

P-2019/20373

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

DIRECCIÓN DE NUEVAS CREACIONES

E. S. D.

Re: Expediente No. **NC2019/0005949**Solicitud de patente a nombre de **BAYER CROPSCIENCE
AKTIENGESELLSCHAFT**

Yo, CAROLINA DAZA MONTALVO identificada como aparece al pie de mi firma, domiciliada en la Carrera 11 No. 86-53, obrando como apoderada de la sociedad BAYER CROPSCIENCE AKTIENGESELLSCHAFT, domiciliada en Monheim am Rhein, Alemania, solicitante de la patente de la referencia, en respuesta al oficio No. **5462** notificado electrónicamente el 19 de mayo de 2020, relacionado con los requerimientos de fondo de la solicitud, atentamente me permito presentar la siguiente información:

1. Modificaciones a las Reivindicaciones

Con fundamento en la facultad que confiere el artículo 34 de la Decisión 486 al solicitante para modificar la solicitud de patente en cualquier momento del trámite, presento junto con este memorial nuevo capítulo reivindicatorio, el cual consta de tres (3) reivindicaciones y reemplaza completamente el capítulo presentado anteriormente. Las modificaciones realizadas se presentan a continuación:

1.1 Se ha modificado la reivindicación 1, en donde se eliminó la expresión "y", con el fin de claridad a la invención y superar las objeciones del examinador. Adicionalmente, se incluyeron parte de las características de la antigua reivindicación 2, con el fin definir con mayor claridad la materia a proteger.

1.2 Se eliminaron las expresiones "*preferentemente*" y "*preferencia especial*" de la antigua reivindicación 2, y dichas características opcionales se incluyeron en las nuevas reivindicaciones 2 y 3.

1.3 Se eliminó la antigua reivindicación 3, con el fin de superar las objeciones del examinador.

En cuanto a estas modificaciones, me permito decir que las mismas no amplían de ninguna manera la materia objeto de la presente solicitud y se realizaron con el ánimo de superar las objeciones de claridad y patentabilidad planteadas por el examinador en su concepto técnico.

2. Pago de tasas

En relación con el número de reivindicaciones, atentamente nos permitimos decir que no se adjunta tasa por concepto de reivindicaciones adicionales, toda vez que el nuevo capítulo reivindicatorio tiene igual número de reivindicaciones a las presentadas anteriormente, y en esencia es el mismo objeto, pero definido con mayor claridad.

Por otra parte, me permito adjuntar recibo por concepto de pago de tasa de examen de patentabilidad, según lo establecido en la Resolución No. 3719 del 2016.

3. Claridad y concisión de las Reivindicaciones

El solicitante desea manifestar que mediante el nuevo capítulo reivindicatorio quedan subsanadas la totalidad de las objeciones, ya que la nueva reivindicación proporciona claridad y concisión a la invención reclamada, cuenta con pleno soporte en la descripción de la solicitud en estudio, y además sigue las recomendaciones realizadas por el examinador en su concepto técnico. En particular, frente a cada objeción, me permito señalar lo siguiente:

3.1 Como se indicó previamente, se ha modificado la reivindicación 1, en donde se eliminó la expresión "y", con el fin de claridad a la invención

y superar las objeciones del examinador. Adicionalmente, se incluyeron parte de las características de la antigua reivindicación 2, con el fin definir con mayor claridad la materia a proteger.

3.2 El examinador indica en el Oficio: *"La reivindicación 2 no es clara, porque emplea los términos: "preferentemente, preferencia especial", precediendo una característica no son limitativos, porque hace opcional a la característica y no limita el alcance de la reivindicación"*. En este respecto, se informa que se eliminaron las expresiones *"preferentemente"* y *"preferencia especial"* de la antigua reivindicación 2, y dichas características opcionales se incluyeron en las nuevas reivindicaciones 2 y 3.

3.3 Con respecto a las objeciones a la antigua reivindicación 3 *"La reivindicación 3 presenta lo siguiente: No es concisa, porque emplea términos generales: "uno o varios otros componentes", se requiere determinar los componentes de la combinación. No es clara, porque emplea el término: "adicionalmente", lo cual significa que hay más componentes en la combinación herbicida, que sí hacen parte de las características esenciales de la misma, deben estar mencionados en la reivindicación independiente que contiene todas las características esenciales. No es concisa, porque se hace referencia a términos que se define por su actividad o función: "principios activos agroquímicos de otro tipo", "aditivos", "auxiliares", no se están definiendo componentes como tal, no tienen sustento en la descripción. Se requiere modificar"*. En este respecto, amablemente se informa que dicha reivindicación se ha eliminado del capítulo reivindicatorio, con el fin de superar las objeciones del examinador.

En consecuencia, nos permitimos indicar que el presente capítulo reivindicatorio, que incluye tres (3) reivindicaciones, se ajusta a las disposiciones del artículo 30 de la Decisión 486/00.

4. Nivel Inventivo

El examinador establece que las reivindicaciones 1 a 3 carecen de nivel inventivo a la luz de las enseñanzas descritas en los documentos WO2006/007947 (D1) y US2010/069246 (D2).

A este respecto, me permito decir que el artículo 18 de la Decisión 486 establece que *"Se considerará que una invención tiene nivel inventivo, si para una persona del oficio normalmente versada en la materia técnica correspondiente, esa invención no hubiese resultado obvia ni se hubiese derivado de manera evidente del estado de la técnica"*.

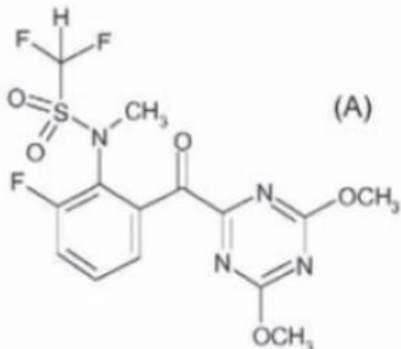
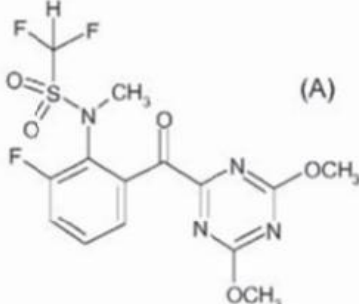
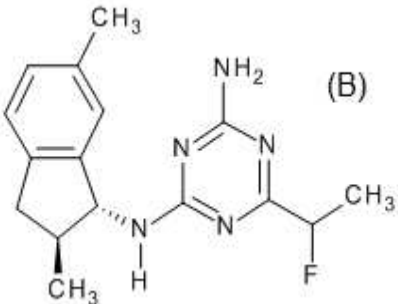
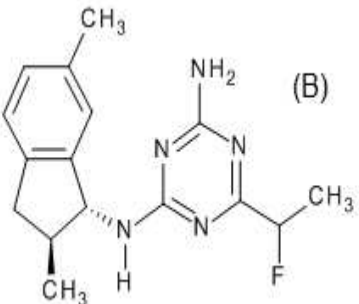
Lo anterior significa que el análisis de nivel inventivo **NO** es una comparación de los objetos de las anterioridades y la solicitud en estudio. El análisis de nivel inventivo **debe demostrar** la obviedad de la invención y establecer cómo ésta no contiene un salto cualitativo, que demuestre su altura inventiva, teniendo en cuenta que se hace **necesario demostrar** que la invención analizada carece de nivel inventivo y hubiese sido obvia para una persona versada en la materia.

De acuerdo con lo anterior, la solicitante desea manifestar respetuosamente su desacuerdo, ya que teniendo en cuenta las modificaciones presentadas en el nuevo capítulo reivindicatorio, se superan las objeciones realizadas, por cuanto **dichas características no se encuentran divulgadas individualmente en los documentos citados por el examinador.**

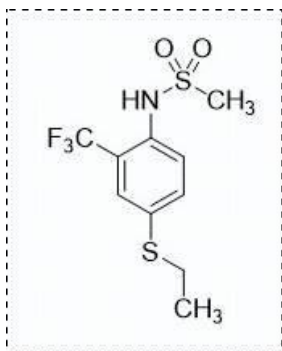
Ahora bien, el solicitante desea señalar que los documentos citados D1 y D2 corresponden a los documentos adjuntos *D1-BCS04-1036-EN-Publication-US2006-019829A1.pdf* y *D2-BCS08-1030-EN-Publication-US2010-069246A1.pdf*, respectivamente, los cuales son solicitudes presentadas por el mismo solicitante y, por tanto, conocen muy bien las enseñanzas técnicas de ambas referencias citadas.

El solicitante desea manifestar respetuosamente que el examinador hizo un análisis ex post facto, es decir un análisis retrospectivo inadmisibile porque está ignorando por completo la enseñanza técnica de ambas referencias citadas. El

examinador presentó la siguiente tabla en la que había buscado posibles coincidencias entre ambas citas y la presente invención:

Essential features	D1	D2
Combinación herbicida	Combinación herbicida (Página 1)	Combinación herbicida (Resumen)
Componente A 	Componente B Benzofluor (Página 86, línea 2) [0287]	Componente A1  (0048, Página 3)
Componente B 	Componente A-85  Tabla 1 (Página 23) D1-BCS04-1036-EN-Publication-US2006-019829A1.pdf	Herbicidas adicionales de triazinas (0072) [0072] D2-BCS08-1030-EN-Publication-US2010-069246A1.pdf

Con respecto a la **cita "Benzofluor"** de D1, el benzofluor tiene una estructura completamente diferente, como se puede observar en la imagen a continuación y en el documento que se anexa a este memorial,



el cual obviamente no es comparable con el “**Componente A1**” del documento D2. Además, el examinador se equivoca aquí al afirmar que el benzofluor como herbicida de **sulfoanilida** apunta directamente al “Componente A1” de D2 (nombre común: triafamona) que pertenece a la clase diferente de las “difluorometanos**sulfonilanilidas** sustituidas con dimetoxitriazinilo”.

