{{5-(trifluoromethyl)-2H-tetrazol-2-yl)methyl}-1H-pyrazole-5-carboxamide (II-25-97) (known from WO2010/069502), (1E)-N-[(6-chloropyridin-3-yl)methyl]-N'-cyano-N-(2,2-difluoroethyl)-ethanimidamide (II-25-98) (known from WO2008/009360), N-[2-(5-amino-1,3,4-thiadiazol-2-yl)-4-chloro-6-methylphenyl]-3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazole-5-carboxamide (II-25-99) (known from CN102057925), and methyl 2-[3,5-dibromo-2-({[3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl}amino)benzoyl]-2-ethyl-1-methylhydrazinecarboxylate (II-25-100) (known from WO2011/049233).

or further biological control agents selected from bacteria, in particular spore-forming bacteria, fungi or yeasts, protozoas, viruses.

2. Combinations according to claim 1, wherein the compound of formula (I) is compound (I-A)



3. Combinations according to claim 1, wherein the compound of the formula (I) is compound (I-B)



4. Combinations according to any of claims 1 to 3, wherein the further insecticide and / or acaricide and / or biological control agent from the group (II) is selected from

Abamectin, Acephate, Acequinocyl, Acetamiprid, Acrinathrin, Aldicarb, Alpha-Cypermethrin, Amitraz, Azadirachtin, Azinphos-methyl, Benfuracarb, Beta-Cyfluthrin, Bifenazate, Bifenthrin, Bensultap (Nereistoxin), Buprofezin, Carbaryl, Carbofuran, Carbosulfan, Cartap hydrochloride, Chloranthraniliprole (Rynazypyr), Chlorfenapyr, Chlorfluazuron, Chloropicrin, Chlorpyrifos, Clothianidin, Cyantraniliprole (Cyazypyr), Cyfluthrin, Cyhalothrin, Cypermethrin, Cyromazine, Deltamethrin, Diafenthiuron, Diazinon, Dichloropropene, Dichlorfos, Dicofol, Diflubenzuron,

Dimethoate, Dinotefuran, Disulfoton, Eamectin-(benzoate), Endosulfan, Ethoprophos, Etofenprox, Etoxazole, Fenamiphos, Fenbutatin oxide, Fenitrothion, Fenobucarb, Fenoxycarb, Fenpropathrin, Fenpyroximate, Fenvalerate, Fipronil, Fluacrypyrim, Fluensulfone, Flufenoxuron, Flupyradifurone, Fosthiazate, Gamma-Cyhalothrin, Hexythiazox, Hexaflumuron, Imidaclopid, Imidaclothiz, Indoxacarb, Lambda-Cyhalothrin, Lepimectin, Lufenuron, Malathion, Metaldehyde, Methidathion, Methomyl, Milbemectin, Monocrotophos, Nitenpyram, Oxamyl, Permethrin, Pirimicarb, Profenofos, Propargite, Pymetrozine, Pyrafluprole, Pyrethrin, Pyridaben, Pyrifluquinazone, Pyrimethanil, Pyrimidifen, Pyriprole, Pyriproxyfen, Quinalphos, Resmethrin, Spinetoram, Spinosad, Spirodiclofen, Sulfoxaflo, Tau-Fluvalinate, Tebufenpyrad, Teflubenzuron, Tefluthrin, Thiaclopid, Thiamethoxam, Thiodicarb, Trichlorfon, Triflumuron; Zeta-Cypermethrin, 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-[[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl]-1H-pyrazole-5-carboxamide/ 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-[[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl]-1H-pyrazole-5-carboxamid, 2-{6-[2-(5-fluoropyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine, 2-{6-[2-(pyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine, (1E)-N-[(6-chloropyridin-3-yl)methyl]-N'-cyano-N-(2,2-difluoroethyl)ethanimidamide, Bacillus firmus I-1582, Bacillus subtilis GB03 and QST 713, Bacillus amyloliquefaciens FZB24 and FZB 42, Bacillus thuringiensis subspecies aizawai, kurstaki, tenebrionis and israelensis, Metarhizium anisopliae F52, Metschnikowia fructicola, Paecilomyces lilacinus strain 251, Paecilomyces fumosoroseus, Nomuraea rileyi, Cydia pomonella granulosus virus, Pyrethrum, Harpin-Protein and Thymol.

