

CASTELLANOS & CO LTDA  
ABOGADOS  
Calle 94 A No. 7 A-09  
Bogotá, D.C. - COLOMBIA

A  
352

Señor

**Jefe de la División de Nuevas Creaciones**

Superintendencia de Industria y Comercio

Ministerio de Comercio, Desarrollo, Industria y Turismo

E. S. D.

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 07-033627- -00003-0000

Fecha: 2008-11-13 15:43:35 Dep: 2020 NULCRACIONE  
Tra: 11 PATENTELIYII Lve: 378 FASENACIONALI  
Act: 538 PETICION Folios: 2

Re.: Expediente No. **07.033.627**

Solicitud del examen de patentabilidad correspondiente a la Patente PCT Entrada en  
Fase Nacional, para: **NUEVOS INSECTICIDAS**

Solicitante: **SYNGENTA PARTICIPATIONS AG y SYNGENTA LIMITED**

### **SOLICITUD EXAMEN DE PATENTABILIDAD**

#### **(CAPITULO I)**

Yo, **MARGARITA CASTELLANOS ABONDANO**, mayor de edad, identificada y domiciliada como aparece al pié de mi firma, obrando en mi calidad de apoderada de la sociedad solicitante, atentamente me permito solicitar a Ud. que se realice el examen de patentabilidad de la invención arriba citada, para lo cual anexo el comprobante de pago correspondiente a la tasa establecida para dicha solicitud.

En consecuencia, atentamente solicito a Ud. se anexe este memorial junto con el comprobante de pago al expediente correspondiente a esta solicitud de Patente PCT Entrada en Fase Nacional, y se continúe con su tramitación.

Señor Jefe,

  
**Margarita Castellanos Abondano**

C.C. No. **39.779.654** de Usaquén

T.P.A. No. **70.819** del C. S. J.

Calle 94 A No. 7 A-09 - Bogotá, D.C.

Teléfono (PBX): 610 7420

Bogotá,



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14/13  
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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 806176089-2

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 07-033627- -00003-0000

RECIBO OFICIAL DE CAJA : 08 - 88,971  
FECHA : NOVIEMBRE 12 DE 2008

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Act. 538 PLICION Folios: 2

\*\*\*\* CONSIGNACION \*\*\*\*

| DEPOSITANTE        | TIPO PAGO    | BANCO           | CUENTA    | No. PAGO | FECHA PAGO | Vr. PAGO     |
|--------------------|--------------|-----------------|-----------|----------|------------|--------------|
| ALVARO CASTELLANOS | CONSIGNACION | BANCO DE BOGOTA | 062754367 | 14436225 | 12/11/2008 | 2,331,000.00 |

\*\*\*\* CONCEPTO \*\*\*\*

| CANT. | RENTISTICO  | CONCEPTO    | TOTAL CONCEPTO                       |
|-------|-------------|-------------|--------------------------------------|
| 1     | 50005-01-01 | SOLICITUDES | 85 EXAMEN DE PATENTABILIDAD DE INVEN |
|       |             |             | TOTAL : \$ 420,000.00                |

SON: CUATROCIENTOS VEINTE MIL PESOS

RESPONSABLE : \_\_\_\_\_

RECIBO DE CAJA APLICADO AL EXPEDIENTE No. \_\_\_\_\_

356

**DIVISIÓN DE NUEVAS CREACIONES**

RADICACIÓN EXPEDIENTE No. 07-33627

EL EXTRACTO DE LA PRESENTE SOLICITUD DE **PATENTE DE INVENCION**

FUE PUBLICADO EN LA GACETA DE PROPIEDAD INDUSTRIAL No **594** DE

FECHA **31 DE JULIO DE 2008** EL TÉRMINO HÁBIL SEÑALADO POR LA LEY

EXPIRA EL **28 DE OCTUBRE DE 2008**

NOTA: Dentro del plazo de los seis (6) meses siguientes a partir de la fecha de publicación en la gaceta de Propiedad Industrial, deberá solicitar y cancelar el examen de patentabilidad so pena de que la solicitud caiga en abandono, de acuerdo con lo establecido en el Artículo 44 de la Decisión 486/2000.

SE PRESENTARON OPOSICIONES POR PARTE DE TERCEROS.

SI \_\_\_\_\_

NO   X

357

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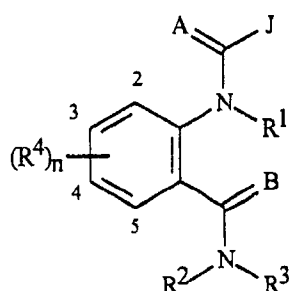
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- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **LAHM, George, P.** [US/US]; 148 Fairhill Drive, Wilmington, DE 19808 (US). **MYERS, Brian, J.** [US/US]; 102 East Ruddy Duck Circle, Oxford, PA 19363 (US). **SELBY, Thomas, P.** [US/US]; 116 Hunter Court, Wilmington, DE 19808 (US). **STEVENSON, Thomas, M.** [US/US]; 103 Iroquois Court, Newark, DE 19702 (US).
- (74) Agent: **BIRCH, Linda, D.**; E.I. Du Pont de Nemours and Company, Legal/Patent Records Center, 1007 Market Street, Wilmington, DE 19898 (US).
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WO 01/70671 A2

(54) Title: INSECTICIDAL ANTHRANILAMIDES



(1)

(57) Abstract: This invention provides compounds of Formula (1), their *N*-oxides and agriculturally suitable salts wherein A, B, J, R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup> and R<sup>4</sup> and n are as defined in the disclosure. Also disclosed are methods for controlling arthropods comprising contacting the arthropods or their environment with an arthropodically effective amount of a compound of Formula (1) and compositions containing the compounds of Formula (1).

TITLE

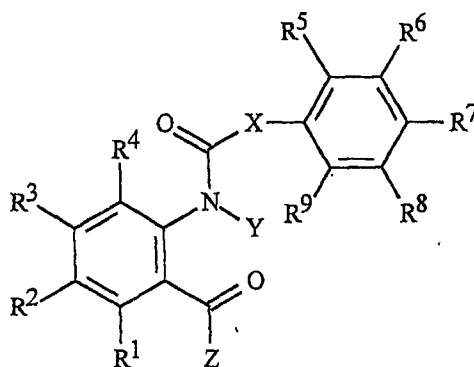
## INSECTICIDAL ANTHRANILAMIDES

BACKGROUND OF THE INVENTION

This invention relates to certain anthranilamides, their *N*-oxides, agriculturally suitable salts and compositions, and methods of their use as arthropodicides in both agronomic and nonagronomic environments.

The control of arthropod pests is extremely important in achieving high crop efficiency. Arthropod damage to growing and stored agronomic crops can cause significant reduction in productivity and thereby result in increased costs to the consumer. The control of arthropod pests in forestry, greenhouse crops, ornamentals, nursery crops, stored food and fiber products, livestock, household, and public and animal health is also important. Many products are commercially available for these purposes, but the need continues for new compounds that are more effective, less costly, less toxic, environmentally safer or have different modes of action.

NL 9202078 discloses *N*-acyl anthranilic acid derivatives of Formula i as insecticides



i

wherein, *inter alia*,

X is a direct bond;

Y is H or C<sub>1</sub>-C<sub>6</sub> alkyl;

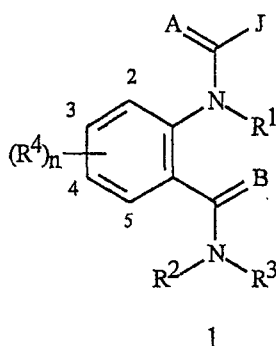
Z is NH<sub>2</sub>, NH(C<sub>1</sub>-C<sub>3</sub> alkyl) or N(C<sub>1</sub>-C<sub>3</sub> alkyl)<sub>2</sub>; and

R<sup>1</sup> through R<sup>9</sup> are independently H, halogen, C<sub>1</sub>-C<sub>6</sub> alkyl, phenyl, hydroxy, C<sub>1</sub>-C<sub>6</sub> alkoxy or C<sub>1</sub>-C<sub>7</sub> acyloxy.

SUMMARY OF THE INVENTION

This invention pertains to a method for controlling arthropods comprising contacting the arthropods or their environment with an arthropodically effective amount of a compound of Formula 1, its *N*-oxide or agriculturally suitable salts

25a



wherein

A and B are independently O or S;

each J is independently a phenyl or naphthyl group substituted with 1 to 2 R<sup>5</sup> and optionally substituted with 1 to 3 R<sup>6</sup>;

or each J is independently a 5- or 6-membered heteroaromatic ring or an aromatic 8-, 9- or 10-membered fused heterobicyclic ring system wherein each ring or ring system is optionally substituted with 1 to 4 R<sup>7</sup>;

n is 1 to 4;

R<sup>1</sup> is H; or C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl or C<sub>3</sub>-C<sub>6</sub> cycloalkyl each optionally substituted with one or more substituents selected from the group consisting of halogen, CN, NO<sub>2</sub>, hydroxy, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>2</sub>-C<sub>4</sub> alkoxy carbonyl, C<sub>1</sub>-C<sub>4</sub> alkylamino, C<sub>2</sub>-C<sub>8</sub> dialkylamino and C<sub>3</sub>-C<sub>6</sub> cycloalkylamino; or

R<sup>1</sup> is C<sub>2</sub>-C<sub>6</sub> alkylcarbonyl, C<sub>2</sub>-C<sub>6</sub> alkoxy carbonyl, C<sub>2</sub>-C<sub>6</sub> alkylaminocarbonyl, C<sub>3</sub>-C<sub>8</sub> dialkylaminocarbonyl or C(=A)J;

R<sup>2</sup> is H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> alkylamino, C<sub>2</sub>-C<sub>8</sub> dialkylamino, C<sub>3</sub>-C<sub>6</sub> cycloalkylamino, C<sub>2</sub>-C<sub>6</sub> alkoxy carbonyl or C<sub>2</sub>-C<sub>6</sub> alkylcarbonyl;

R<sup>3</sup> is H, G, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, each optionally substituted with one or more substituents selected from the group consisting of halogen, G, CN, NO<sub>2</sub>, hydroxy, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>2</sub>-C<sub>6</sub> alkoxy carbonyl, C<sub>2</sub>-C<sub>6</sub> alkylcarbonyl, C<sub>3</sub>-C<sub>6</sub> trialkylsilyl, or a phenyl, phenoxy or 5- or 6-membered heteroaromatic ring, each ring optionally substituted with one to three substituents independently selected from the group consisting of C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>2</sub>-C<sub>4</sub> alkenyl, C<sub>2</sub>-C<sub>4</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>4</sub> haloalkyl, C<sub>2</sub>-C<sub>4</sub> haloalkenyl, C<sub>2</sub>-C<sub>4</sub> haloalkynyl, C<sub>3</sub>-C<sub>6</sub> halocycloalkyl, halogen, CN, NO<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>1</sub>-C<sub>4</sub> alkylamino, C<sub>2</sub>-C<sub>8</sub> dialkylamino, C<sub>3</sub>-C<sub>6</sub> cycloalkylamino,