Una situación similar es cuando se menciona “**Herbicidas adicionales de triazina**” del documento **D2**. De acuerdo con el extracto del documento adjunto Pesticide-Manual-15th-Edition (2009).pdf, que brinda una descripción general oportuna sobre los “herbicidas de triazina adicionales” conocidos en el momento en que se presentó el documento D2, un experto en la técnica encontrará todos estos (excepto diametametrina) en el **párrafo [0072]** del adjunto **D2-BCS08-1030-ES-Publication-US2010-069246A1.pdf** - **resaltado en amarillo**. Al igual que con el benzofluor en D1, la diversidad estructural de estos compuestos es correspondientemente amplia y difiere completamente del Componente A-85 de D1 (ver adjunto Herbicidas de triazina adicionales.jpg para todos los detalles) y tampoco apunta directamente al Componente A-85 de D1 (nombre común: indaziflam).

Además, se puede afirmar que, en las citas del examinador, especialmente los párrafos **[0285]** a **[0287]** del adjunto **D1-BCS04-1036-ES-Publication-US2006-019829A1.pdf** y los párrafos **[0071]** y **[0072]** del adjunto **D2-BCS08-1030-ES-Publication-US2010-069246A1.pdf**, la enseñanza técnica en vista de la presente invención es reconocible muy limitada por pasajes de texto como

- D1: "... también se **puede** combinar con otros herbicidas ... **Ejemplos** de otros socios de combinación ... que tienen una estructura diferente a la de los herbicidas (B) contenidos en las combinaciones ..."
- D2: "... **puede** comprender además, como componentes adicionales ... otros herbicidas **adecuados** son, **por ejemplo**, los siguientes herbicidas que difieren estructuralmente de los herbicidas (A) y (B) ..."

Como conclusión final, se puede decir que los párrafos citados por el examinador contienen solo una gran lista de herbicidas conocidos (con la intención de ser un tercer socio de mezcla que actúa como posible adicional y no sinérgico) que se conocían en el momento de presentar las referencias D1 y D2 y esto no podría considerarse como una enseñanza técnica para un experto en la materia.

Por tanto, una persona experta en la técnica **no tendrá la oportunidad de hacer una selección específica (obvia)** de D1 y D2 para **resolver el problema de esta presente invención**. El problema técnico objetivo de esta invención no es como afirma el examinador, modificar la combinación de herbicidas conocido en D1 con el fin de obtener únicamente una composición alternativa. El problema técnico objetivo fue más bien encontrar una combinación con una actividad sinérgica dirigida contra especies de plantas dañinas específicas (como se demuestra en los ejemplos biológicos de la presente solicitud). Por tanto, D1 y D2 no son una enseñanza suficiente para los expertos en la técnica debido a las diferencias estructurales descritas anteriormente. Además, un experto en la materia no habría seleccionado ninguno de los documentos D1 o D2 porque todos estos documentos no le habrían dado una expectativa suficiente de éxito en la utilización de las combinaciones herbicidas de las reivindicaciones modificadas de la invención, si quisiera lograr los efectos observados e inesperados como se demuestra en la presente invención. Para lograr estos efectos, debe seleccionar, producir y finalmente probar las combinaciones de herbicidas reclamadas, que logran los efectos deseados. Por lo tanto, no podría haber excluido por previsión una respuesta no deseada de efectos no deseados, como efectos antagónicos, combinaciones incompatibles y una carencia de sinergismo. Por lo cual, la presente invención sí posee una actividad inventiva.

De esta forma, teniendo en cuenta que los documentos D1 y D2 **no mencionan, describen o sugieren**, en forma individual o en combinación, todas las características técnicas reclamadas como se describe en la presente invención, **dichas reivindicaciones son novedosas, e inventivas sobre el estado del arte.**

En este sentido, y siguiendo el Manual Andino de Patentes, la presente invención tal y como se encuentra definida en las reivindicaciones 1 a 3, tiene diferencias con el estado del arte e implicó un nivel inventivo durante su desarrollo, por lo cual debe ser considerada como novedosa e inventiva según las disposiciones de los artículos 16 y 18 de la Decisión 486.

5. Conclusión

Con las modificaciones introducidas y los argumentos presentados puede concluirse que:

- i) La presente solicitud es clara, concisa y está debidamente soportada en la descripción, cumpliendo con los requerimientos del Artículo 30 de la Decisión 486; y
- ii) Las reivindicaciones actuales son patentables sobre D1 y D2, cumpliendo así con los requerimientos del Artículo 18 de la Decisión 486.

Por tanto, atentamente me permito solicitar a ese Despacho otorgar el privilegio de patente solicitado a la solicitud en estudio, toda vez que cumple a cabalidad con los requerimientos de la Decisión 486/00.

En consecuencia, solicitamos a ese Despacho pronunciarse en relación con todos los argumentos presentados en este memorial dando estricta aplicación al principio del debido proceso consagrado en el artículo 29 de la Constitución Nacional.

6. Anexos

- Nuevo capítulo reivindicatorio conformado por 3 reivindicaciones.
- D1-BCS04-1036-EN-Publication-US2006-019829A1.pdf
- D2-BCS08-1030-EN-Publication-US2010-069246A1.pdf
- Benzofluor.jpg
- Pesticide-Manual-15th-Edition(2009).pdf
- Herbicidas de triazina adicionales.jpg
- Recibo de pago correspondiente a la Tasa de nuevo examen de patentabilidad.

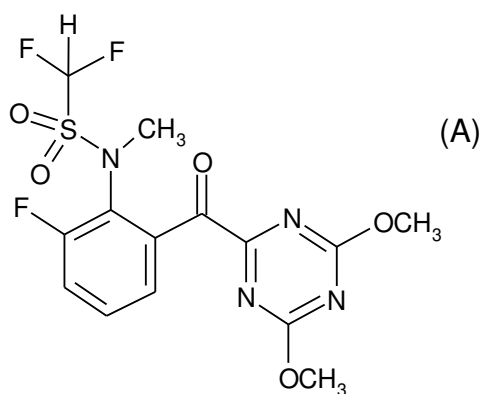
Señora Directora,


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REIVINDICACIONES

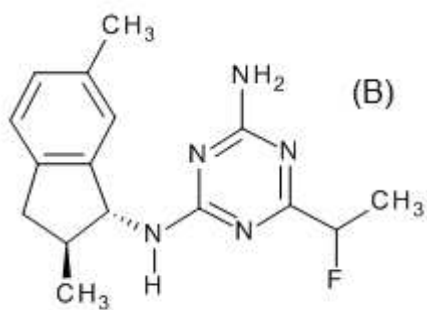
1. Combinación herbicida que contiene componentes (A) y (B), en donde

(A) es el compuesto o sus sales descritos por la fórmula (A):



y

(B) es el compuesto y sus estereoisómeros descritos por la fórmula (B):



en donde los componentes herbicidas, con respecto uno al otro, están presentes en la relación en peso (A):(B) de:

1 - 100 : 0,1 - 100.

2. Combinación herbicida de acuerdo con la reivindicación 1, en donde la relación en peso (A):(B) es de 1 – 25 : 0,5 – 50.

3. Combinación herbicida de acuerdo con la reivindicación 2, en donde la relación en peso (A):(B) es de 1 – 10 : 1 – 20.



US 20060019829A1

(19) **United States**(12) **Patent Application Publication**
Hacker et al.(10) **Pub. No.: US 2006/0019829 A1**(43) **Pub. Date: Jan. 26, 2006**(54) **HERBICIDAL COMPOSITIONS**(76) Inventors: **Erwin Hacker**, Hochheim (DE);
Eckhard Rose, Liederbach (DE);
Hansjorg Dietrich, Hofheim (DE)

Correspondence Address:

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745 FIFTH AVENUE- 10TH FL.
NEW YORK, NY 10151 (US)(21) Appl. No.: **11/181,402**(22) Filed: **Jul. 14, 2005**(30) **Foreign Application Priority Data**

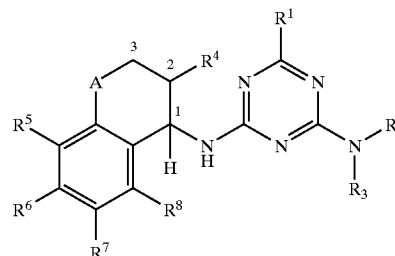
Jul. 17, 2004 (DE)..... 10 2004 034 571.6

Publication Classification(51) **Int. Cl.**
A01N 43/64 (2006.01)(52) **U.S. Cl.** **504/133; 504/134**(57) **ABSTRACT**

Herbicide combinations comprising an effective amount of components (A) and (B), where

component (A) is one or more herbicides of the formula (I) or salts thereof,

(I)



in which

R is H or a group of the formula $CZ^1Z^2Z^3$, where Z^1 , Z^2 and Z^3 are as defined in claim 1, R^2 and R^3 are each H, alkyl, haloalkyl, alkenyl, haloalkenyl, alkynyl, haloalkynyl having in each case up to 4 carbon atoms or acyl, R^4 is H, (C_1-C_6) -alkyl or (C_1-C_6) -alkoxy; R^5 , R^6 , R^7 and R^8 are each H, (C_1-C_4) -alkyl, (C_1-C_3) -haloalkyl, halogen, (C_1-C_3) -alkoxy, (C_1-C_3) -haloalkoxy or cyano;A is CH_2 or O or a direct bond, and component (B) is one or more herbicides from the group of compounds consisting of (B1) soil-acting herbicides particularly suitable for pre-emergence application against monocotyledonous or dicotyledonous harmful plants, (B2) foliar-acting herbicides particularly suitable for post-emergence application against monocotyledonous or dicotyledonous harmful plants, and (B3) soil-acting and foliar-acting herbicides suitable for pre- or post-emergence application against monocotyledonous or dicotyledonous harmful plants, are suitable for controlling harmful plants.