5. Combinations according to any of claims 1 to 4, wherein the further insecticide and / or acaricide and / or biological control agent from the group (II) is selected from

Abamectin, Acetamiprid, Acrinathrin, Alpha-Cypermethrin, Beta-Cyfluthrin, Bifenthrin, Buprofezin, Flupyradifurone, Chlorfenapyr, Chlorpyrifos, Clothianidin, Cyantraniliprole, Cyfluthrin, Cypermethrin, Deltamethrin, Diafenthiuron, Dinotefuran, Eamectin-(benzoate), Fenpyroximate, Fipronil, Fluensulfone, Gamma-Cyhalothrin, Imidaclopid, Indoxacarb, Lambda-Cyhalothrin, Milbemectin, Nitenpyram, Pyrifluquinazone, Pymetrozine, Chloranthraniliprole, Spinetoram, Spinosad, Spirodiclofen, Sulfoxaflo, Tebufenpyrad, Tefluthrin, Thiaclopid, Thiamethoxam, Thiodicarb, Triflumuron; 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-[[5-(trifluoromethyl)-1H-tetrazol-1-yl]methyl]-1H-pyrazole-5-carboxamide/ 1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-[[5-(trifluoromethyl)-2H-tetrazol-2-yl]methyl]-1H-pyrazole-5-carboxamide; 2-{6-[2-(5-fluoropyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine, 2-{6-[2-(pyridin-3-yl)-1,3-thiazol-5-yl]pyridin-2-yl}pyrimidine (1E)-N-[(6-chloropyridin-3-yl)methyl]-N'-cyano-N-(2,2-difluoroethyl)etha-

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nimidamide, *Bacillus firmus* I-1582, *Bacillus subtilis* GB03 and QST 713, *Bacillus amyloliquefaciens* FZB24 and FZB 42, *Bacillus thuringiensis* subspecies *aizawai*, *kurstaki*, *tenebrionis* and *israelensis*, *Metarhizium anisopliae* F52, *Paecilomyces lilacinus* strain 251, *Nomuraea rileyi*.

- 5    6.    Use of active ingredient combinations according to any of claims 1 to 5 comprising a compound of the formula (I) in combination with at least one biological control agent selected from bacteria, fungi or yeasts, protozoas, viruses, and entomopathogenic nematodes, optionally in the presence of inoculants, for reducing overall damage of plants and plant parts as well as losses in harvested fruits or vegetables caused by insects, nematodes and phytopathogens.
- 10   7.    The use according to claim 6, wherein the plant part is a seed or a plant emerging from the seed.
8.    The use according to claim 7, wherein the seed is from a conventional or a transgenic plant.
9.    The use according to claim 7 or 8 wherein the plant is a horticultural crop selected from carrots, pumpkin, squash, zucchini, potato, sweet corn, onions, ornamentals, medicinal herbs, culinary herbs, tomatoes, spinach, pepper, melon, lettuce, cucumber, celery, beets, cabbage, cauliflower, 15 broccoli, Brussels sprouts, turnip cabbage, kale, radish, rutabaga, turnip, asparagus, bean, pea, apples, raspberry, strawberry, banana, mango, grapes, peaches, pears, guava, pineapple, pomegranate, garlic, capsicum, chili, radish, star fruit, tapioca, walnuts, lemon, mandarin, mangold, mushroom, olive, orange, papaya, paprika, passion fruit, peanuts, pecan nuts, prune, pistachio nuts, persimmon, pamplemousse (grapefruit), eggplant, endive, cranberry, gooseberry, 20 hazel nuts, kiwifruit, almonds, amaranth, apricot, artichoke, avocado, blackberry, cashew nut, cherry, clementine, coconut, and cantaloupes.
10.   The use according to claim 7 or 8, wherein the plant is a broad acre crop selected from cotton, corn, soybean, cereals, canola, oil seed rape, sugar cane and rice.
11.   A method for reducing overall damage of plants and plant parts as well as losses in harvested 25 fruits or vegetables caused by insects and/or phytopathogens comprising the step of simultaneously or sequentially applying a compound of formula (I) as defined in any of claims 1 to 3 and at least one biological control agent selected from bacteria, fungi or yeasts, protozoas, viruses, and optionally at least an inoculant on the plant, plant parts, harvested fruits or vegetables.
- 30   12    An active ingredient combination as defined in any of claims 1 to 5 comprising extenders and /or surfactants.

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**Active ingredient combinations having insecticidal and acaricidal properties**

**A b s t r a c t**

The novel active ingredient combinations which comprise a compound of the formula (I) in combination with further active insecticidal ingredients or biological control agents are very suitable for control of animal pests such as insects and / or unwanted acarids and indirectly improve plant health. The compound of the formula (I) in combination with further active insecticidal ingredients or biological control agents can be used for reducing overall damage of plants and plant parts as well as losses in harvested fruits or vegetables caused by insects, nematodes and phytopathogens.