C<sub>3</sub>-C<sub>6</sub> (alkyl)cycloalkylamino, C<sub>2</sub>-C<sub>4</sub> alkylcarbonyl, C<sub>2</sub>-C<sub>6</sub> alkoxycarbonyl, C<sub>2</sub>-C<sub>6</sub> alkylaminocarbonyl, C<sub>3</sub>-C<sub>8</sub> dialkylaminocarbonyl or C<sub>3</sub>-C<sub>6</sub> trialkylsilyl; C<sub>1</sub>-C<sub>4</sub> alkoxy; C<sub>1</sub>-C<sub>4</sub> alkylamino; C<sub>2</sub>-C<sub>8</sub> dialkylamino; C<sub>3</sub>-C<sub>6</sub> cycloalkylamino; C<sub>2</sub>-C<sub>6</sub> alkoxycarbonyl or C<sub>2</sub>-C<sub>6</sub> alkylcarbonyl; or

5 R<sup>2</sup> and R<sup>3</sup> can be taken together with the nitrogen to which they are attached to form a ring containing 2 to 6 atoms of carbon and optionally one additional atom of nitrogen, sulfur or oxygen, said ring may be optionally substituted with 1 to 4 substituents selected from the group consisting of C<sub>1</sub>-C<sub>2</sub> alkyl, halogen, CN, NO<sub>2</sub> and C<sub>1</sub>-C<sub>2</sub> alkoxy;

10 G is a 5- or 6-membered nonaromatic carbocyclic or heterocyclic ring, optionally including one or two ring members selected from the group consisting of C(=O), SO or S(O)<sub>2</sub> and optionally substituted with 1 to 4 substituents selected from the group consisting of C<sub>1</sub>-C<sub>2</sub> alkyl, halogen, CN, NO<sub>2</sub> and C<sub>1</sub>-C<sub>2</sub> alkoxy;

15 each R<sup>4</sup> is independently H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>6</sub> haloalkyl, C<sub>2</sub>-C<sub>6</sub> haloalkenyl, C<sub>2</sub>-C<sub>6</sub> haloalkynyl, C<sub>3</sub>-C<sub>6</sub> halocycloalkyl, halogen, CN, NO<sub>2</sub>, hydroxy, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>1</sub>-C<sub>4</sub> haloalkylthio, C<sub>1</sub>-C<sub>4</sub> haloalkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> haloalkylsulfonyl, C<sub>1</sub>-C<sub>4</sub> alkylamino, C<sub>2</sub>-C<sub>8</sub> dialkylamino, C<sub>3</sub>-C<sub>6</sub> cycloalkylamino or C<sub>3</sub>-C<sub>6</sub> trialkylsilyl; or

20 each R<sup>4</sup> is independently phenyl, benzyl or phenoxy, each optionally substituted with C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>2</sub>-C<sub>4</sub> alkenyl, C<sub>2</sub>-C<sub>4</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>4</sub> haloalkyl, C<sub>2</sub>-C<sub>4</sub> haloalkenyl, C<sub>2</sub>-C<sub>4</sub> haloalkynyl, C<sub>3</sub>-C<sub>6</sub> halocycloalkyl, halogen, CN, NO<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>1</sub>-C<sub>4</sub> alkylamino, C<sub>2</sub>-C<sub>8</sub> dialkylamino, C<sub>3</sub>-C<sub>6</sub> cycloalkylamino, C<sub>3</sub>-C<sub>6</sub> (alkyl)cycloalkylamino, C<sub>2</sub>-C<sub>4</sub> alkylcarbonyl, C<sub>2</sub>-C<sub>6</sub> alkoxycarbonyl, C<sub>2</sub>-C<sub>6</sub> alkylaminocarbonyl, C<sub>3</sub>-C<sub>8</sub> dialkylaminocarbonyl or C<sub>3</sub>-C<sub>6</sub> trialkylsilyl;

25 each R<sup>5</sup> is independently C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>6</sub> haloalkyl, C<sub>2</sub>-C<sub>6</sub> haloalkenyl, C<sub>2</sub>-C<sub>6</sub> haloalkynyl, C<sub>3</sub>-C<sub>6</sub> halocycloalkyl, halogen, CN, CO<sub>2</sub>H, CONH<sub>2</sub>, NO<sub>2</sub>, hydroxy, C<sub>1</sub>-C<sub>6</sub> alkoxy, C<sub>1</sub>-C<sub>6</sub> haloalkoxy, C<sub>1</sub>-C<sub>6</sub> alkylthio, C<sub>1</sub>-C<sub>6</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>6</sub> alkylsulfonyl, C<sub>1</sub>-C<sub>6</sub> haloalkylthio, C<sub>1</sub>-C<sub>6</sub> haloalkylsulfinyl, C<sub>1</sub>-C<sub>6</sub> haloalkylsulfonyl, C<sub>1</sub>-C<sub>6</sub> alkylamino, C<sub>2</sub>-C<sub>12</sub> dialkylamino, or C<sub>3</sub>-C<sub>6</sub> cycloalkylamino, C<sub>2</sub>-C<sub>6</sub> alkylcarbonyl, C<sub>2</sub>-C<sub>6</sub> alkoxycarbonyl, C<sub>2</sub>-C<sub>6</sub> alkylaminocarbonyl, C<sub>3</sub>-C<sub>8</sub> dialkylaminocarbonyl, C<sub>3</sub>-C<sub>6</sub> trialkylsilyl; or

35 (R<sup>5</sup>)<sub>2</sub> when attached to adjacent carbon atoms can be taken together as -OCF<sub>2</sub>O-, -CF<sub>2</sub>CF<sub>2</sub>O-, or -OCF<sub>2</sub>CF<sub>2</sub>O-;

each R<sup>6</sup> is independently H, halogen, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>4</sub> alkoxy or C<sub>2</sub>-C<sub>4</sub> alkoxycarbonyl; or

each R<sup>6</sup> is independently a phenyl, benzyl, phenoxy, 5- or 6-membered

heteroaromatic ring or an aromatic 8-, 9- or 10-membered fused heterobicyclic

ring system, each ring optionally substituted with one to three substituents

independently selected from the group consisting of C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>2</sub>-C<sub>4</sub> alkenyl,

C<sub>2</sub>-C<sub>4</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>4</sub> haloalkyl, C<sub>2</sub>-C<sub>4</sub> haloalkenyl, C<sub>2</sub>-C<sub>4</sub>

haloalkynyl, C<sub>3</sub>-C<sub>6</sub> halocycloalkyl, halogen, CN, NO<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub>

haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>1</sub>-C<sub>4</sub>

alkylamino, C<sub>2</sub>-C<sub>8</sub> dialkylamino, C<sub>3</sub>-C<sub>6</sub> cycloalkylamino, C<sub>3</sub>-C<sub>6</sub>

(alkyl)cycloalkylamino, C<sub>2</sub>-C<sub>4</sub> alkylcarbonyl, C<sub>2</sub>-C<sub>6</sub> alkoxycarbonyl, C<sub>2</sub>-C<sub>6</sub>

alkylaminocarbonyl, C<sub>3</sub>-C<sub>8</sub> dialkylaminocarbonyl or C<sub>3</sub>-C<sub>6</sub> trialkylsilyl;

each R<sup>7</sup> is independently H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub>

cycloalkyl, C<sub>1</sub>-C<sub>6</sub> haloalkyl, C<sub>2</sub>-C<sub>6</sub> haloalkenyl, C<sub>2</sub>-C<sub>6</sub> haloalkynyl, C<sub>3</sub>-C<sub>6</sub>

halocycloalkyl, halogen, CN, CO<sub>2</sub>H, CONH<sub>2</sub>, NO<sub>2</sub>, hydroxy, C<sub>1</sub>-C<sub>4</sub> alkoxy,

C<sub>1</sub>-C<sub>4</sub> haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl,

C<sub>1</sub>-C<sub>4</sub> haloalkylthio, C<sub>1</sub>-C<sub>4</sub> haloalkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> haloalkylsulfonyl, C<sub>1</sub>-C<sub>4</sub>

alkylamino, C<sub>2</sub>-C<sub>8</sub> dialkylamino, C<sub>3</sub>-C<sub>6</sub> cycloalkylamino, C<sub>2</sub>-C<sub>6</sub> alkylcarbonyl,

C<sub>2</sub>-C<sub>6</sub> alkoxycarbonyl, C<sub>2</sub>-C<sub>6</sub> alkylaminocarbonyl, C<sub>3</sub>-C<sub>8</sub> dialkylaminocarbonyl,

C<sub>3</sub>-C<sub>6</sub> trialkylsilyl; or

each R<sup>7</sup> is independently a phenyl, benzyl, benzoyl, phenoxy, 5- or 6-membered

heteroaromatic ring or an aromatic 8-, 9- or 10-membered fused heterobicyclic

ring system, each ring optionally substituted with one to three substituents

independently selected from the group consisting of C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>2</sub>-C<sub>4</sub> alkenyl,

C<sub>2</sub>-C<sub>4</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>4</sub> haloalkyl, C<sub>2</sub>-C<sub>4</sub> haloalkenyl, C<sub>2</sub>-C<sub>4</sub>

haloalkynyl, C<sub>3</sub>-C<sub>6</sub> halocycloalkyl, halogen, CN, NO<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub>

haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>1</sub>-C<sub>4</sub>

alkylamino, C<sub>2</sub>-C<sub>8</sub> dialkylamino, C<sub>3</sub>-C<sub>6</sub> cycloalkylamino, C<sub>3</sub>-C<sub>6</sub>

(alkyl)cycloalkylamino, C<sub>2</sub>-C<sub>4</sub> alkylcarbonyl, C<sub>2</sub>-C<sub>6</sub> alkoxycarbonyl, C<sub>2</sub>-C<sub>6</sub>

alkylaminocarbonyl, C<sub>3</sub>-C<sub>8</sub> dialkylaminocarbonyl or C<sub>3</sub>-C<sub>6</sub> trialkylsilyl;

provided that

(1) when A and B are both O, R<sup>2</sup> is H or C<sub>1</sub>-C<sub>3</sub> alkyl, R<sup>3</sup> is H or C<sub>1</sub>-C<sub>3</sub> alkyl and R<sup>4</sup>

is H, halogen, C<sub>1</sub>-C<sub>6</sub> alkyl, phenyl, hydroxy or C<sub>1</sub>-C<sub>6</sub> alkoxy, then one R<sup>5</sup> is

other than halogen, C<sub>1</sub>-C<sub>6</sub> alkyl, hydroxy or C<sub>1</sub>-C<sub>6</sub> alkoxy; or

(2) J is other than an optionally substituted 1,2,3-thiadiazole.

This invention also pertains to compounds of Formula 1, their *N*-oxides and agriculturally suitable salts

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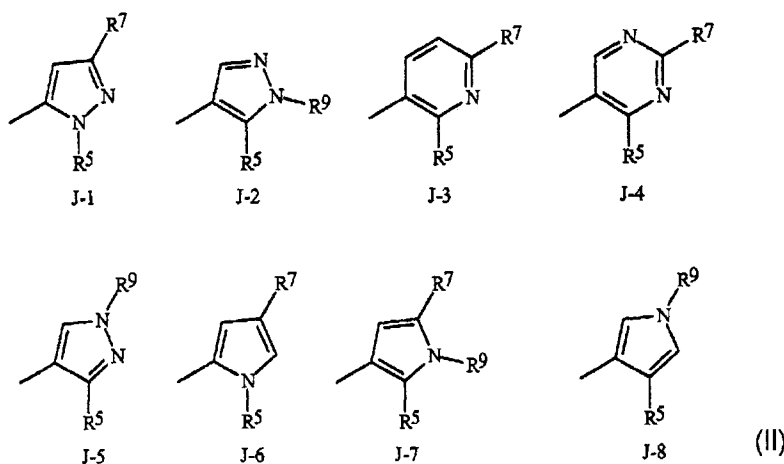
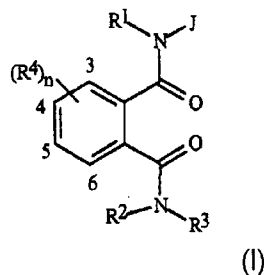
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- (74) Agent: BIRCH, Linda, D.; E. I. DU PONT DE NEMOURS AND COMPANY, Legal Patent Records Center, 1007 Market Street, Wilmington, DE 19898 (US).
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[Continued on next page]

(54) Title: SUBSTITUTED HETEROCYCLIC PHTHALIC ACID DIAMIDE ARTHROPODICIDES



(57) Abstract: Compounds of (I), and their N-oxides and agriculturally suitable salts, are disclosed which are useful for controlling invertebrate pests (Formula) wherein J is selected from the group consisting of J-1, J-2, J-3, J-4, J-5, J-6, J-7 and J-8 (I) and R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>7</sub>, R<sub>9</sub> and n are as defined in the disclosure. Also disclosed are compositions for controlling an invertebrate pest comprising a biologically effective amount of a compound of (I) and methods for controlling an invertebrate pest comprising contacting the invertebrate pest or its environment with a biologically effective amount of a compound of (I) (e.g., as a composition described herein).