HERBICIDAL COMPOSITIONS

[0001] The invention is in the technical field of crop protection products which can be used against unwanted vegetation on non-crop land, for preparing seed or in plant crops and which comprise, as herbicidally active compounds, a combination of at least two herbicides, where one herbicide component is selected from the group consisting of certain bicyclically substituted azines.

[0002] Compounds from the structural class of N-substituted-amino-s-triazines having bicyclic radicals on the amino group are known as herbicides (see, for example, WO-A-97/31904 or U.S. Pat. No. 6,069,114). The compounds are effective against a broad spectrum of harmful plants both when applied by the pre-emergence method and when applied by the post-emergence method, a non-selective use for controlling unwanted vegetation or a selective use in plant crops, if appropriate in combination with safeners, being possible.

[0003] The efficacy of these herbicides against harmful plants is at a high level, but depends in general on the application rate, the formulation in question, the spectrum of harmful plants, the harmful plants to be controlled in each case, the climatic and soil conditions and the like. Another criterion is the duration of action, or the breakdown rate of the herbicide. If appropriate, changes in the sensitivity of harmful plants, which may occur upon prolonged use of the herbicides or within geographic limitations, must also be taken into consideration. The compensation of losses in action in the case of individual harmful plants by increasing the application rates of the herbicides is only possible to a certain degree, for example because such a procedure frequently reduces the selectivity of the herbicides or because the action is not improved, even when applying higher rates. In some cases, the selectivity in crops can be improved by adding safeners. In general, however, there remains a need for methods to achieve the herbicidal action with a lower application rate of active compounds. Not only does a lower application rate reduce the amount of an active compound required for application, but, as a rule, it also reduces the amount of formulation auxiliaries required. It both reduces the economic input and improves the ecological compatibility of the herbicide treatment.

[0004] One possibility of improving the application profile of a herbicide can consist in combining the active compound with one or more other active compounds which contribute the desired additional properties. However, the combined use of a plurality of active compounds frequently causes phenomena of physical and biological incompatibility, for example a lack of stability in a coformulation, decomposition of an active compound, or antagonism of the active compounds. What is desired are, in contrast, combinations of active compounds having an advantageous activity profile, high stability and, if possible, an unexpected synergistically improved action, which allows the application rate to be reduced in comparison with the individual application of the active compounds to be combined.

[0005] It is already known that the combination of other herbicides with herbicides from the broadly defined class of the amino-s-triazines which are N-substituted by arylalkyl radicals may result in synergistic effects (see WO-A-00/16627). Specific examples of combinations of other herbicides with amino-s-triazines having bicyclic radicals on the

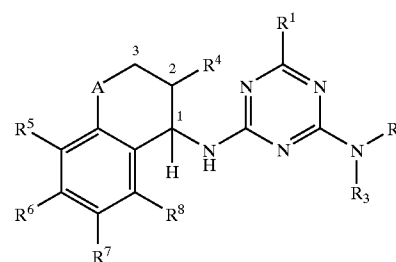
amino group are not described in this publication. Owing to the relatively strong differences between the amino-s-triazines having arylalkyl radicals on the amino group on the one hand and having bicyclic radicals on the other hand, where, in addition to the structural changes, differences can also be observed in changed activity characteristics, synergistic effects for the bicyclically substituted compounds, in particular individual stereoisomers thereof, are not to be expected in the same manner.

[0006] Surprisingly, it has now been found that active compounds of the herbicide type mentioned act in a particularly favorable manner against unwanted vegetation when they are used in combination with certain structurally different herbicides. They are preferably used on non-crop land, plantation crops and crops which are substantially tolerant to the application of the herbicides, if appropriate with added safeners.

[0007] Accordingly, the invention provides herbicide combinations comprising an effective amount of components (A) and (B) where

[0008] component (A) is one or more herbicides of the formula (I) or salts thereof

[herbicides (A)]



(I)

in which

[0009] R^1 is H or a group of the formula $CZ^1Z^2Z^3$, where

[0010] Z^1 is H, halogen, (C_1-C_6) -alkyl, (C_1-C_6) -haloalkyl, $[(C_1-C_4)$ -alkoxy]- (C_1-C_6) -alkyl, (C_3-C_6) -cycloalkyl which is unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, (C_1-C_4) -alkyl and (C_1-C_4) -haloalkyl, or is (C_2-C_6) -alkenyl, (C_2-C_6) -alkynyl, (C_2-C_6) -haloalkenyl, (C_4-C_6) -cycloalkenyl, (C_4-C_6) -halocycloalkenyl, (C_1-C_6) -alkoxy or (C_1-C_6) -haloalkoxy,

[0011] Z^2 is H, halogen, (C_1-C_6) -alkyl or (C_1-C_4) -alkoxy; or

[0012] Z^1 and Z^2 together with the carbon atom of the group $CZ^1Z^2Z^3$ are a (C_3-C_6) -cycloalkyl radical or (C_4-C_6) -cycloalkenyl radical; where each of the two last-mentioned radicals is unsubstituted or substituted by one or more radicals selected from the group consisting of (C_1-C_4) -alkyl, and

[0013] Z^3 is H, (C_1-C_6) -alkyl, (C_1-C_4) -alkoxy or halogen,

- [0014] R^2 and R^3 are each independently of one another H, (C_1-C_4) -alkyl, (C_1-C_4) -haloalkyl, (C_3-C_4) -alkenyl, (C_3-C_4) -haloalkenyl, (C_3-C_4) -alkynyl, (C_3-C_4) -haloalkynyl or an acyl radical,
- [0015] R^4 is H, (C_1-C_6) -alkyl or (C_1-C_6) -alkoxy,
- [0016] R^5 , R^6 , R^7 and R^8 are each independently of one another H, (C_1-C_4) -alkyl, (C_1-C_3) -haloalkyl, halogen, (C_1-C_3) -alkoxy, (C_1-C_3) -haloalkoxy or cyano and
- [0017] A is a divalent group of the formula CH_2 or O or a direct bond, and
- [0018] component (B) is one or more herbicides (B) which are structurally different from the herbicides (A) present in each case, selected from the group of compounds consisting of
- [0019] (B1) soil-acting herbicides particularly suitable for pre-emergence application against monocotyledonous or dicotyledonous harmful plants,
- [0020] (B2) foliar-acting herbicides particularly suitable for post-emergence application against monocotyledonous or dicotyledonous harmful plants, and
- [0021] (B3) soil-acting and foliar-acting herbicides suitable for pre- or post-emergence application against monocotyledonous or dicotyledonous harmful plants.
- [0022] The herbicide combinations according to the invention may comprise further components, for example other active compounds against harmful organisms such as harmful plants, plant-damaging animals or plant-damaging fungi, in particular compounds from the group of the herbicides, fungicides, insecticides, acaricides, nematocides and miticides and related substances, or else crop protection agents of a different type (for example safeners, resistance inducers), plant growth regulators and/or formulation auxiliaries and/or additives customary in crop protection. Here, the components may be formulated (finished formulation) and applied together, or they can be formulated separately and applied together, for example by the tank mix method or in a sequential application.
- [0023] The individual herbicides of the formula (I) present as component (A) are herein-below also referred to as compounds (A) or active compounds (A). Correspondingly, the individual herbicides present as component (B) are hereinbelow also referred to as compounds (B) or active compounds (B).
- [0024] The synergistic effects are observed when the active compounds (A) and (B) are applied together; however, they may frequently also occur when the compounds are applied as a split application over time. Another possibility is the application of the herbicides or the herbicide combinations in a plurality of portions (sequential application), for example one or more pre-emergence applications may be followed by a post-emergence application, or an early post-emergence application may be followed by applications at medium or late post-emergence. Preferred is the joint or nearly simultaneous application of the active compounds of the combination in question, if appropriate in a plurality of portions. However, it is also possible to apply the individual active compounds of a combination at different times, which may be advantageous in the individual case. It is also possible to integrate other crop protection agents, such as the active compounds mentioned (fungicides, insecticides, acaricides, etc.) and/or various auxiliaries, adjuvants and/or fertilizer applications with the application of this system.
- [0025] Application by the pre-emergence or post-emergence method is, depending on the context in which the terms are used, to be understood as meaning the application of the active compounds before or after the point in time when the harmful plants become visible above the ground, respectively, or the application of the active compounds against the harmful plants before the emergence of the crop plants and after the emergence of the crop plants, respectively.
- [0026] By applying the herbicides (A) and (B) in combination, it is possible to achieve application properties superior to what might be expected for the combination based on the known properties of the individual herbicides. The synergistic effects permit, for example, a reduction in the application rates of the individual active compounds, a higher efficacy at the same application rate, the control of previously uncontrolled species of harmful plants (gaps), higher residual action, longer long-term action, a more rapid onset of action, an extension of the period of application and/or a reduction of the number of individual applications required and—as a result for the user—weed control systems which are more advantageous economically and ecologically.
- [0027] In formula (I) for compounds of the herbicidally active components (A) and in all subsequent formulae, the following definitions apply:
- [0028] The formula (I) also includes all stereoisomers of the compounds whose specific stereochemical configuration is not expressly expressed by the formula, and mixtures thereof. Such compounds of the formula (I) contain one or more asymmetrical carbon atoms or else double bonds which are not specifically shown in the general formulae (I). The formula (I) embraces all possible stereoisomers defined by their specific spatial form, such as enantiomers, diastereoisomers, Z and E isomers, and these stereoisomers can be obtained by customary methods from mixtures of the stereoisomers or else by stereoselective reactions in combination with the use of stereochemically pure starting materials.
- [0029] By forming an adduct of a suitable inorganic or organic acid, such as, for example, HCl, HBr, H_2SO_4 or HNO_3 , or else oxalic acid or sulfonic acids, to a basic group, such as, for example, amino or alkylamino, the compounds of the formula (I) are capable of forming salts. Suitable substituents present in deprotonated form, such as, for example, sulfonic acids or carboxylic acids, can form inner salts with groups which for their part are protonatable, such as amino groups.
- [0030] It is also possible to form salts by replacing the hydrogen of suitable substituents, such as, for example, sulfonic acids or carboxylic acids, by an agriculturally useful cation. These salts are, for example, metal salts, in particular alkali metal salts or alkaline earth metal salts, especially sodium and potassium salts, or else ammonium salts, salts with organic amines or quaternary ammonium salts.
- [0031] The term “ (C_1-C_4) -alkyl” is an abbreviated notation for open-chain alkyl having one to 4 carbon atoms, i.e.