PATENT COOPERATION TREATY

PCT/EP2012/075255

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING SUBMISSION,  
OBTENTION OR TRANSMITTAL  
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

BIP PATENTS  
Bayer Intellectual Property GmbH  
Creative Campus Monheim  
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ALLEMAGNE

|                                                                      |                                                                             |
|----------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Date of mailing (day/month/year)<br>01 February 2013 (01.02.2013)    |                                                                             |
| Applicant's or agent's file reference<br>BCS11-3081WO                | IMPORTANT NOTIFICATION                                                      |
| International application No.<br>PCT/EP2012/075255                   | International filing date (day/month/year)<br>12 December 2012 (12.12.2012) |
| International publication date (day/month/year)<br>Not yet published | Priority date (day/month/year)<br>15 December 2011 (15.12.2011)             |
| Applicant<br>BAYER INTELLECTUAL PROPERTY GMBH                        |                                                                             |

The applicant is hereby notified of the date of receipt (or of obtaining by the International Bureau) of the priority document(s) relating to all earlier application(s) whose priority is claimed. Unless otherwise indicated by the letters "NR", in the right-hand column or by an asterisk appearing next to the date of receipt, **the priority document concerned was submitted or transmitted to or obtained by the International Bureau in compliance with Rule 17.1(a), (b) or (b-bis)**. This Form replaces any previously issued notification concerning submission, transmittal or obtaining of priority documents.

| Priority date                 | Priority application No. | Country or regional Office<br>or PCT receiving Office | Date of receipt<br>of priority document |
|-------------------------------|--------------------------|-------------------------------------------------------|-----------------------------------------|
| 15 December 2011 (15.12.2011) | 11193829.6               | EP                                                    | 31 January 2013 (31.01.2013)            |

The letters "NR" denote a priority document which, on the date of mailing of this Form, had not yet been received or obtained by the International Bureau in compliance with Rule 17.1(a), (b) or (b-bis). Where the applicant has failed to either submit, request to prepare and transmit, or to request the International Bureau to obtain the priority document within the applicable time limit under that Rule, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

An asterisk "\*" next to a date of receipt, denotes a priority document submitted or transmitted to or obtained by the International Bureau but not in compliance with Rule 17.1(a), (b) or (b-bis) (the priority document was received after the time limit prescribed in Rule 17.1(a); the request to prepare and transmit the priority document was submitted to the receiving Office after the applicable time limit under Rule 17.1(b) or the request to the International Bureau to obtain the priority document was made after the applicable time limit under Rule 17.1(b-bis)). Even though the priority document was not furnished in compliance with Rule 17.1(a), (b) or (b-bis), the International Bureau will nevertheless transmit a copy of the document to the designated Offices, for their consideration. In case such a copy is not accepted by the designated Office as the priority document, Rule 17.1(c) provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

|                                                                                               |                                                                                                          |
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| The International Bureau of WIPO<br>34, chemin des Colombettes<br>1211 Geneva 20, Switzerland | Authorized officer<br>Agnès Wittmann-Regis<br>e-mail pt06.pct@wipo.int<br>Telephone No. +41 22 338 74 06 |
| Facsimile No. +41 22 338 89 70                                                                |                                                                                                          |

## SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 800.176.089-2

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239

Industria y Comercio  
SUPERINTENDENCIA

## RECIBO DE CAJA

No. 14 - 0059887

Bogotá D.C., Junio 05 de 2014 - 13:59:56

RECIBIDO DE : POSSE HERRERA &amp; RUIZ S.A.

NI 830.022.196

## \*\*\* Soporte del Pago \*\*\*

| TIPO PAGO    | BANCO           | CUENTA    | No. PAGO  | FECHA PAGO | VR. PAGO   |
|--------------|-----------------|-----------|-----------|------------|------------|
| CONSIGNACION | BANCO DE BOGOTA | 062754387 | 589997251 | 05/06/2014 | 515.000.00 |

## \*\*\* Conceptos Pagados \*\*\*

| CANT. | RENTISTICO              | CONCEPTO                                   | Vr. UNIDITARIO | Vr. CONCEPTO |
|-------|-------------------------|--------------------------------------------|----------------|--------------|
| 1     | 50005-01-01 SOLICITUDES | 1 TRAMITES DE SOL. DE PATENTE DE INVENCIÓN | 515.000.00     | 515.000.00   |
|       |                         |                                            |                | \$515.000.00 |

SON: \*\*QUINIENTOSQUINCE MIL PESOS MONEDA CORRIENTE\*\*

Responsable: \_\_\_\_\_

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Recibo de Caja Aplicado al Expediente No. \_\_\_\_\_