## SUBSTITUTED HETEROCYCLIC PHTHALIC ACID DIAMIDE ARTHROPODICIDES

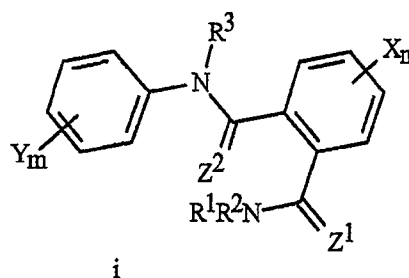
BACKGROUND OF THE INVENTION

This invention relates to certain heterocyclic phthalic acid diamides, their *N*-oxides, agriculturally suitable salts and compositions, and methods of their use as arthropodocides in both agronomic and nonagronomic environments.

The control of invetebate pests is extremely important in achieving high crop efficiency. Damage by invertebrate pests to growing and stored agronomic crops can cause significant reduction in productivity and thereby result in increased costs to the consumer.

The control of invertebrate pests in forestry, greenhouse crops, ornamentals, nursery crops, stored food and fiber products, livestock, household, and public and animal health is also important. Many products are commercially available for these purposes, but the need continues for new compounds that are more effective, less costly, less toxic, environmentally safer or have different modes of action.

EP919542 discloses phthalic acid diamides of Formula i as insecticides

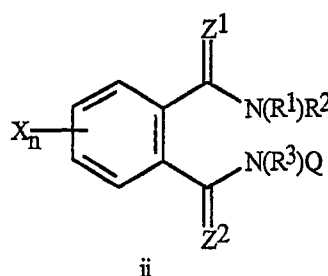


wherein, inter alia,

$Z^1$  and  $Z^2$  are O or S; and

$R^1$ ,  $R^2$  and  $R^3$  are, among others, H, alkyl or substituted alkyl.

WO01/02354 discloses phthalic acid diamides of Formula ii as insecticides



wherein, inter alia,

Q is an optionally substituted heterocycle containing O, S or N;

$Z^1$  and  $Z^2$  are O or S; and

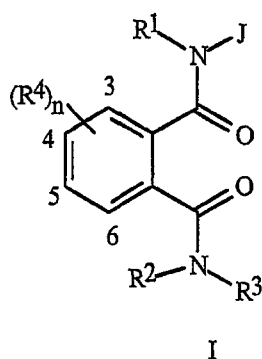
$R^1$ ,  $R^2$  and  $R^3$  are, among others, H, alkyl or substituted alkyl.

36h

CLAIMS

What is claimed is:

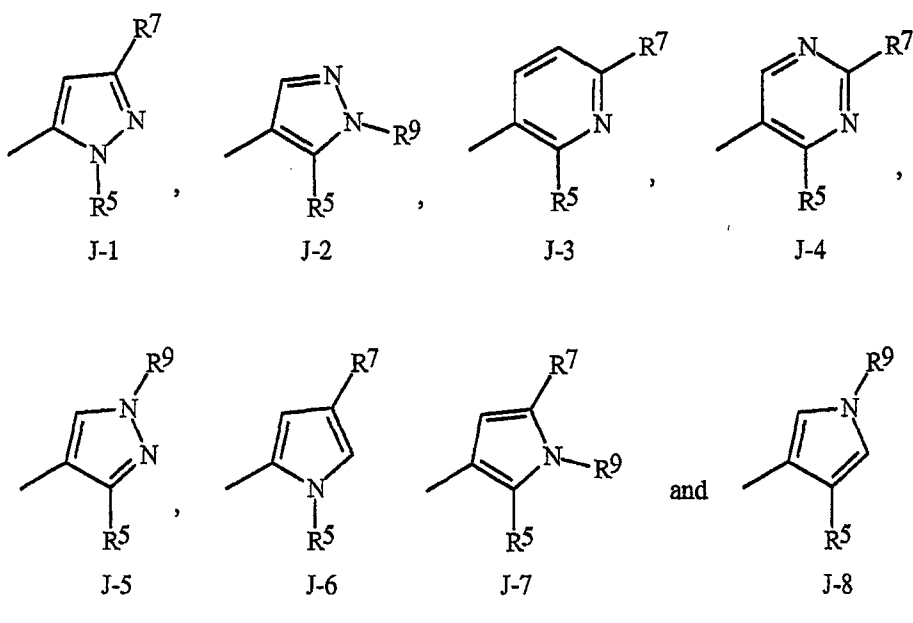
1. A compound of Formula I and *N*-oxides and agriculturally suitable salts thereof



5

wherein

J is selected from the group consisting of J-1, J-2, J-3, J-4, J-5, J-6, J-7 and J-8



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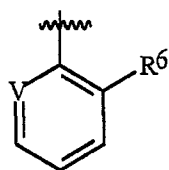
R<sup>1</sup> is H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkoxy carbonyl or C<sub>2</sub>-C<sub>6</sub> alkyl carbonyl;

R<sup>2</sup> is H or C<sub>1</sub>-C<sub>6</sub> alkyl;

R<sup>3</sup> is H; C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, or C<sub>4</sub>-C<sub>8</sub> cycloalkylalkyl, each optionally substituted with one or more substituents selected from the group consisting of halogen, CN, NO<sub>2</sub>, hydroxy, C<sub>1</sub>-C<sub>4</sub> alkyl,

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C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>2</sub>-C<sub>6</sub> alkoxycarbonyl or C<sub>2</sub>-C<sub>6</sub> alkylcarbonyl;  
 one R<sup>4</sup> group is attached to the phenyl ring at the 3-position or 6-position, and said R<sup>4</sup>  
 is C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>1</sub>-C<sub>4</sub> haloalkyl, halogen, CN, NO<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub>  
 haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>1</sub>-C<sub>4</sub>  
 haloalkylthio, C<sub>1</sub>-C<sub>4</sub> haloalkylsulfinyl, or C<sub>1</sub>-C<sub>4</sub> haloalkylsulfonyl; and  
 an optional second R<sup>4</sup> is H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub>  
 cycloalkyl, C<sub>1</sub>-C<sub>6</sub> haloalkyl, C<sub>2</sub>-C<sub>6</sub> haloalkenyl, C<sub>2</sub>-C<sub>6</sub> haloalkynyl, C<sub>3</sub>-C<sub>6</sub>  
 halocycloalkyl, halogen, CN, NO<sub>2</sub>, hydroxy, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy,  
 C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>1</sub>-C<sub>4</sub> haloalkylthio,  
 C<sub>1</sub>-C<sub>4</sub> haloalkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> haloalkylsulfonyl, C<sub>1</sub>-C<sub>4</sub> alkylamino, C<sub>2</sub>-C<sub>8</sub>  
 dialkylamino, C<sub>3</sub>-C<sub>6</sub> cycloalkylamino, C<sub>1</sub>-C<sub>4</sub> alkoxyalkyl, C<sub>1</sub>-C<sub>4</sub> hydroxyalkyl,  
 C(O)R<sup>10</sup>, CO<sub>2</sub>R<sup>10</sup>, C(O)NR<sup>10</sup>R<sup>11</sup>, NR<sup>10</sup>R<sup>11</sup>, N(R<sup>11</sup>)COR<sup>10</sup>, N(R<sup>11</sup>)CO<sub>2</sub>R<sup>10</sup> or  
 C<sub>3</sub>-C<sub>6</sub> trialkylsilyl;  
 R<sup>5</sup> is H, C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>1</sub>-C<sub>4</sub> haloalkyl, or



;

V is N, CH, CF, CCl, CBr or Cl;

each R<sup>6</sup> and R<sup>7</sup> is independently H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>6</sub> haloalkyl,  
 halogen, CN, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy or C<sub>1</sub>-C<sub>4</sub> haloalkylthio;

R<sup>9</sup> is H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>1</sub>-C<sub>6</sub> haloalkyl, C<sub>3</sub>-C<sub>6</sub> alkenyl, C<sub>3</sub>-C<sub>6</sub> haloalkenyl, C<sub>3</sub>-C<sub>6</sub>  
 alkynyl or C<sub>3</sub>-C<sub>6</sub> haloalkynyl; provided R<sup>7</sup> and R<sup>9</sup> are not both H;

R<sup>10</sup> is H or C<sub>1</sub>-C<sub>4</sub> alkyl or C<sub>1</sub>-C<sub>4</sub> haloalkyl;

R<sup>11</sup> is H or C<sub>1</sub>-C<sub>4</sub> alkyl; and

n is 1 or 2.

2. The compound of Claim 1 wherein V is N.

3. The compound of Claim 1 wherein V is CH, CF, CCl or CBr.

4. The compound of Claim 2 or Claim 3 wherein

R<sup>1</sup> and R<sup>2</sup> are both H;

R<sup>3</sup> is C<sub>1</sub>-C<sub>4</sub> alkyl optionally substituted with halogen, CN, OCH<sub>3</sub>, S(O)<sub>p</sub>CH<sub>3</sub>;

one R<sup>4</sup> group is attached to the phenyl ring at the 3-position and said R<sup>4</sup> is CH<sub>3</sub>, CF<sub>3</sub>,

OCF<sub>3</sub>, OCHF<sub>2</sub>, S(O)<sub>p</sub>CF<sub>3</sub>, S(O)<sub>p</sub>CHF<sub>2</sub>, CN or halogen;

a second R<sup>4</sup> is H, F, Cl, Br, I or CF<sub>3</sub>;

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(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

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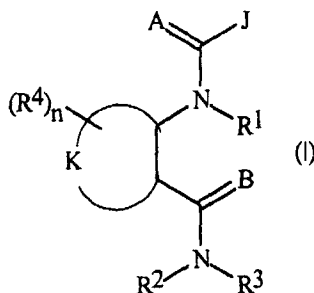
(74) Agent: **BIRCH, Linda, D.**; E. I. Du Pont de Nemours and Company, Legal Patent Records Center, 4417 Lancaster Pike, Wilmington, DE 19805 (US).