it comprises the radicals methyl, ethyl, 1-propyl, 2-propyl, 1-butyl, 2-butyl, 2-methylpropyl or tert-butyl. Correspondingly, general alkyl radicals having a wider stated range of carbon atoms, for example "(C₁-C₆)-alkyl", also comprise straight-chain or branched alkyl radicals having a larger number of carbon atoms, i.e., for example, also the alkyl radicals having 5 and 6 carbon atoms.

[0032] Unless specifically indicated, the lower carbon skeletons, for example those having 1 to 6 carbon atoms or, in the case of unsaturated groups, having 2 to 6 carbon atoms, are preferred for the hydrocarbon radicals, such as alkyl, alkenyl and alkynyl radicals, including in composite radicals. Alkyl radicals, including the composite meanings, such as alkoxy, haloalkyl, etc., are, for example, methyl, ethyl, n- or i-propyl, n-, i-, t- or 2-butyl, pentyls, hexyls, such as n-hexyl, i-hexyl and 1,3-dimethylbutyl, heptyls, such as n-heptyl, 1-methylhexyl and 1,4-dimethylpentyl; alkenyl and alkynyl radicals denote the possible unsaturated radicals which correspond to the meaning of the alkyl radicals; alkenyl is, for example, vinyl, allyl, 1-methyl-2-propenyl, 2-methyl-2-propenyl, 2-butenyl, pentenyl, 2-methylpentenyl or hexenyl, preferably allyl, 1-methylprop-2-en-1-yl, 2-methyl-prop-2-en-1-yl, but-2-en-1-yl, but-3-en-1-yl, 1-methyl-but-3-en-1-yl or 1-methyl-but-2-en-1-yl. (C₂-C₆)-Alkynyl is, for example, ethynyl, propargyl, 1-methyl-2-propynyl, 2-methyl-2-propynyl, 2-butylnyl, 2-pentylnyl or 2-hexynyl, preferably propargyl, but-2-yn-1-yl, but-3-yn-1-yl or 1-methyl-but-3-yn-1-yl.

[0033] Cycloalkyl denotes a carbocyclic saturated ring system having preferably 3-8 carbon atoms, for example cyclopropyl, cyclobutyl, cyclopentyl or cyclohexyl.

[0034] Cycloalkenyl denotes a carbocyclic non-aromatic partially unsaturated ring system having preferably 4-8 carbon atoms, for example 1-cyclobutenyl, 2-cyclobutenyl, 1-cyclopentenyl, 2-cyclopentenyl, 3-cyclopentenyl, or 1-cyclohexenyl, 2-cyclohexenyl, 3-cyclohexenyl, 1,3-cyclohexadienyl or 1,4-cyclohexadienyl.

[0035] Halogen denotes, for example, fluorine, chlorine, bromine or iodine. Haloalkyl, -alkenyl and -alkynyl denote alkyl, alkenyl and alkynyl, respectively, which are partially or fully substituted by identical or different halogen atoms, preferably selected from the group consisting of fluorine, chlorine and bromine, in particular from the group consisting of fluorine and chlorine, for example monohaloalkyl, perhaloalkyl, CF₃, CHF₂, CH₂F, CF₃CF₂, CH₂FCHCl, CCl₃, CHCl₂, CH₂CH₂Cl; haloalkoxy is, for example, OCF₃, OCHF₂, OCH₂F, CF₃CF₂O, OCH₂CF₃ and OCH₂CH₂Cl; this applies correspondingly to haloalkenyl and other halogen-substituted radicals.

[0036] In the case of radicals having carbon atoms, preference is given to those having 1 to 4 carbon atoms, preferably 1 or 2 carbon atoms. Preference is generally given to substituents selected from the group consisting of halogen, for example fluorine and chlorine, (C₁-C₄)-alkyl, preferably methyl or ethyl, (C₁-C₄)-haloalkyl, preferably trifluoromethyl, (C₁-C₄)-alkoxy, preferably methoxy or ethoxy, (C₁-C₄)-haloalkoxy, nitro and cyano. Particular preference is given here to the substituents methyl, methoxy, fluorine and chlorine.

[0037] Acyl denotes a radical of an organic acid which, formally, is formed by removing a hydroxyl group from the

acid function, it also being possible for the organic radical in the acid to be attached to the acid function via a heteroatom. Examples of acyl are the radical —CO—R of a carboxylic acid HO—CO—R and radicals of acids derived therefrom, such as thiocarboxylic acid, unsubstituted or N-substituted iminocarboxylic acids or the radical of carbonic acid monoesters, N-substituted carbamic acid, sulfonic acids, sulfinic acids, N-substituted sulfonamido acids, phosphonic acids, phosphinic acids.

[0038] Acyl denotes, for example, formyl, alkylcarbonyl, such as [(C₁-C₄)-alkyl]-carbonyl, phenylcarbonyl, alkyloxy-carbonyl, phenyloxycarbonyl, benzyloxycarbonyl, alkylsulfonyl, alkylsulfinyl, N-alkyl-1-iminoalkyl and other radicals of organic acids. Here, the radicals may in each case be substituted further in the alkyl or phenyl moiety, for example in the alkyl moiety by one or more radicals selected from the group consisting of halogen, alkoxy, phenyl and phenoxy; examples of substituents in the phenyl moiety are the substituents which have already been mentioned further above in a general manner for substituted phenyl.

[0039] Acyl preferably denotes an acyl radical in the narrower sense, i.e. a radical of an organic acid where the acid group is attached directly to the carbon atom of an organic radical, for example formyl, alkylcarbonyl, such as acetyl or [(C₁-C₄)-alkyl]carbonyl, phenylcarbonyl, alkylsulfonyl, alkylsulfinyl and other radicals of organic acids.

[0040] If a general radical is designated (defined) as "hydrogen", this means an attached hydrogen atom.

[0041] The "yl-position" of a radical (for example of an alkyl radical) denotes its point of attachment.

[0042] Hereinbelow, compounds of the formula (I) and salts thereof which can be used according to the invention are, in short, also referred to as "compounds (I) according to the invention".

[0043] The compounds of the formula (I) are known in principle from WO 97/31904 or can be prepared by the processes described therein. Of particular interest are compounds of the formula (I) or salts thereof in which

[0044] R¹ is H or a group of the formula CZ¹Z²Z³ in which

[0045] Z¹ is H, halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, [(C₁-C₄)-alkoxy]-(C₁-C₆)-alkyl, (C₃-C₆)-cycloalkyl, which is unsubstituted or substituted by one or more radicals selected from the group consisting of (C₁-C₄)-alkyl, or is (C₂-C₄)-alkenyl, (C₂-C₄)-alkynyl, (C₁-C₄)-alkoxy or (C₁-C₄)-haloalkoxy;

[0046] Z² is H, halogen or (C₁-C₄)-alkyl, or

[0047] Z¹ and Z² together with the carbon atom attached to the radicals are a (C₃-C₆)-cycloalkyl radical and

[0048] Z³ is H, (C₁-C₄)-alkyl, (C₁-C₂)-alkoxy or halogen,

[0049] R² is H, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₃-C₄)-alkenyl, (C₃-C₄)-haloalkenyl, (C₃-C₄)-alkynyl, (C₃-C₄)-haloalkynyl or an acyl radical having 1 to 12 carbon atoms (preferably an acyl radical selected from the group consisting of formyl, phenylcarbonyl, phenoxy-carbonyl, where phenyl in the two last-mentioned radicals is unsubstituted or substituted by one or more radicals selected

from the group consisting of halogen, (C₁-C₂)-alkyl, (C₁-C₂)-haloalkyl, (C₁-C₂)-alkoxy, (C₁-C₂)-haloalkoxy and nitro, or (C₁-C₆)-alkyl-carbonyl, (C₁-C₆)-alkoxy-carbonyl or (C₁-C₆)-alkyl-sulfonyl),

[0050] R³ is H, (C₁-C₄)-alkyl or (C₁-C₄)-haloalkyl,

[0051] R⁴ is H, (C₁-C₃)-alkyl or (C₁-C₃)-alkoxy,

[0052] R⁵, R⁶, R⁷ and R⁸ are each independently of one another H, (C₁-C₃)-alkyl, halogen, (C₁-C₃)-alkoxy, and

[0053] A is a divalent group of the formula CH₂ or O or a direct bond, preferably CH₂ or a direct bond, in particular a direct bond.