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 14-121257- -00000-0000

Fecha: 2014-06-05 14:09:46  
Tra. 11 PATENTEIYII  
Act. 411 PRESENTACIONDep. 2020 DIR.NUEVASCR  
Eve: 378 FASENACIONALI  
Folios: 240

241

Sede Centro: Carrera 13 No. 27 - 00 Pisos 3,4,5 y 10 Bogotá, D.C.- Colombia

Web: www.sic.gov.co e-mail: info@sic.gov.co Conmutador: (571) 5870000 Fax: (571) 5870284 Línea: 018000-910165 Call Center: (571) 6513240

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## RECIBO DE CAJA

No. 14 - 0059888

Bogotá D.C., Junio 05 de 2014 - 14:01:33

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RE

## \*\*\* Soporte del Pago \*\*\*

| TIPO PAGO    | BANCO     | CUENTA | No. PAGO   | FECHA PAGO | VR PAGO   |
|--------------|-----------|--------|------------|------------|-----------|
| RECIBO DE CA | 999999999 | 47397  | 06/05/2014 |            | 31.000.00 |
| RECIBO DE CA | 999999999 | 52482  | 19/05/2014 |            | 31.000.00 |
| RECIBO DE CA | 999999999 | 53861  | 22/05/2014 |            | 31.000.00 |

## \*\*\* Conceptos Pagados \*\*\*

CANT. RENTISTICO

CONCEPTO

Vr.UNDITARIO

Vr.CONCEPTO

3 50005-01-01 SOLICITUDES

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SON: \*\*NOVENTA Y TRES MIL PESOS MONEDA CORRIENTE\*\*\*

Responsable:

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Recibo de Caja-Aplicado al Expediente No. \_\_\_\_\_

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 14-121257-00000-0000

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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 14-121257- -00000-0000

Fecha: 2014-06-05 14:09:46

Dep. 2020 DIR.NUEVASCR

Tra. 11 PATENTEIYII

Eve: 378 FASENACIONALI

Act. 411 PRESENTACION

Folios: 240

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PATENTE DE INVENCION ☐

MODELO DE ☐

Art.33 Decisión 486/00

|                                   |                                                                                      |
|-----------------------------------|--------------------------------------------------------------------------------------|
| <input type="checkbox"/>          | Indicación que se solicita una patente.                                              |
| <input type="checkbox"/>          | Datos de identificación del solicitante o de la persona que presenta la solicitud    |
| <input type="checkbox"/>          | Descripción de la invención                                                          |
| <input type="checkbox"/>          | Dibujos de ser estos pertinentes                                                     |
| <input type="checkbox"/>          | Comprobante de pago de las tasas establecidas (De ser el caso formato de descuento). |
| Completa <input type="checkbox"/> | Incompleta <input type="checkbox"/>                                                  |

PATENTE DE INVENCION PCT ☐

MODELO DE UTILIDAD PCT ☐

Art.33 Decisión 486/00, Circular Única

|                                   |                                                                                                                         |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/>          | Indicación que se solicita una PCT                                                                                      |
| <input type="checkbox"/>          | Copia de la solicitud en español, tal como fue presentada inicialmente (capítulo descriptivo, reivindicatorio, resumen) |
| <input type="checkbox"/>          | Dibujos de ser estos pertinentes                                                                                        |
| <input type="checkbox"/>          | Comprobante de pago de las tasas establecidas (de ser el caso formato de descuento)                                     |
| Completa <input type="checkbox"/> | Incompleta <input type="checkbox"/>                                                                                     |

DISEÑO INDUSTRIAL ☐

(Art. 119 Decisión 486/00)

|                                   |                                                                                                           |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/>          | Indicación que se solicita Diseño industrial                                                              |
| <input type="checkbox"/>          | Datos de identificación del solicitante o de la persona que presenta la solicitud                         |
| <input type="checkbox"/>          | Representación gráfica y fotográfica del Diseño industrial o muestra del material que incorpora el diseño |
| <input type="checkbox"/>          | Comprobante de pago de las tasas establecidas                                                             |
| Completa <input type="checkbox"/> | Incompleta <input type="checkbox"/>                                                                       |

ESQUEMA DE TRAZADO ☐

(Art. 92 Decisión 486/00)

|                                   |                                                                                   |
|-----------------------------------|-----------------------------------------------------------------------------------|
| <input type="checkbox"/>          | Indicación que se solicita un esquema de trazado                                  |
| <input type="checkbox"/>          | Datos de identificación del solicitante o de la persona que presenta la solicitud |
| <input type="checkbox"/>          | Representación gráfica de un esquema de trazado                                   |
| <input type="checkbox"/>          | Comprobante de pago de las tasas establecidas                                     |
| Completa <input type="checkbox"/> | Incompleta <input type="checkbox"/>                                               |