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: HETEROCYCLIC DIAMIDE INVERTEBRATE PEST CONTROL AGENTS



(57) Abstract: This invention provides compounds of Formula (I), *N*-oxides and suitable salts thereof, wherein A and B are independently O or S; each J is independently a phenyl ring, a naphthyl ring system, a 5- or 6-membered heteroaromatic ring or an aromatic 8-, 9- or 10-membered fused heterobicyclic ring system wherein each ring or ring system is optionally substituted with 1 to 4 R<sup>5</sup>; K is, together with the two contiguous linking carbon atoms, a 5- or 6-membered heteroaromatic ring optionally substituted with 1 to 3 R<sup>4</sup>; and R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup> and n are as defined in the disclosure. Also disclosed are methods for controlling an invertebrate pest comprising contacting the invertebrate pest or its environment with a biologically effective amount of a compound of Formula (I), an *N*-oxide thereof or a suitable salt of the compound (e.g., as a composition described herein). This invention also pertains to a composition for controlling an invertebrate pest comprising a biologically effective amount

of a compound of Formula (I), an *N*-oxide thereof or a suitable salt of the compound and at least one additional component selected from the group consisting of surfactants, solid diluents and liquid diluents.

WO 02/070483 A1

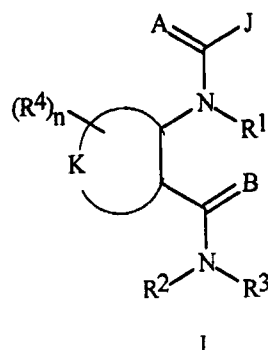
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CLAIMS

What is claimed is:

1. A compound of Formula I, an *N*-oxide thereof or suitable salt thereof



5 wherein

A and B are independently O or S;

each J is independently a phenyl ring, a naphthyl ring system, a 5- or 6-membered heteroaromatic ring or an aromatic 8-, 9- or 10-membered fused heterobicyclic ring system wherein each ring or ring system is optionally substituted with 1 to 4 R<sup>5</sup>;

K is, together with the two contiguous linking carbon atoms, a 5- or 6-membered heteroaromatic ring optionally substituted with 1 to 3 R<sup>4</sup>;

n is 1 to 3;

R<sup>1</sup> is H; or C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl or C<sub>3</sub>-C<sub>6</sub> cycloalkyl each optionally substituted with one or more substituents selected from the group consisting of halogen, CN, NO<sub>2</sub>, hydroxy, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>2</sub>-C<sub>4</sub> alkoxycarbonyl, C<sub>1</sub>-C<sub>4</sub> alkylamino, C<sub>2</sub>-C<sub>8</sub> dialkylamino and C<sub>3</sub>-C<sub>6</sub> cycloalkylamino; or

R<sup>1</sup> is C<sub>2</sub>-C<sub>6</sub> alkylcarbonyl, C<sub>2</sub>-C<sub>6</sub> alkoxycarbonyl, C<sub>2</sub>-C<sub>6</sub> alkylaminocarbonyl, C<sub>3</sub>-C<sub>8</sub> dialkylaminocarbonyl or C(=A)J;

R<sup>2</sup> is H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> alkylamino, C<sub>2</sub>-C<sub>8</sub> dialkylamino, C<sub>3</sub>-C<sub>6</sub> cycloalkylamino, C<sub>2</sub>-C<sub>6</sub> alkoxycarbonyl or C<sub>2</sub>-C<sub>6</sub> alkylcarbonyl;

R<sup>3</sup> is H; G; or C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, each optionally substituted with one or more substituents selected from the group consisting of G, halogen, CN, NO<sub>2</sub>, hydroxy, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>2</sub>-C<sub>6</sub> alkoxycarbonyl, C<sub>2</sub>-C<sub>6</sub> alkylcarbonyl, C<sub>3</sub>-C<sub>6</sub> trialkylsilyl, or a phenyl, phenoxy or 5- or 6-membered heteroaromatic ring, each ring optionally substituted with one to three substituents independently selected from R<sup>6</sup>; or

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alkylcarbonyl, C<sub>2</sub>-C<sub>6</sub> alkoxy carbonyl, C<sub>2</sub>-C<sub>6</sub> alkylaminocarbonyl, C<sub>3</sub>-C<sub>8</sub> dialkylaminocarbonyl or C<sub>3</sub>-C<sub>6</sub> trialkylsilyl;

each R<sup>10</sup> is independently H, C<sub>1</sub>-C<sub>4</sub> alkyl or C<sub>1</sub>-C<sub>4</sub> haloalkyl;

each R<sup>11</sup> is independently H or C<sub>1</sub>-C<sub>4</sub> alkyl; and

5 each R<sup>12</sup> is independently C<sub>1</sub>-C<sub>2</sub> alkyl, halogen, CN, NO<sub>2</sub> or C<sub>1</sub>-C<sub>2</sub> alkoxy.

2. The compound of Claim 1 wherein A and B are both O and J is a phenyl ring optionally substituted with 1 to 4 R<sup>5</sup>.

3. The compound of Claim 2 wherein

10 each R<sup>4</sup> is independently C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>1</sub>-C<sub>4</sub> haloalkyl, halogen, CN, NO<sub>2</sub> or C<sub>1</sub>-C<sub>4</sub> alkoxy, and one R<sup>4</sup> group is attached to the K ring at the atom adjacent to either the NR<sup>1</sup>C(=A)J moiety or the C(=B)NR<sup>2</sup>R<sup>3</sup> moiety; and

15 each R<sup>5</sup> is independently H, halogen, C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>1</sub>-C<sub>2</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkyl, CN, NO<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub> haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>1</sub>-C<sub>4</sub> haloalkylthio, C<sub>1</sub>-C<sub>4</sub> haloalkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> haloalkylsulfonyl or C<sub>2</sub>-C<sub>4</sub> alkoxy carbonyl; or

each R<sup>5</sup> is independently a phenyl or a 5- or 6-membered heteroaromatic ring, each ring optionally substituted with one to three substituents independently selected from R<sup>6</sup>; or

20 (R<sup>5</sup>)<sub>2</sub> when attached to adjacent carbon atoms can be taken together as -OCF<sub>2</sub>O-, -CF<sub>2</sub>CF<sub>2</sub>O- or -OCF<sub>2</sub>CF<sub>2</sub>O-.

4. The compound of Claim 3 wherein

R<sup>1</sup> is H;

R<sup>2</sup> is H or CH<sub>3</sub>;

25 R<sup>3</sup> is C<sub>1</sub>-C<sub>4</sub> alkyl optionally substituted with one or more substituents independently selected from halogen, CN, OCH<sub>3</sub> or S(O)<sub>p</sub>CH<sub>3</sub>;

each R<sup>4</sup> is independently CH<sub>3</sub>, CF<sub>3</sub>, CN or halogen, and one R<sup>4</sup> group is attached to the K ring at the atom adjacent to the NR<sup>1</sup>C(=A)J moiety;

30 each R<sup>5</sup> is independently H, halogen, methyl, CF<sub>3</sub>, OCF<sub>3</sub>, OCHF<sub>2</sub>, S(O)<sub>p</sub>CF<sub>3</sub>, S(O)<sub>p</sub>CHF<sub>2</sub>, OCH<sub>2</sub>CF<sub>3</sub>, OCF<sub>2</sub>CHF<sub>2</sub>, S(O)<sub>p</sub>CH<sub>2</sub>CF<sub>3</sub> or S(O)<sub>p</sub>CF<sub>2</sub>CHF<sub>2</sub>; or a phenyl, pyrazole, imidazole, triazole, pyridine or pyrimidine ring, each ring optionally substituted with one to three substituents independently selected from C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>1</sub>-C<sub>4</sub> haloalkyl, halogen or CN; and

p is 0, 1 or 2.

5. The compound of Claim 4 wherein R<sup>3</sup> is C<sub>1</sub>-C<sub>4</sub> alkyl.

35 6. The compound of Claim 1 wherein

A and B are both O;

J is a 5- or 6-membered heteroaromatic ring selected from the group consisting of J-1, J-2, J-3, J-4 and J-5, each J optionally substituted with 1 to 3 R<sup>5</sup>

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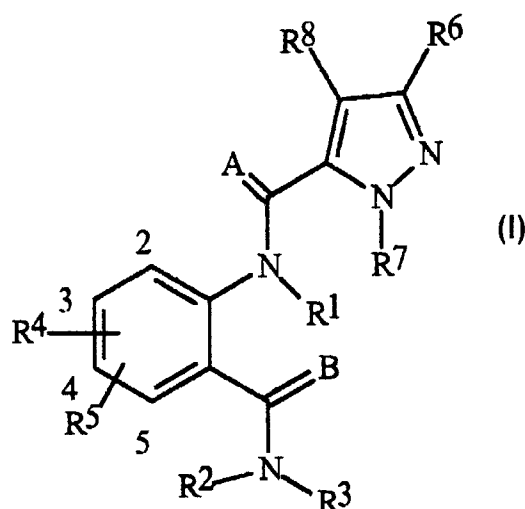
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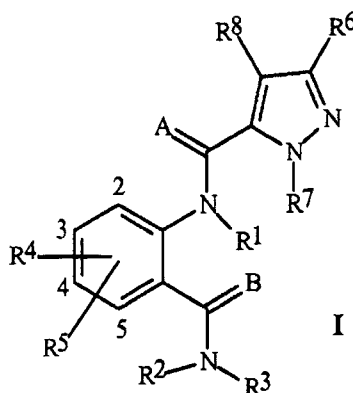


(57) Abstract: This invention pertains to methods for protecting a propagule or a plant grown therefrom from invertebrate pests comprising contacting the propagule or the locus of the propagule with a biologically effective amount of a compound of Formula I: its N-oxide or an agriculturally suitable salt thereof wherein A and B and R<sup>1</sup> through R<sup>8</sup> are as defined in the disclosure. This invention also relates to propagules treated with a compound of Formula I and compositions comprising a Formula I compound for coating propagules.

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SUMMARY OF THE INVENTION

This invention involves compounds of Formula I, their *N*-oxides and their agriculturally suitable salts



5 wherein

A and B are independently O or S;

R<sup>1</sup> is H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkoxy, carbonyl or C<sub>2</sub>-C<sub>6</sub> alkylcarbonyl;

R<sup>2</sup> is H or C<sub>1</sub>-C<sub>6</sub> alkyl;

10 R<sup>3</sup> is H; C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl, or C<sub>3</sub>-C<sub>6</sub> cycloalkyl, each optionally substituted with one or more substituents selected from the group consisting of halogen, CN, NO<sub>2</sub>, hydroxy, C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>2</sub>-C<sub>6</sub> alkoxy, carbonyl, C<sub>2</sub>-C<sub>6</sub> alkylcarbonyl, C<sub>3</sub>-C<sub>6</sub> trialkylsilyl, phenyl, phenoxy, 5-membered heteroaromatic rings, and 6-membered heteroaromatic rings;

15 each phenyl, phenoxy, 5-membered heteroaromatic ring, and 6-membered heteroaromatic ring optionally substituted with one to three substituents independently selected from the group consisting of C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>2</sub>-C<sub>4</sub> alkenyl, C<sub>2</sub>-C<sub>4</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>4</sub> haloalkyl, C<sub>2</sub>-C<sub>4</sub> haloalkenyl, C<sub>2</sub>-C<sub>4</sub> haloalkynyl, C<sub>3</sub>-C<sub>6</sub> halocycloalkyl, halogen, CN, NO<sub>2</sub>,