[0054] Preference is given to optically active compounds of the formula (I) and salts thereof in which the stereochemical configuration at the carbon atom marked 1 in formula (I) is the (R)-configuration with a stereochemical purity of 60 to 100% (R), preferably 70-100% (R), in particular 80 to 100% (R), in each case based on the content of stereoisomers having (R)- and (S)-configuration in this position. The configuration is assumed to have been determined using the Cahn/Ingold/Prelog system, the priority of the substituents in position 1 being as follows:

[0055] 1. priority is given to substituted NH; 2. priority is given to the bond to the phenyl ring; 3. priority is given to the other carbon ring atom, 4. priority is given to the hydrogen atom.

[0056] Preference is furthermore given to optically active compounds of the formula (I) and salts thereof in which R¹ is a group of the formula CZ¹Z²Z³, where CZ¹Z²Z³ is defined as above, in particular to those compounds in which the stereochemical configuration at the carbon atom of the group CZ¹Z²Z³ is the (R,S)-configuration or the (R)-configuration with a stereochemical purity of 60 to 100% (R), preferably 70-100% (R), in particular 80 to 100% (R), in each case based on the content of stereoisomers having (R)- and (S)-configuration in this position.

[0057] Suitable combination partners (A) are, for example, certain compounds of the formula (I) from Table 1 below.

[0058] Notes for Table 1:

[0059] In Table 1, the compounds are designated by the chemical formula of the main component, this component being present in a chemical purity of at least 95% by weight of the compound. It is, of course, also possible to use the compounds in lower purities. In particular if minor components of the compounds consist predominantly or entirely of active stereoisomers of the respective compounds (A), similar efficacies are achieved during application. Accordingly, preferred herbicides (A) are also mixtures of two or more compounds (A) from Table 1. For reasons of easier preparability, in practice, preference is especially also given to herbicides (A) comprising, as main component, a compound (A) from Table 1 and, as minor components, stereoisomers of the compound (A), preferably those which are also mentioned in Table 1.

[0060] If, in the chemical formula in question in Table 1, the stereochemical orientation at a carbon atom is given and the stereochemical orientation is additionally assigned using the system of Cahn, Ingold and Prelog, the main component of the compound is a stereoisomer or a stereoisomer mixture

which has the R- or S-configuration at the carbon atom referred to; the compound (A) is thus optically active.

[0061] If the stereochemistry is not assigned by an R- or S-configuration, the main component is a compound which, at the carbon atom in question, has the RS-configuration (racemic).

[0062] If a plurality of stereocenters are present and the configuration is in each case assigned by R or S, these are optically active compounds having the stereochemistry mentioned at the centers referred to.

[0063] If, in the case of a plurality of centers, no R- or S-configuration is assigned, the compounds are racemic mixtures, i.e. the non-chiral stereoisomers contained therein (enantiomers of a pair of enantiomers) are present in the mixture in identical proportions. Unless indicated in more detail, in Table 1, in the case of racemic compounds (A) having a plurality of stereocenters, the diastereoisomeric components are present in approximately identical proportions. However, for practical application, in the case of racemic compounds having a plurality of stereocenters, mixtures of diastereomers (in each case in racemic form) having different proportions of the diastereomeric components are possible.

[0064] In the bicyclic radical, the carbon atom which is attached to the amino group is carbon atom 1. In the side group (unless the radical is H) the carbon atom attached directly to the triazine ring is referred to as 1*.

TABLE 1

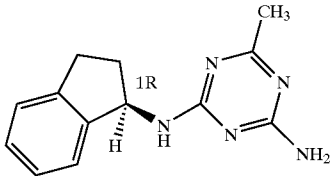
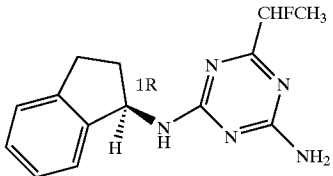
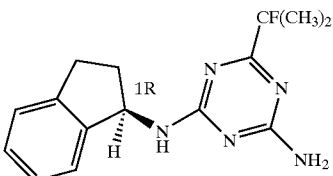
Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A1	
A2	
A3	

TABLE 1-continued

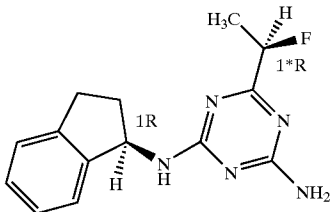
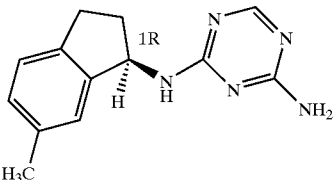
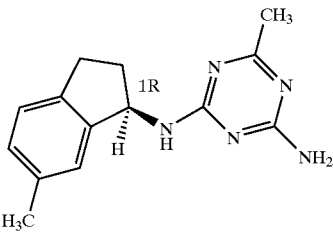
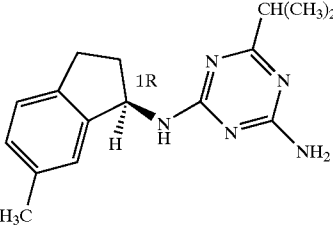
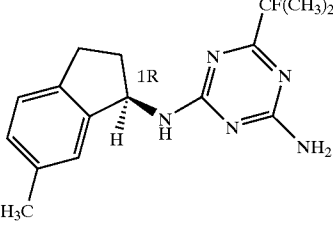
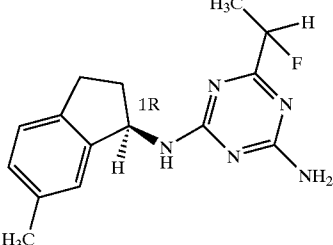
Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A4	
A5	
A6	
A7	
A8	
A9	

TABLE 1-continued

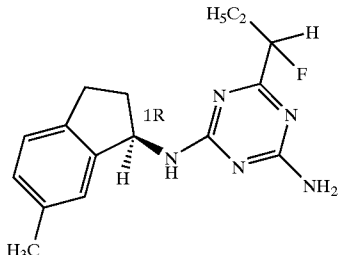
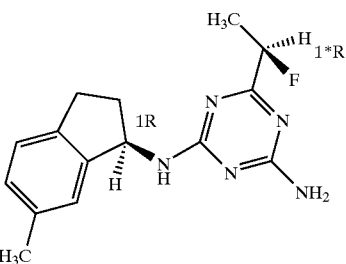
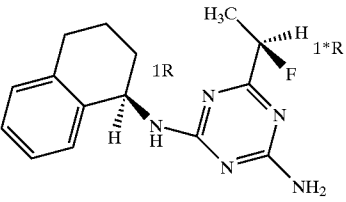
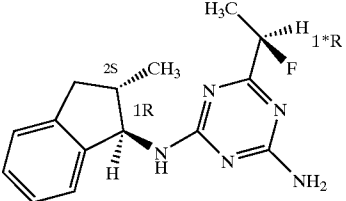
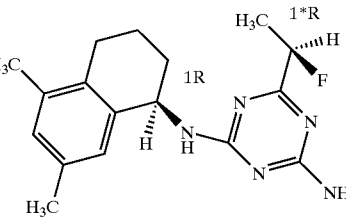
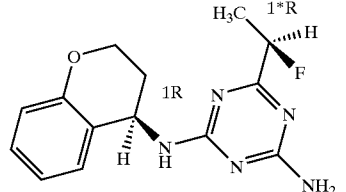
Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A10	
A11	
A12	
A13	
A14	
A15	

TABLE 1-continued

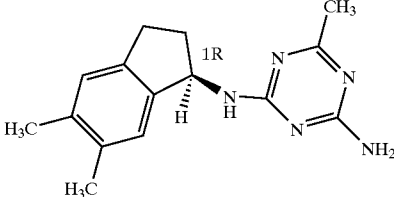
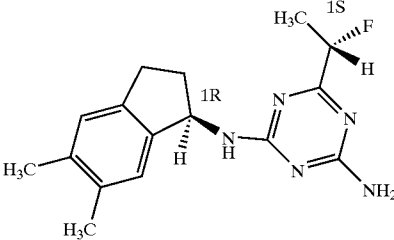
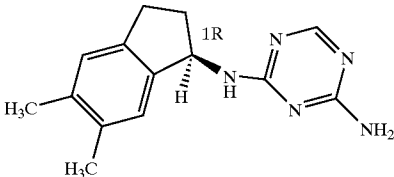
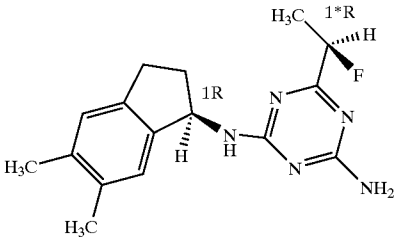
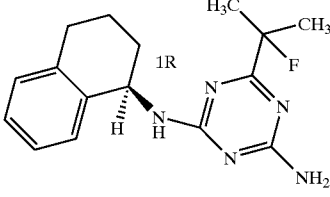
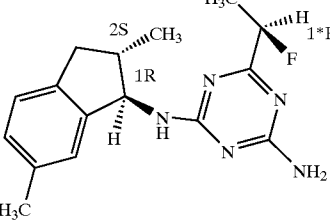
Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A16	
A17	
A18	
A19	
A20	
A21	