20 C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>1</sub>-C<sub>4</sub> alkylamino, C<sub>2</sub>-C<sub>8</sub> dialkylamino, C<sub>3</sub>-C<sub>6</sub> cycloalkylamino, C<sub>4</sub>-C<sub>8</sub> (alkyl)(cycloalkyl)amino, C<sub>2</sub>-C<sub>4</sub> alkylcarbonyl, C<sub>2</sub>-C<sub>6</sub> alkoxy, carbonyl, C<sub>2</sub>-C<sub>6</sub> alkylaminocarbonyl, C<sub>3</sub>-C<sub>8</sub> dialkylaminocarbonyl and C<sub>3</sub>-C<sub>6</sub> trialkylsilyl; C<sub>1</sub>-C<sub>4</sub> alkoxy; C<sub>1</sub>-C<sub>4</sub> alkylamino; C<sub>2</sub>-C<sub>8</sub> dialkylamino; C<sub>3</sub>-C<sub>6</sub> cycloalkylamino; C<sub>2</sub>-C<sub>6</sub> alkoxy, carbonyl or C<sub>2</sub>-C<sub>6</sub> alkylcarbonyl;

25

R<sup>4</sup> is H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>6</sub> haloalkyl, CN, halogen, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy or NO<sub>2</sub>;

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R<sup>2</sup> and R<sup>3</sup> can be taken together with the nitrogen to which they are attached to form a ring containing 2 to 6 atoms of carbon and optionally one additional atom of nitrogen, sulfur or oxygen, and said ring may be optionally substituted with one to four substituents selected from R<sup>12</sup>; and

5 G is a 5- or 6-membered nonaromatic carbocyclic or heterocyclic ring, optionally including one or two ring members selected from the group consisting of C(=O), SO or S(O)<sub>2</sub> and optionally substituted with one to four substituents selected from R<sup>12</sup>;

10 each R<sup>4</sup> is independently H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>6</sub> haloalkyl, C<sub>2</sub>-C<sub>6</sub> haloalkenyl, C<sub>2</sub>-C<sub>6</sub> haloalkynyl, C<sub>3</sub>-C<sub>6</sub> halocycloalkyl, halogen, CN, NO<sub>2</sub>, hydroxy, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>1</sub>-C<sub>4</sub> haloalkylthio, C<sub>1</sub>-C<sub>4</sub> haloalkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> haloalkylsulfonyl, C<sub>1</sub>-C<sub>4</sub> alkylamino, C<sub>2</sub>-C<sub>8</sub> dialkylamino, C<sub>3</sub>-C<sub>6</sub> cycloalkylamino, C<sub>1</sub>-C<sub>4</sub> alkoxyalkyl, C<sub>1</sub>-C<sub>4</sub> hydroxyalkyl, 15 C(O)R<sup>10</sup>, CO<sub>2</sub>R<sup>10</sup>, C(O)NR<sup>10</sup>R<sup>11</sup>, NR<sup>10</sup>R<sup>11</sup>, N(R<sup>11</sup>)CO<sub>2</sub>R<sup>10</sup>; or

each R<sup>4</sup> is independently a phenyl, benzyl, phenoxy or 5- or 6-membered heteroaromatic ring, each ring optionally substituted with one to three substituents independently selected from R<sup>6</sup>;

20 each R<sup>5</sup> is independently H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>6</sub> haloalkyl, C<sub>2</sub>-C<sub>6</sub> haloalkenyl, C<sub>2</sub>-C<sub>6</sub> haloalkynyl, C<sub>3</sub>-C<sub>6</sub> halocycloalkyl, halogen, CN, CO<sub>2</sub>H, CONH<sub>2</sub>, NO<sub>2</sub>, hydroxy, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>1</sub>-C<sub>4</sub> haloalkylthio, C<sub>1</sub>-C<sub>4</sub> haloalkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> haloalkylsulfonyl, C<sub>1</sub>-C<sub>4</sub> alkylamino, C<sub>2</sub>-C<sub>8</sub> dialkylamino, C<sub>3</sub>-C<sub>6</sub> cycloalkylamino, C<sub>2</sub>-C<sub>6</sub> alkylcarbonyl, 25 C<sub>2</sub>-C<sub>6</sub> alkoxy carbonyl, C<sub>2</sub>-C<sub>6</sub> alkylaminocarbonyl, C<sub>3</sub>-C<sub>8</sub> dialkylaminocarbonyl, C<sub>3</sub>-C<sub>6</sub> trialkylsilyl; or

each R<sup>5</sup> is independently a phenyl, benzyl, benzoyl, phenoxy, 5- or 6-membered heteroaromatic ring or an aromatic 8-, 9- or 10-membered fused heterobicyclic ring system, each ring or ring system optionally substituted with one to three substituents independently selected from R<sup>6</sup>; or

30 (R<sup>5</sup>)<sub>2</sub> when attached to adjacent carbon atoms can be taken together as -OCF<sub>2</sub>O-, -CF<sub>2</sub>CF<sub>2</sub>O-, or -OCF<sub>2</sub>CF<sub>2</sub>O-; and

each R<sup>6</sup> is independently C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>2</sub>-C<sub>4</sub> alkenyl, C<sub>2</sub>-C<sub>4</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>4</sub> haloalkyl, C<sub>2</sub>-C<sub>4</sub> haloalkenyl, C<sub>2</sub>-C<sub>4</sub> haloalkynyl, C<sub>3</sub>-C<sub>6</sub> halocycloalkyl, halogen, CN, NO<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>1</sub>-C<sub>4</sub> alkylamino, C<sub>2</sub>-C<sub>8</sub> dialkylamino, C<sub>3</sub>-C<sub>6</sub> cycloalkylamino, C<sub>3</sub>-C<sub>6</sub> (alkyl)cycloalkylamino, C<sub>2</sub>-C<sub>4</sub> 35

$R^5$  is H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>1</sub>-C<sub>6</sub> haloalkyl, C<sub>1</sub>-C<sub>4</sub> alkoxyalkyl, C<sub>1</sub>-C<sub>4</sub> hydroxyalkyl, C(O)R<sup>10</sup>, CO<sub>2</sub>R<sup>10</sup>, C(O)NR<sup>10</sup>R<sup>11</sup>, halogen, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy, NR<sup>10</sup>R<sup>11</sup>, N(R<sup>11</sup>)C(O)R<sup>10</sup>, N(R<sup>11</sup>)CO<sub>2</sub>R<sup>10</sup> or S(O)<sub>n</sub>R<sup>12</sup>;

$R^6$  is H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>1</sub>-C<sub>6</sub> haloalkyl, halogen, CN, C<sub>1</sub>-C<sub>4</sub> alkoxy or C<sub>1</sub>-C<sub>4</sub> haloalkoxy;

$R^7$  is C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>6</sub> haloalkyl, C<sub>2</sub>-C<sub>6</sub> haloalkenyl, C<sub>2</sub>-C<sub>6</sub> haloalkynyl or C<sub>3</sub>-C<sub>6</sub> halocycloalkyl; or

$R^7$  is a phenyl ring, a benzyl ring, a 5- or 6-membered heteroaromatic ring, a naphthyl ring system or an aromatic 8-, 9- or 10-membered fused heterobicyclic ring system, each ring or ring system optionally substituted with one to three substituents independently selected from R<sup>9</sup>;

$R^8$  is H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>1</sub>-C<sub>6</sub> haloalkyl, halogen, C<sub>1</sub>-C<sub>4</sub> alkoxy or C<sub>1</sub>-C<sub>4</sub> haloalkoxy;

each R<sup>9</sup> is independently C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>2</sub>-C<sub>4</sub> alkenyl, C<sub>2</sub>-C<sub>4</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>4</sub> haloalkyl, C<sub>2</sub>-C<sub>4</sub> haloalkenyl, C<sub>2</sub>-C<sub>4</sub> haloalkynyl, C<sub>3</sub>-C<sub>6</sub> halocycloalkyl, halogen, CN, NO<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>1</sub>-C<sub>4</sub> alkylamino, C<sub>2</sub>-C<sub>8</sub> dialkylamino, C<sub>3</sub>-C<sub>6</sub> cycloalkylamino, C<sub>4</sub>-C<sub>8</sub> (alkyl)(cycloalkyl)amino, C<sub>2</sub>-C<sub>4</sub> alkylcarbonyl, C<sub>2</sub>-C<sub>6</sub> alkoxy carbonyl, C<sub>2</sub>-C<sub>6</sub> alkylaminocarbonyl, C<sub>3</sub>-C<sub>8</sub> dialkylaminocarbonyl or C<sub>3</sub>-C<sub>6</sub> trialkylsilyl;

R<sup>10</sup> is H, C<sub>1</sub>-C<sub>4</sub> alkyl or C<sub>1</sub>-C<sub>4</sub> haloalkyl;

R<sup>11</sup> is H or C<sub>1</sub>-C<sub>4</sub> alkyl;

R<sup>12</sup> is C<sub>1</sub>-C<sub>4</sub> alkyl or C<sub>1</sub>-C<sub>4</sub> haloalkyl; and

n is 0, 1 or 2.

This invention provides a method for protecting a propagule or a plant grown therefrom from an invertebrate pest. The method comprises contacting the propagule or the locus of the propagule with a biologically effective amount of a compound of Formula I, an *N*-oxide thereof or an agriculturally suitable salt thereof.

This invention also provides a propagule comprising a biologically effective amount of a compound of Formula I, its *N*-oxide or an agriculturally suitable salt thereof.

This invention further provides a propagule contacted with a biologically effective amount of a compound of Formula I, its *N*-oxide or an agriculturally suitable salt thereof.

This invention still further provides an invertebrate pest control composition for coating a propagule comprising a biologically effective amount of a compound of Formula I, its *N*-oxide or an agriculturally suitable salt thereof and a film former or adhesive agent.

#### DETAILED DESCRIPTION OF THE INVENTION

As referred to in the present disclosure and claims, the term "propagule" means a seed or a regenerable plant part. The term "regenerable plant part" means a part of a plant other

than a seed from which a whole plant may be grown or regenerated when the plant part is placed in horticultural or agricultural growing media such as moistened soil, peat moss, sand, vermiculite, perlite, rock wool, fiberglass, coconut husk fiber, tree fern fiber and the like, or even a completely liquid medium such as water. Regenerable plant parts commonly include

5 rhizomes, tubers, bulbs and corms of such geophytic plant species as potato, sweet potato, yam, onion, dahlia, tulip, narcissus, etc. Regenerable plant parts include plant parts that are divided (e.g., cut) to preserve their ability to grow into a new plant. Therefore regenerable plant parts include viable divisions of rhizomes, tubers, bulbs and corms which retain meristematic tissue, such as an eye. Regenerable plant parts can also include other plant

10 parts such as cut or separated stems and leaves from which some species of plants can be grown using horticultural or agricultural growing media. As referred to in the present disclosure and claims, unless otherwise indicated, the term "seed" includes both unsprouted seeds and sprouted seeds in which the testa (seed coat) still surrounds part of the emerging shoot and root.

15 In the above recitations, the term "alkyl", used either alone or in compound words such as "alkylthio" or "haloalkyl" includes straight-chain or branched alkyl, such as, methyl, ethyl, *n*-propyl, *i*-propyl, or the different butyl, pentyl or hexyl isomers. "Alkenyl" includes straight-chain or branched alkenes such as 1-propenyl, 2-propenyl, and the different butenyl, pentenyl and hexenyl isomers. "Alkenyl" also includes polyenes such as 1,2-propadienyl

20 and 2,4-hexadienyl. "Alkynyl" includes straight-chain or branched alkynes such as 1-propynyl, 2-propynyl and the different butynyl, pentynyl and hexynyl isomers. "Alkynyl" can also include moieties comprised of multiple triple bonds such as 2,5-hexadiynyl. "Alkoxy" includes, for example, methoxy, ethoxy, *n*-propyloxy, isopropyloxy and the different butoxy, pentoxy and hexyloxy isomers. "Alkoxyalkyl" denotes alkoxy substitution

25 on alkyl. Examples of "alkoxyalkyl" include  $\text{CH}_3\text{OCH}_2$ ,  $\text{CH}_3\text{OCH}_2\text{CH}_2$ ,  $\text{CH}_3\text{CH}_2\text{OCH}_2$ ,  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2$  and  $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_2$ . "Alkylthio" includes branched or straight-chain alkylthio moieties such as methylthio, ethylthio, and the different propylthio, butylthio, pentylthio and hexylthio isomers. "Cycloalkyl" includes, for example, cyclopropyl, cyclobutyl, cyclopentyl and cyclohexyl.

30 The term "heterocyclic ring" or "heterocyclic ring system" denotes rings or ring systems in which at least one ring atom is not carbon and comprises 1 to 4 heteroatoms independently selected from the group consisting of nitrogen, oxygen and sulfur, provided that each heterocyclic ring comprises no more than 4 nitrogens, no more than 2 oxygens and no more than 2 sulfurs. The heterocyclic ring can be attached through any available carbon

35 or nitrogen by replacement of hydrogen on said carbon or nitrogen. The term "aromatic ring system" denotes fully unsaturated carbocycles and heterocycles in which at least one ring of the polycyclic ring system is aromatic (where aromatic indicates that the Hückel rule is satisfied for the ring system). The term "heteroaromatic ring" denotes fully aromatic rings in

which at least one ring atom is not carbon and comprises 1 to 4 heteroatoms independently selected from the group consisting of nitrogen, oxygen and sulfur, provided that each heterocyclic ring comprises no more than 4 nitrogens, no more than 2 oxygens and no more than 2 sulfurs (where aromatic indicates that the Hückel rule is satisfied). The heterocyclic ring can be attached through any available carbon or nitrogen by replacement of hydrogen on said carbon or nitrogen. The term "aromatic heterocyclic ring system" includes fully aromatic heterocycles and heterocycles in which at least one ring of a polycyclic ring system is aromatic (where aromatic indicates that the Hückel rule is satisfied). The term "fused heterobicyclic ring system" includes a ring system comprised of two fused rings in which at least one ring atom is not carbon and can be aromatic or non aromatic, as defined above.

The term "halogen", either alone or in compound words such as "haloalkyl", includes fluorine, chlorine, bromine or iodine. Further, when used in compound words such as "haloalkyl", said alkyl may be partially or fully substituted with halogen atoms which may be the same or different. Examples of "haloalkyl" include  $F_3C$ ,  $ClCH_2$ ,  $CF_3CH_2$  and  $CF_3CCl_2$ . The terms "haloalkenyl", "haloalkynyl", "haloalkoxy", and the like, are defined analogously to the term "haloalkyl". Examples of "haloalkenyl" include  $(Cl)_2C=CHCH_2$  and  $CF_3CH_2CH=CHCH_2$ . Examples of "haloalkynyl" include  $HC\equiv CCHCl$ ,  $CF_3C\equiv C$ ,  $CCl_3C\equiv C$  and  $FCH_2C\equiv CCH_2$ . Examples of "haloalkoxy" include  $CF_3O$ ,  $CCl_3CH_2O$ ,  $HCF_2CH_2CH_2O$  and  $CF_3CH_2O$ .

The total number of carbon atoms in a substituent group is indicated by the " $C_i-C_j$ " prefix where i and j are numbers from 1 to 8. For example,  $C_1-C_4$  alkylsulfonyl designates methylsulfonyl through butylsulfonyl;  $C_2$  alkoxyalkyl designates  $CH_3OCH_2$ ;  $C_3$  alkoxyalkyl designates, for example,  $CH_3CH(OCH_3)$ ,  $CH_3OCH_2CH_2$  or  $CH_3CH_2OCH_2$ ; and  $C_4$  alkoxyalkyl designates the various isomers of an alkyl group substituted with an alkoxy group containing a total of four carbon atoms, examples including  $CH_3CH_2CH_2OCH_2$  and  $CH_3CH_2OCH_2CH_2$ . In the above recitations, when a compound of Formula I comprises a heterocyclic ring, all substituents are attached to this ring through any available carbon or nitrogen by replacement of a hydrogen on said carbon or nitrogen.

When a group has a substituent which can be hydrogen, for example  $R^3$ , then, when this substituent is taken as hydrogen, it is recognized that this is equivalent to said group being unsubstituted.

Compounds of Formula I can exist as one or more stereoisomers. The various stereoisomers include enantiomers, diastereomers, atropisomers and geometric isomers. One skilled in the art will appreciate that one stereoisomer may be more active and/or may exhibit beneficial effects when enriched relative to the other stereoisomer(s) or when separated from the other stereoisomer(s). Additionally, the skilled artisan knows how to separate, enrich, and/or to selectively prepare said stereoisomers. Accordingly, the

compounds of the invention may be present as a mixture of stereoisomers, individual stereoisomers, or as an optically active form.

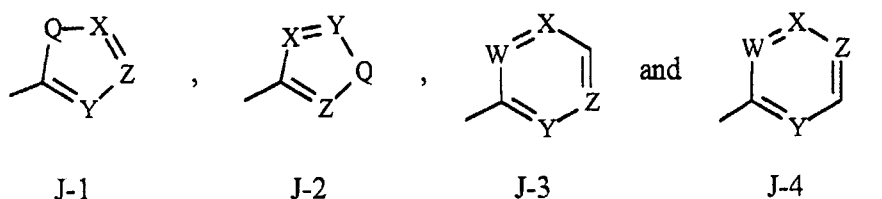
The salts of compounds of Formula I include acid-addition salts with inorganic or organic acids such as hydrobromic, hydrochloric, nitric, phosphoric, sulfuric, acetic, butyric, fumaric, lactic, maleic, malonic, oxalic, propionic, salicylic, tartaric, 4-toluenesulfonic or valeric acids.

Methods, propagules and compositions of the invention preferred for reason of cost, ease of chemical synthesis or application, and/or biological efficacy involve the following preferred compounds:

10 Preferred 1. A compound of Formula I wherein

A and B are both O;

R<sup>7</sup> is a phenyl ring or a 5- or 6-membered heteroaromatic ring selected from the group consisting of



each ring optionally substituted with one to three substituents independently selected from R<sup>9</sup>;

15

Q is O, S, NH or NR<sup>9</sup>; and

W, X, Y and Z are independently N, CH or CR<sup>9</sup>, provided that in J-3 and J-4 at least one of W, X, Y or Z is N.

Preferred 2. A compound of Preferred 1 wherein

20

R<sup>1</sup>, R<sup>2</sup> and R<sup>8</sup> are all H;

R<sup>3</sup> is C<sub>1</sub>-C<sub>4</sub> alkyl optionally substituted with halogen, CN, OCH<sub>3</sub> or S(O)<sub>p</sub>CH<sub>3</sub>;

R<sup>4</sup> group is attached at position 2;

R<sup>4</sup> is CH<sub>3</sub>, CF<sub>3</sub>, OCF<sub>3</sub>, OCHF<sub>2</sub>, CN or halogen;

25

R<sup>5</sup> is H, CH<sub>3</sub> or halogen;

R<sup>6</sup> is CH<sub>3</sub>, CF<sub>3</sub> or halogen;

R<sup>7</sup> is phenyl or 2-pyridinyl, each optionally substituted; and

p is 0, 1 or 2.

Preferred 3. A compound of Preferred 2 wherein R<sup>3</sup> is C<sub>1</sub>-C<sub>4</sub> alkyl and R<sup>6</sup> is CF<sub>3</sub>.

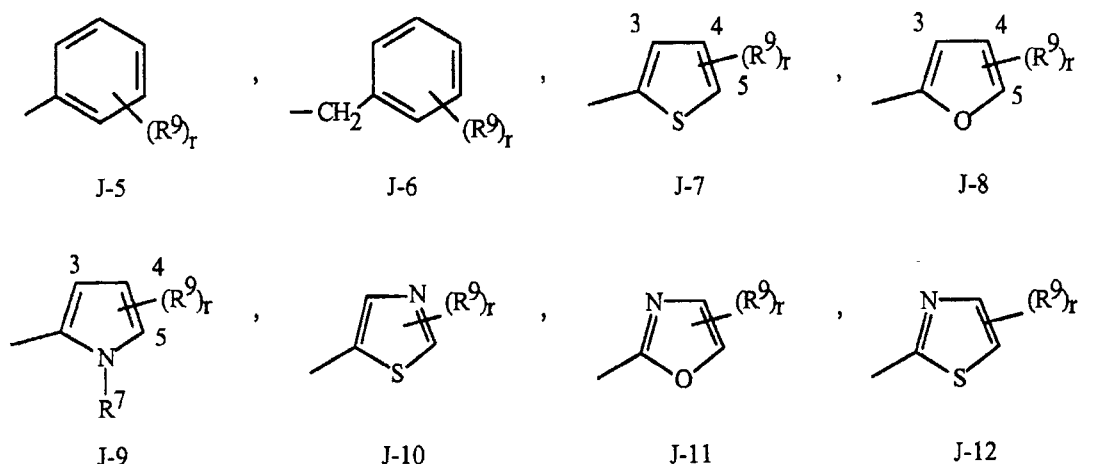
30

Preferred 4. A compound of Preferred 2 wherein R<sup>3</sup> is C<sub>1</sub>-C<sub>4</sub> alkyl and R<sup>6</sup> is Cl or Br.

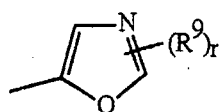
As noted above, R<sup>7</sup> is (among others) a phenyl, a benzyl, a 5- or 6-membered heteroaromatic ring, a naphthyl ring system or an aromatic 8-, 9- or 10-membered fused heterobicyclic ring system, each ring or ring system optionally substituted with one to three substituents independently selected from R<sup>9</sup>. The term "optionally substituted" in

connection with these  $R^7$  groups refers to groups which are unsubstituted or have at least one non-hydrogen substituent that does not extinguish the invertebrate pest control activity possessed by the unsubstituted analog. Note also that J-1 through J-4 below denote 5- or 6-membered heteroaromatic rings. An example of a phenyl ring optionally substituted with 1 to 3  $R^9$  is the ring illustrated as J-5 in Exhibit 1, wherein r is an integer from 0 to 3. An example of a benzyl ring optionally substituted with 1 to 3  $R^9$  is the ring illustrated as J-6 in Exhibit 1, wherein r is an integer from 0 to 3. An example of a naphthyl ring system optionally substituted with 1 to 3  $R^9$  is illustrated as J-59 in Exhibit 1, wherein r is an integer from 0 to 3. Examples of a 5- or 6-membered heteroaromatic ring optionally substituted with 1 to 3  $R^9$  include the rings J-7 through J-58 illustrated in Exhibit 1 wherein r is an integer from 0 to 3. Note that J-7 through J-26 are examples of J-1, J-27 through J-41 are examples of J-2, and J-46 through J-58 are examples of J-3 and J-4. The nitrogen atoms that require substitution to fill their valence are substituted with H or  $R^9$ . Note that some J groups can only be substituted with less than 3  $R^9$  groups (e.g. J-19, J-20, J-23 through J-26 and J-37 through J-40 can only be substituted with one  $R^9$ ). Examples of aromatic 8-, 9- or 10-membered fused heterobicyclic ring systems optionally substituted with 1 to 3  $R^9$  include J-60 through J-90 illustrated in Exhibit 1 wherein r is an integer from 0 to 3. Although  $R^9$  groups are shown in the structures J-5 through J-90, it is noted that they do not need to be present since they are optional substituents. Note that when the attachment point between  $(R^9)_r$  and the J group is illustrated as floating,  $(R^9)_r$  can be attached to any available carbon atom of the J group. Note that when the attachment point on the J group is illustrated as floating, the J group can be attached to the remainder of Formula I through any available carbon of the J group by replacement of a hydrogen atom.