TABLE 1-continued

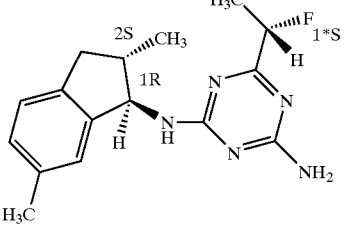
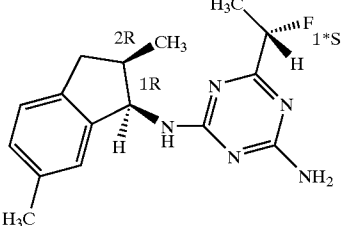
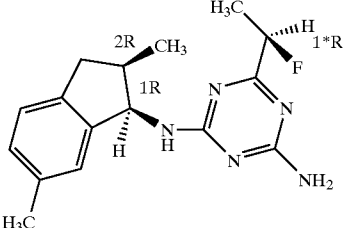
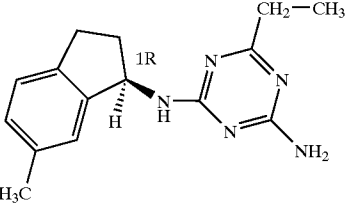
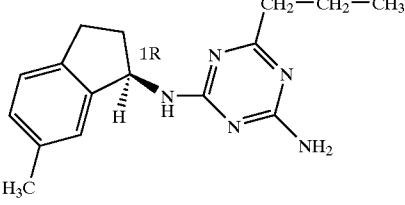
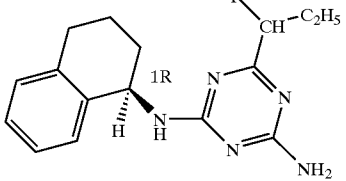
Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A22	
A23	
A24	
A25	
A26	
A27	

TABLE 1-continued

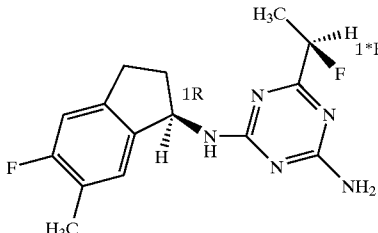
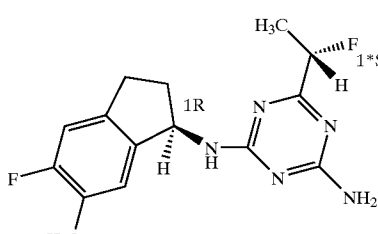
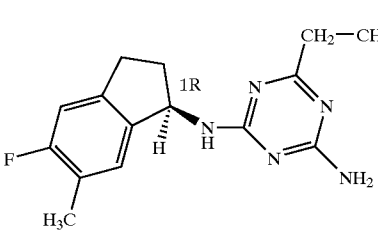
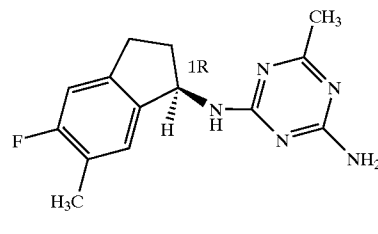
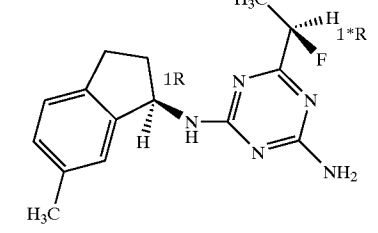
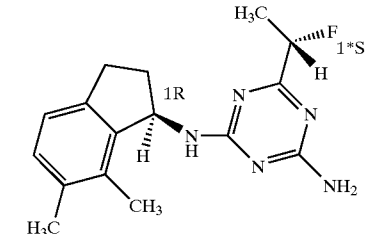
Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A28	
A29	
A30	
A31	
A32	
A33	

TABLE 1-continued

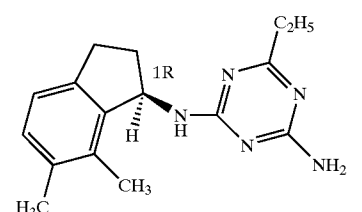
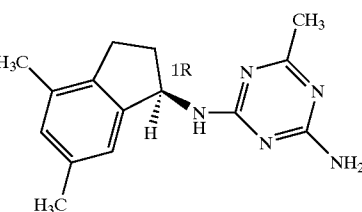
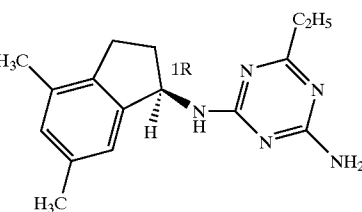
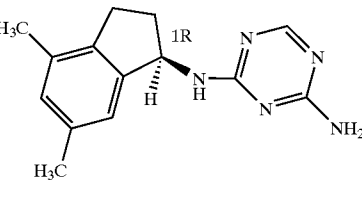
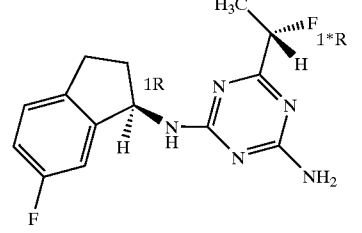
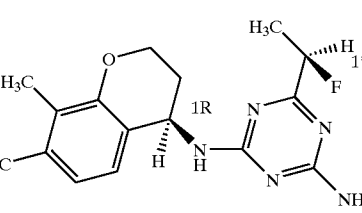
Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
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A35	
A36	
A37	
A38	
A39	

TABLE 1-continued

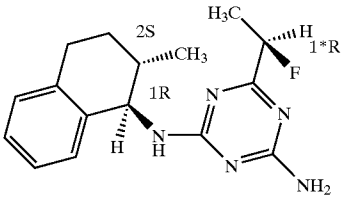
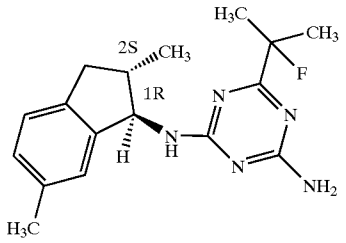
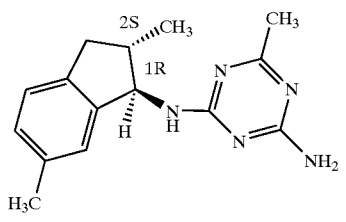
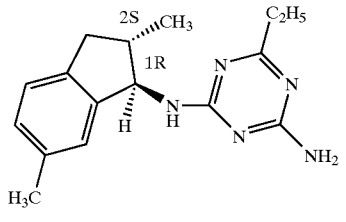
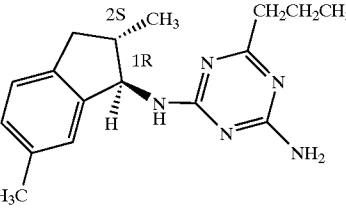
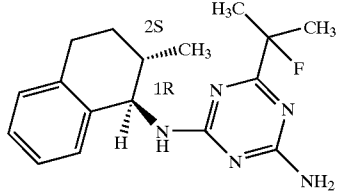
Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A40	
A41	
A42	
A43	
A44	
A45	

TABLE 1-continued

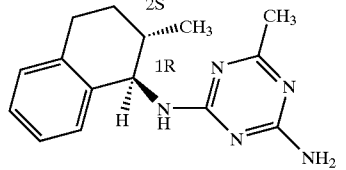
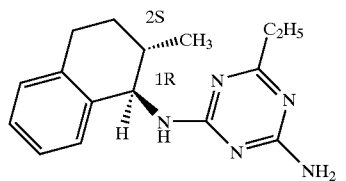
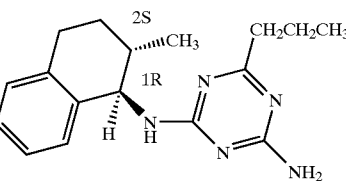
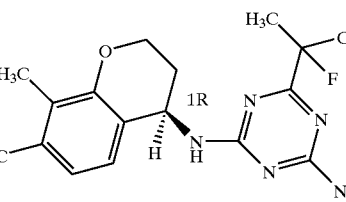
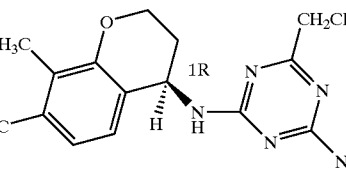
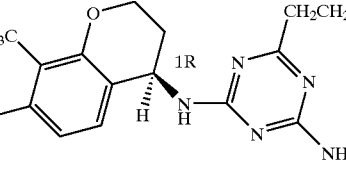
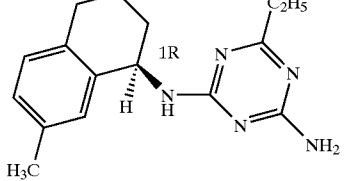
Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A46	
A47	
A48	
A49	
A50	
A51	
A52	