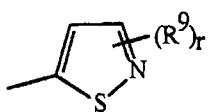
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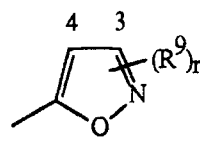
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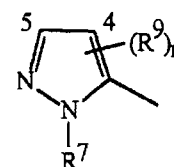
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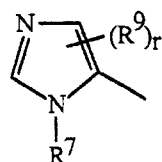
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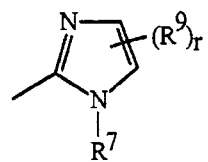
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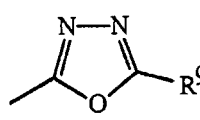
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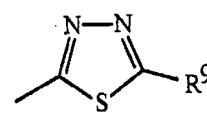
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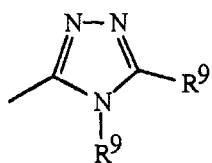
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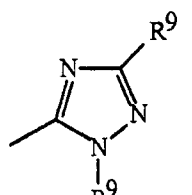
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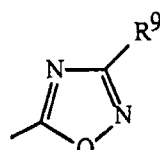
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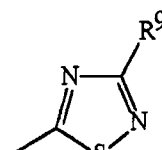
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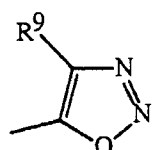
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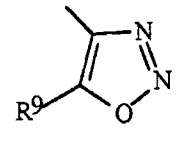
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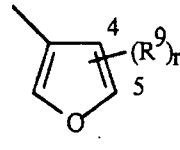
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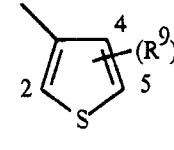
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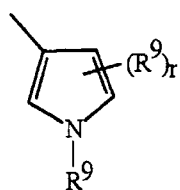
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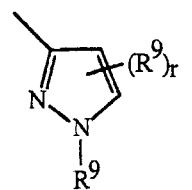
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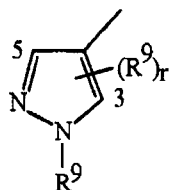
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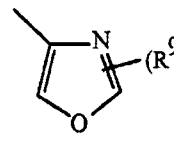
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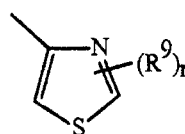
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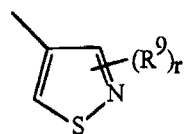
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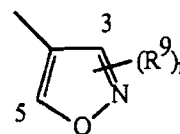
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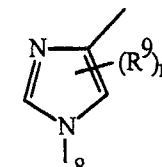
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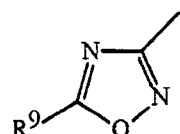
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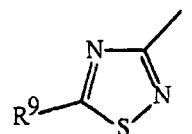
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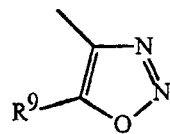
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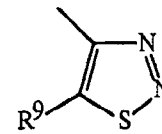
J-37



J-38

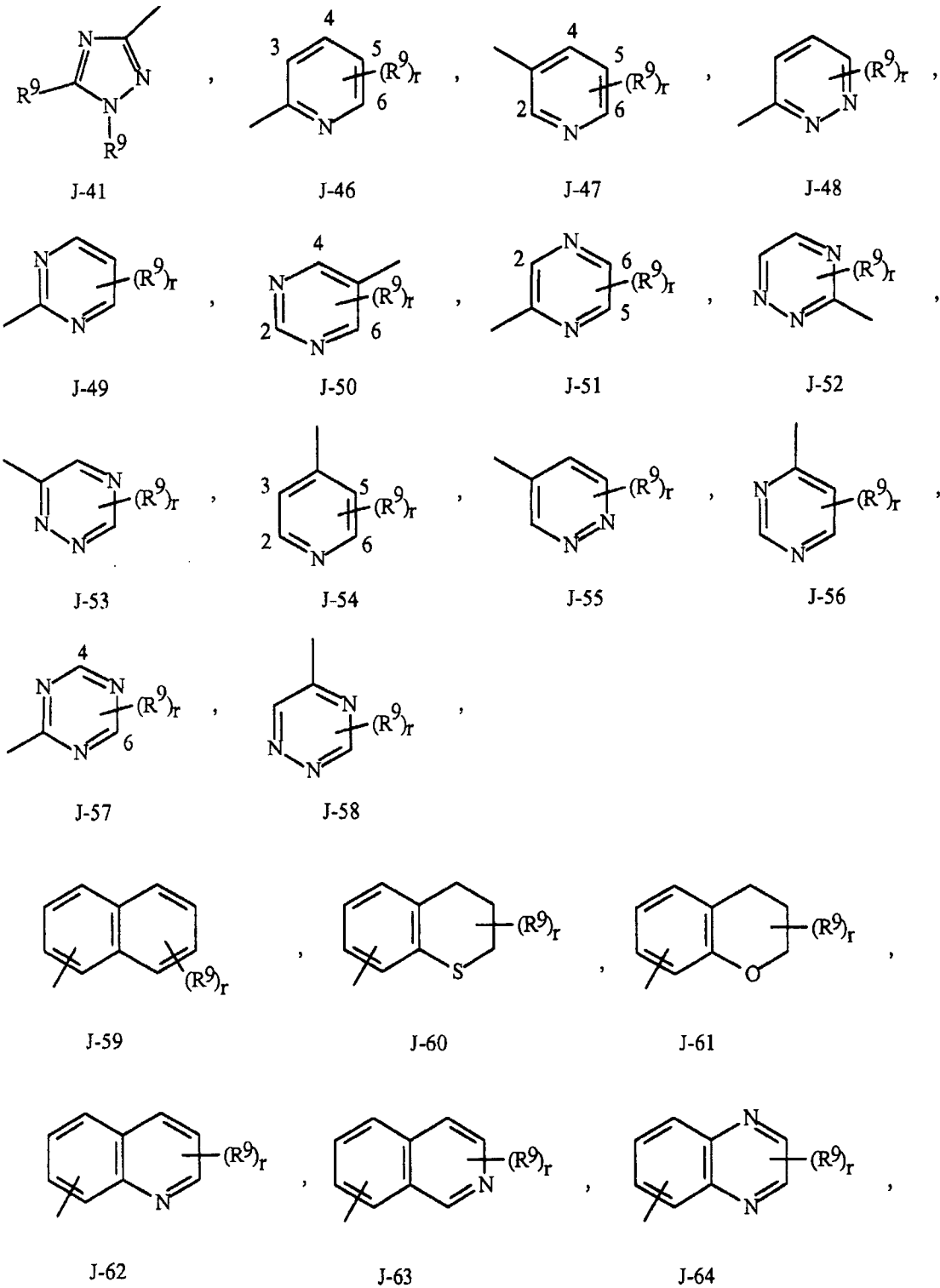


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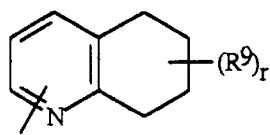
J-40

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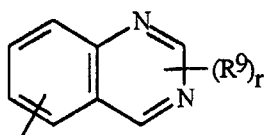


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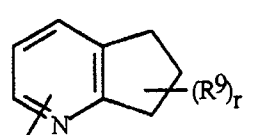
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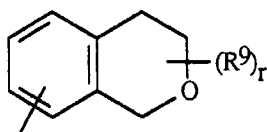
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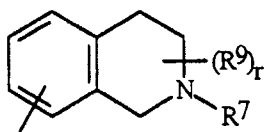
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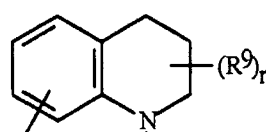
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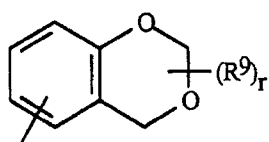
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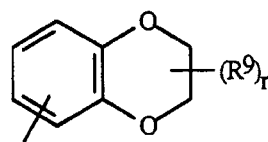
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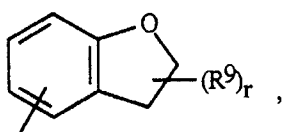
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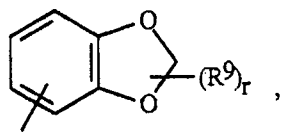
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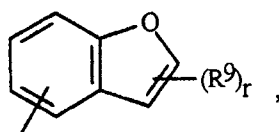
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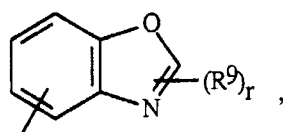
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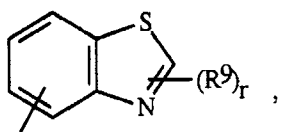
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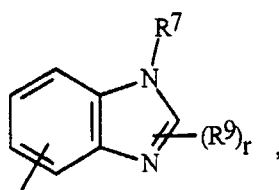
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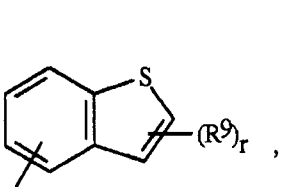
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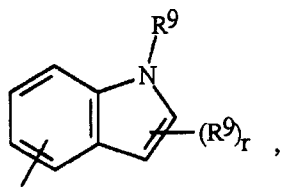
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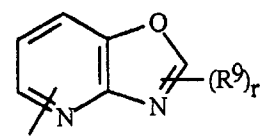
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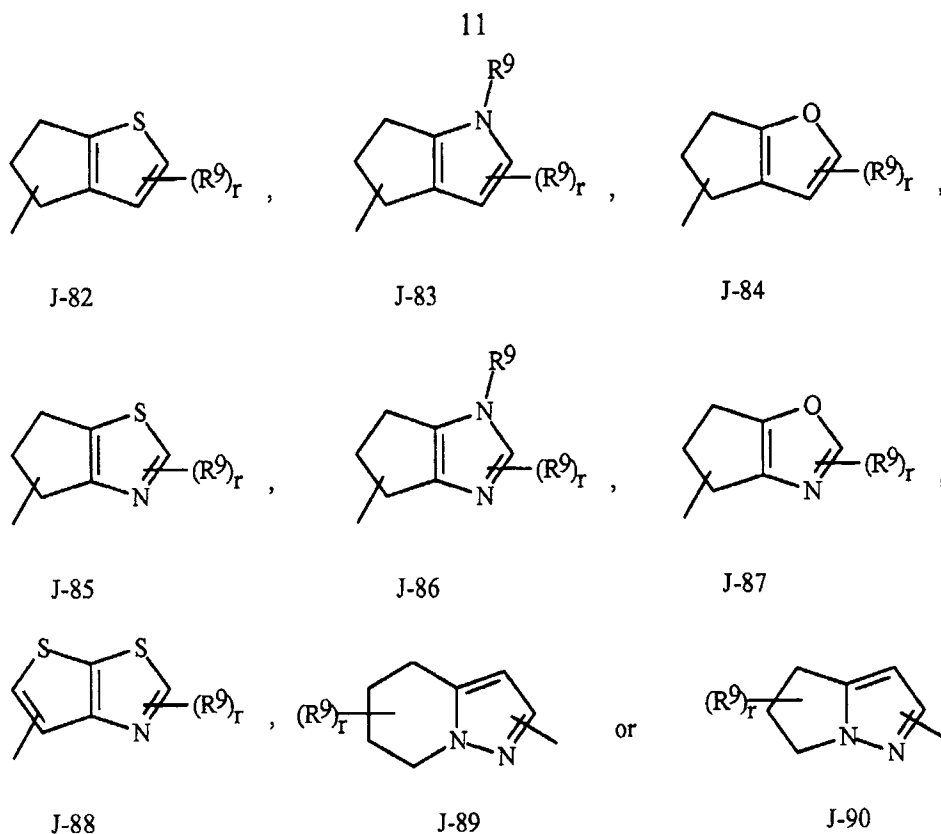
J-79



J-80

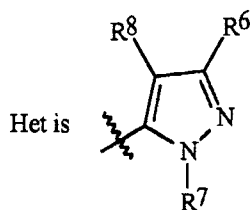


J-81



5 One or more of the following methods and variations as described in Schemes 1-22 can be used to prepare the compounds of Formula I. The definitions of A, B and R<sup>1</sup> through R<sup>9</sup> in the compounds of Formulae 2-40 below are as defined above in the Summary of the Invention unless indicated otherwise. Compounds of Formulae 1a-d, 2a-d, 3a, 4a-d, 5a-b, 17a-c, 18a and 32a-b are various subsets of the compounds of Formula I, 2, 3, 4, 5, 17, 18 and 32. In the schemes, Het is the moiety shown below:

10



A typical method for preparation of a compound of Formula Ia is described in Scheme 1.

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(81) Designated States (national): AE, AG, AL, AM, AT, AU,  
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GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,  
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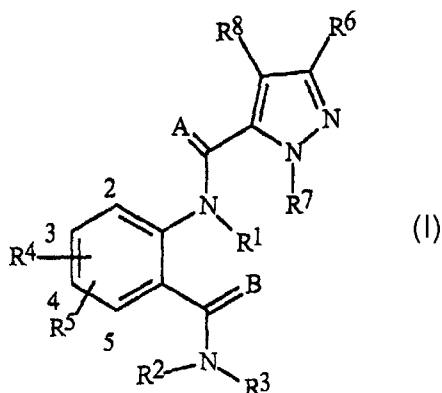
(72) Inventors; and

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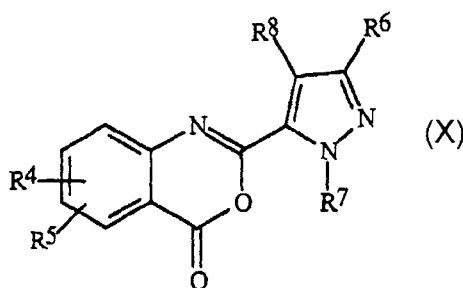
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Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),

[Continued on next page]

(54) Title: METHOD FOR CONTROLLING PARTICULAR INSECT PESTS BY APPLYING ANTHRANILAMIDE  
COMPOUNDS



(57) Abstract: This invention pertains to a method for controlling  
lepidopteran, homopteran, hemipteran, thysanopteran and coleopteran  
insect pests comprising contacting the insects or their environment with  
an arthropodically effective amount of a compound of Formula I, its  
N-oxide or an agriculturally suitable salt thereof wherein A and B and R<sub>1</sub>  
through R<sub>8</sub> are as defined in the disclosure. This invention further relates to  
a bezoxazinone compound of Formula (10), wherein R<sub>4</sub> through R<sub>8</sub> are as  
defined in the disclosure, useful for preparation of a compound of Formula  
I.

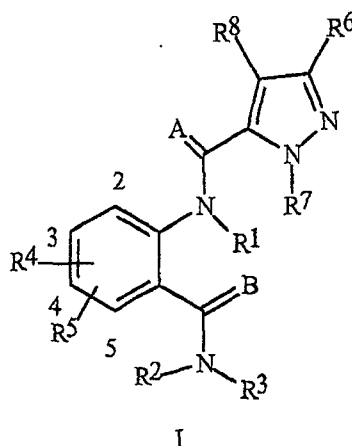


WO 03/015518 A1

CLAIMS

What is claimed is:

1. A method for controlling for controlling lepidopteran, homopteran, hemipteran, thysanopteran and coleopteran insect pests, comprising:  
 5 contacting the insects or their environment with an arthropodically effective amount of a compound of Formula I, an *N*-oxide or an agriculturally suitable salt thereof



wherein

- A and B are independently O or S;
- 10 R<sup>1</sup> is H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkoxy carbonyl or C<sub>2</sub>-C<sub>6</sub> alkyl carbonyl;
- R<sup>2</sup> is H or C<sub>1</sub>-C<sub>6</sub> alkyl;
- R<sup>3</sup> is H; C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl, or C<sub>3</sub>-C<sub>6</sub> cycloalkyl, each optionally substituted with one or more substituents selected from the group consisting of halogen, CN, NO<sub>2</sub>, hydroxy, C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>2</sub>-C<sub>6</sub> alkoxy carbonyl, C<sub>2</sub>-C<sub>6</sub> alkyl carbonyl, C<sub>3</sub>-C<sub>6</sub> trialkylsilyl, phenyl, phenoxy, 5-membered heteroaromatic rings, and 6-membered heteroaromatic rings; each phenyl, phenoxy, 5-membered heteroaromatic ring, and 6-membered heteroaromatic ring optionally substituted with one to three substituents independently selected from the group consisting of C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>2</sub>-C<sub>4</sub> alkenyl, C<sub>2</sub>-C<sub>4</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>4</sub> haloalkyl, C<sub>2</sub>-C<sub>4</sub> haloalkenyl, C<sub>2</sub>-C<sub>4</sub> haloalkynyl, C<sub>3</sub>-C<sub>6</sub> halocycloalkyl, halogen, CN, NO<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>1</sub>-C<sub>4</sub> alkylamino, C<sub>2</sub>-C<sub>8</sub> dialkylamino, C<sub>3</sub>-C<sub>6</sub> cycloalkylamino, C<sub>4</sub>-C<sub>8</sub> (alkyl)(cycloalkyl)amino, C<sub>2</sub>-C<sub>4</sub> alkyl carbonyl, C<sub>2</sub>-C<sub>6</sub> alkoxy carbonyl, C<sub>2</sub>-C<sub>6</sub> alkylaminocarbonyl, C<sub>3</sub>-C<sub>8</sub> dialkylaminocarbonyl and C<sub>3</sub>-C<sub>6</sub> trialkylsilyl; C<sub>1</sub>-C<sub>4</sub>

alkoxy; C<sub>1</sub>-C<sub>4</sub> alkylamino; C<sub>2</sub>-C<sub>8</sub> dialkylamino; C<sub>3</sub>-C<sub>6</sub> cycloalkylamino; C<sub>2</sub>-C<sub>6</sub> alkoxy carbonyl or C<sub>2</sub>-C<sub>6</sub> alkyl carbonyl;

R<sup>4</sup> is H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>6</sub> haloalkyl, CN, halogen, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy or NO<sub>2</sub>;

5 R<sup>5</sup> is H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>1</sub>-C<sub>6</sub> haloalkyl, C<sub>1</sub>-C<sub>4</sub> alkoxyalkyl, C<sub>1</sub>-C<sub>4</sub> hydroxyalkyl, C(O)R<sup>10</sup>, CO<sub>2</sub>R<sup>10</sup>, C(O)NR<sup>10</sup>R<sup>11</sup>, halogen, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy, NR<sup>10</sup>R<sup>11</sup>, N(R<sup>11</sup>)C(O)R<sup>10</sup>, N(R<sup>11</sup>)CO<sub>2</sub>R<sup>10</sup> or S(O)<sub>n</sub>R<sup>12</sup>;

R<sup>6</sup> is H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>1</sub>-C<sub>6</sub> haloalkyl, halogen, CN, C<sub>1</sub>-C<sub>4</sub> alkoxy or C<sub>1</sub>-C<sub>4</sub> haloalkoxy;

10 R<sup>7</sup> is C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>2</sub>-C<sub>6</sub> alkenyl, C<sub>2</sub>-C<sub>6</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>6</sub> haloalkyl, C<sub>2</sub>-C<sub>6</sub> haloalkenyl, C<sub>2</sub>-C<sub>6</sub> haloalkynyl or C<sub>3</sub>-C<sub>6</sub> halocycloalkyl; or

R<sup>7</sup> is a phenyl ring, a benzyl ring, a 5- or 6-membered heteroaromatic ring, a naphthyl ring system or an aromatic 8-, 9- or 10-membered fused heterobicyclic ring system, each ring or ring system optionally substituted with one to three substituents independently selected from R<sup>9</sup>;

15 R<sup>8</sup> is H, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>1</sub>-C<sub>6</sub> haloalkyl, halogen, C<sub>1</sub>-C<sub>4</sub> alkoxy or C<sub>1</sub>-C<sub>4</sub> haloalkoxy;

each R<sup>9</sup> is independently C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>2</sub>-C<sub>4</sub> alkenyl, C<sub>2</sub>-C<sub>4</sub> alkynyl, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, C<sub>1</sub>-C<sub>4</sub> haloalkyl, C<sub>2</sub>-C<sub>4</sub> haloalkenyl, C<sub>2</sub>-C<sub>4</sub> haloalkynyl, C<sub>3</sub>-C<sub>6</sub> halocycloalkyl, halogen, CN, NO<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> haloalkoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, C<sub>1</sub>-C<sub>4</sub> alkylamino, C<sub>2</sub>-C<sub>8</sub> dialkylamino, C<sub>3</sub>-C<sub>6</sub> cycloalkylamino, C<sub>4</sub>-C<sub>8</sub> (alkyl)(cycloalkyl)amino, C<sub>2</sub>-C<sub>4</sub> alkyl carbonyl, C<sub>2</sub>-C<sub>6</sub> alkoxy carbonyl, C<sub>2</sub>-C<sub>6</sub> alkylaminocarbonyl, C<sub>3</sub>-C<sub>8</sub> dialkylaminocarbonyl or C<sub>3</sub>-C<sub>6</sub> trialkylsilyl;

R<sup>10</sup> is H, C<sub>1</sub>-C<sub>4</sub> alkyl or C<sub>1</sub>-C<sub>4</sub> haloalkyl;

25 R<sup>11</sup> is H or C<sub>1</sub>-C<sub>4</sub> alkyl;

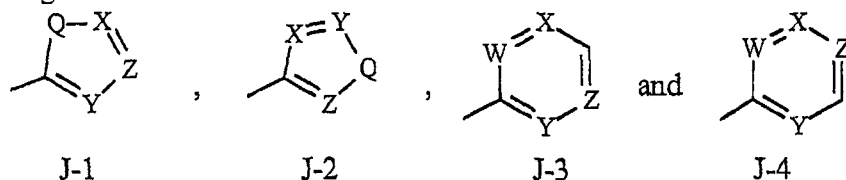
R<sup>12</sup> is C<sub>1</sub>-C<sub>4</sub> alkyl or C<sub>1</sub>-C<sub>4</sub> haloalkyl; and

n is 0, 1 or 2.

2. The method of Claim 1 wherein

A and B are both O;

30 R<sup>7</sup> is a phenyl ring or a 5- or 6-membered heteroaromatic ring selected from the group consisting of



each ring optionally substituted with one to three substituents independently selected from R<sup>9</sup>;

Q is O, S, NH or NR<sup>9</sup>; and