TABLE 1-continued

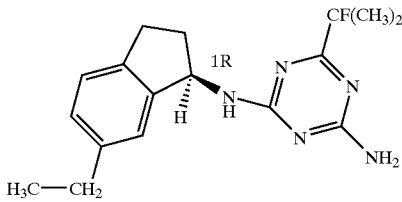
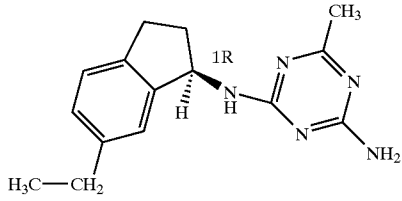
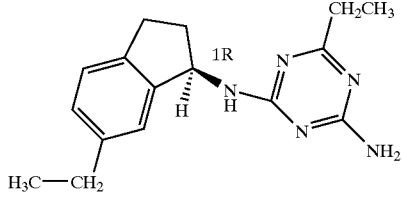
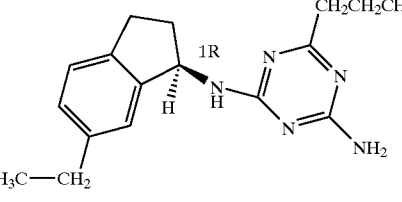
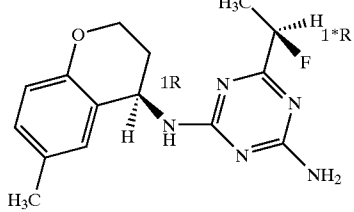
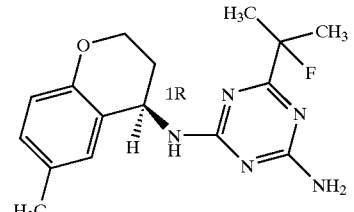
Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A53	
A54	
A55	
A56	
A57	
A58	

TABLE 1-continued

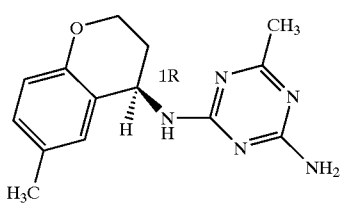
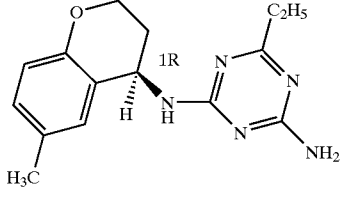
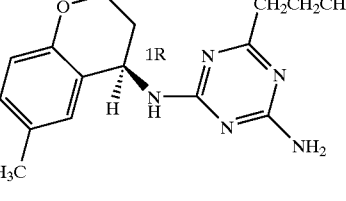
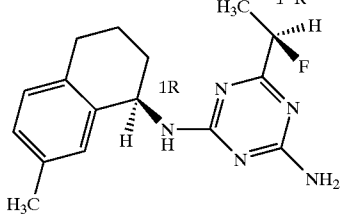
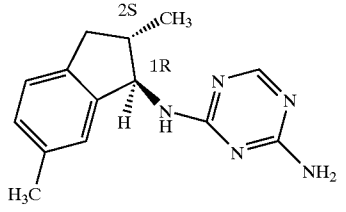
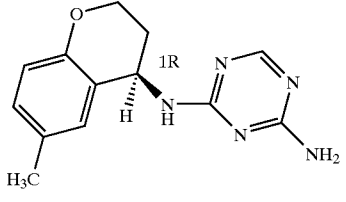
Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A59	
A60	
A61	
A62	
A63	
A64	

TABLE 1-continued

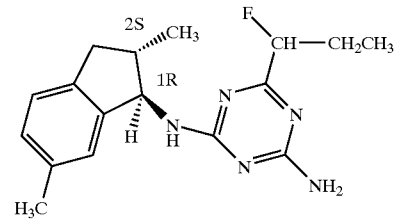
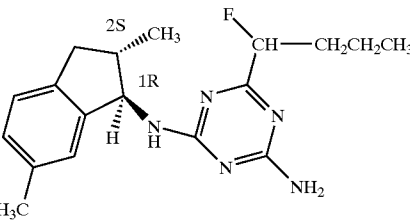
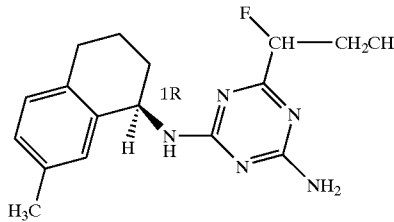
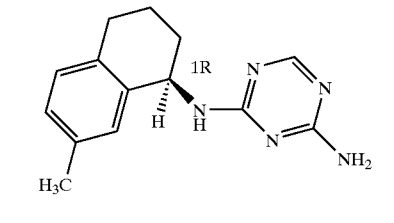
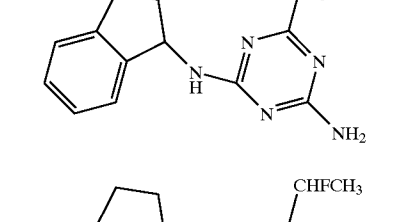
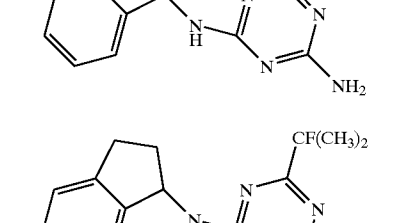
Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A65	
A66	
A67	
A68	
A69	
A70	
A71	

TABLE 1-continued

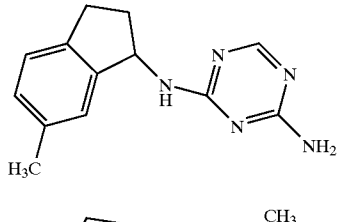
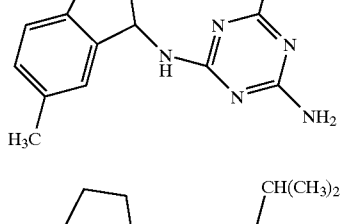
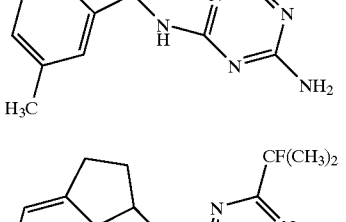
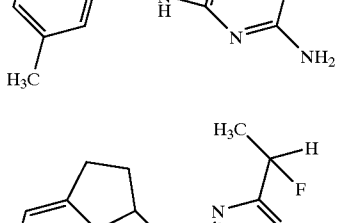
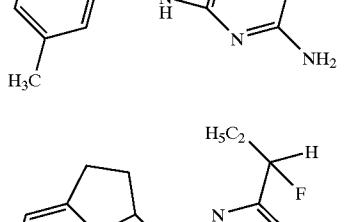
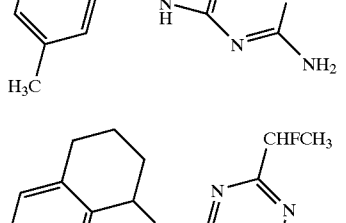
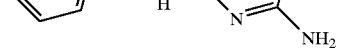
Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A72	
A73	
A74	
A75	
A76	
A77	
A78	

TABLE 1-continued

Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A79	
A80	
A81	
A82	
A83	
A84	
A85	

TABLE 1-continued

Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A86	
A87	
A88	
A89	
A90	
A91	
A92	

TABLE 1-continued

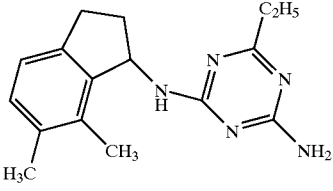
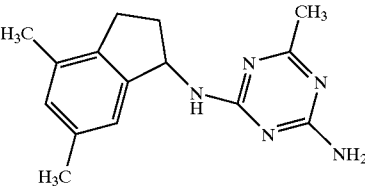
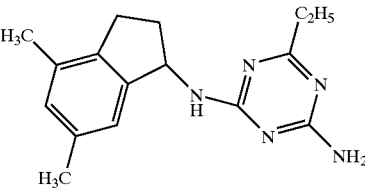
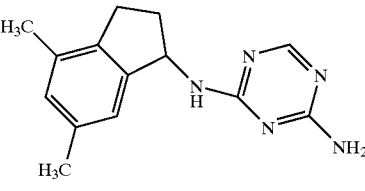
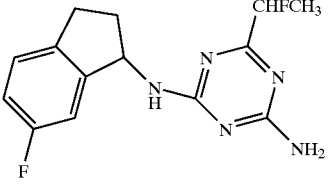
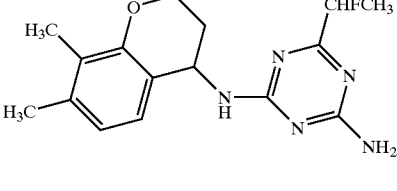
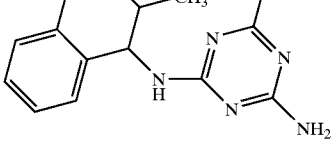
Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A93	
A94	
A95	
A96	
A97	
A98	
A99	

TABLE 1-continued

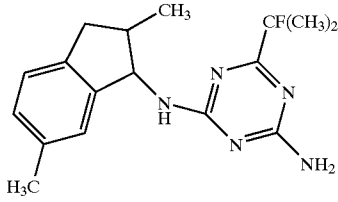
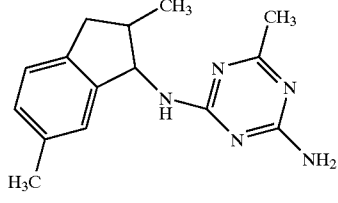
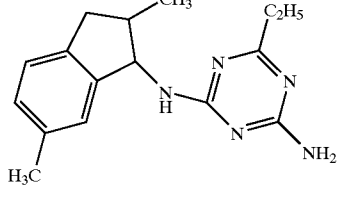
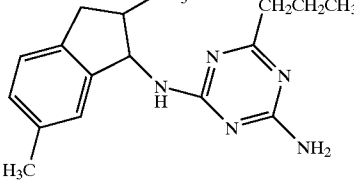
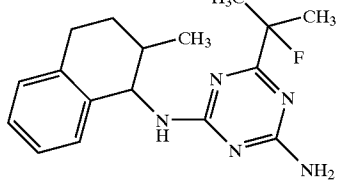
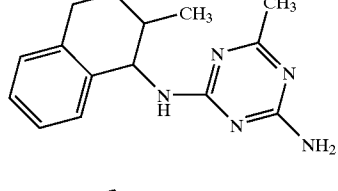
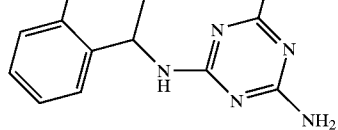
Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A100	
A101	
A102	
A103	
A104	
A105	
A106	

TABLE 1-continued

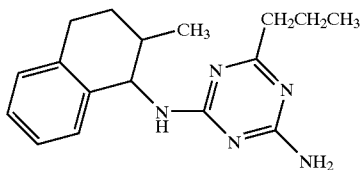
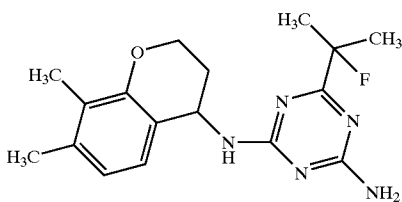
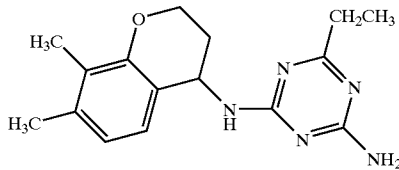
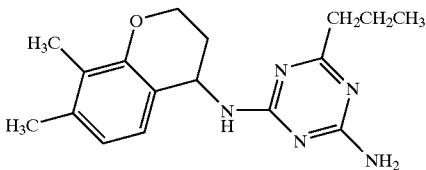
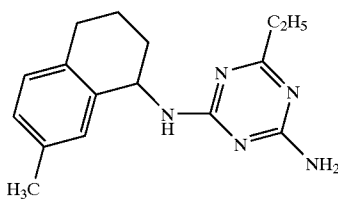
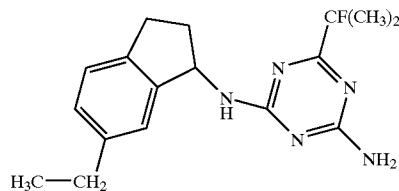
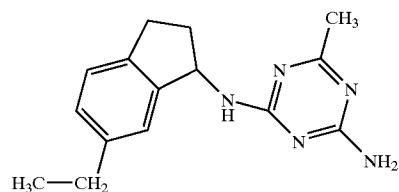
Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A107	
A108	
A109	
A110	
A111	
A112	
A113	

TABLE 1-continued

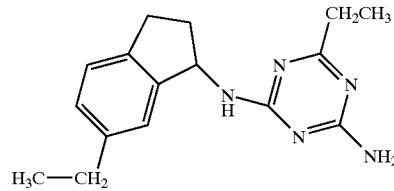
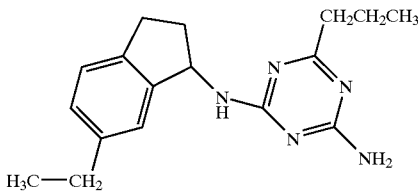
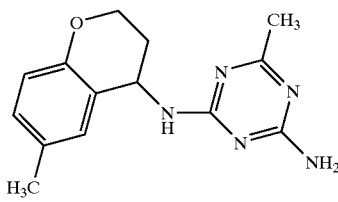
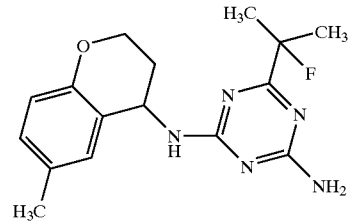
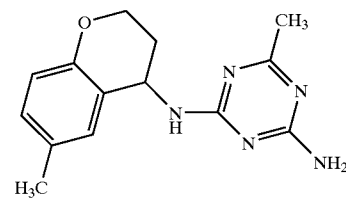
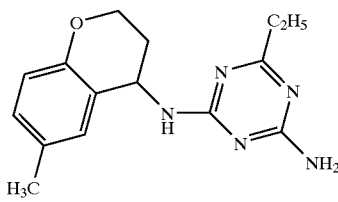
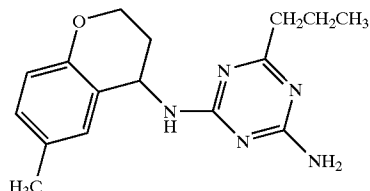
Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A114	
A115	
A116	
A117	
A118	
A119	
A120	

TABLE 1-continued

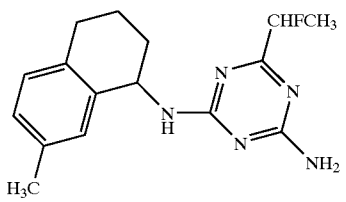
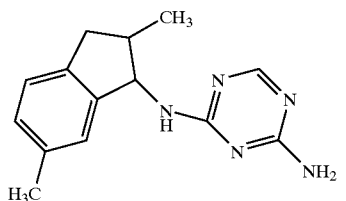
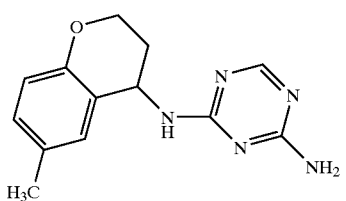
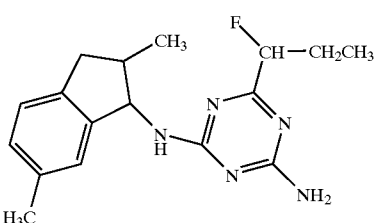
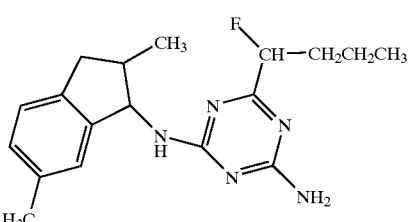
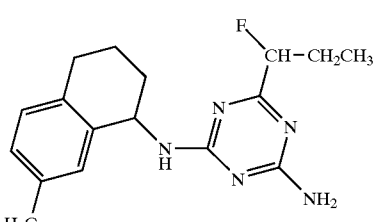
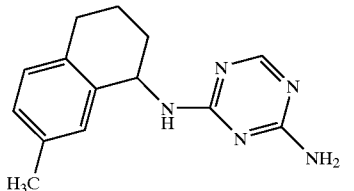
Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A121	
A122	
A123	
A124	
A125	
A126	

TABLE 1-continued

Compounds of the formula (I) (herbicide (A)):	
Compound No.	Chemical formula or chemical name
A127	

[0065] The application rates of the herbicides (A) are known in principle and are in the range from 0.5 to 2000 g of active compound per hectare, preferably from 1 to 800 g of active compound per hectare, in particular from 5 to 500 g of active compound per hectare. In the combinations according to the invention, in the context of the application rates mentioned, lower application rates of the active compound in question are required compared to the application on its own.

[0066] Suitable combination partners (B) [=component (B)] are, for example, the following compounds, differing from compounds (A), of subgroups (B1) to (B3), where the herbicides are in most cases referred to by the "common name" according to the literature reference "The Pesticide Manual" 13th Ed., British Crop Protection Council 2003, abbreviated as "PM":

[0067] (B1) soil-acting herbicides which are particularly suitable for pre-emergence application against monocotyledonous or dicotyledonous harmful plants,

for example one or more compounds selected from the group consisting of

[0068] (B1.1) soil-acting herbicides which are particularly suitable for pre-emergence application against monocotyledonous and dicotyledonous harmful plants,

for example one or more compounds selected from the group consisting of

[0069] (B1.1.1) tebuthiuron (PM, pp. 929-930), i. e. 1-(5-tert-butyl-1,3,4-thiadiazol-2-yl)-1,3-dimethylurea,

[0070] (B1.1.2) sulfometuron(-methyl) (PM, pp. 929-930), i. e. methyl 2-(4,6-dimethyl-pyrimidin-2-yl-carbamoylsulfamoyl)benzoate,

[0071] (B1.1.3) flumioxazine (PM, pp. 461-462), i. e. 2-(7-fluoro-3,4-dihydro-3-oxo-4-prop-2-ynyl-2H-1,4-benzoxazin-6-yl)-4,5,6,7-tetrahydro-1H-isindole-1,3(2H)-dione

[0072] (B1.1.4) simazine (PM, pp. 891-892), i. e. 6-chloro-N,N'-diethyl-1,3,5-triazine-2,4-diamine,

[0073] (B1.1.5) dichlobenil (PM, pp. 281-282), i. e. 2,6-dichlorobenzonitrile,

[0074] (B1.1.6) trifluralin (PM, pp. 1012-1014), i. e. α,α,α -trifluoro-2,6-dinitro-N,N-dipropyl-p-toluidine,

[0075] (B1.1.7) pendimethalin (PM, pp. 752-753), i. e. N-(1-ethylpropyl)-2,6-dinitro-3,4-xylylidine,

[0076] (B1.1.8) oxadiargyl (PM, pp. 725-726), i. e. 5-tert-butyl-3-[2,4-dichloro-5-(prop-2-ynyloxy)phenyl]-1,3,4-oxadiazol-2(3H)-one,

[0077] (B1.1.9) thiazopyr (PM, pp. 961-962), i. e. methyl 2-difluoromethyl-5-(4,5-dihydro-1,3-thiazol-2-yl)-4-isobutyl-6-trifluoromethylnicotinate,

[0078] (B1.1.10) oryzalin (PM, pp. 723-724), i. e. 4-(dipropylamino)-3,5-dinitrobenzene-sulfonamide,

[0079] (B1.1.11) propyzamide (PM, pp. 833-834), i. e. 3,5-dichloro-N-(1,1-dimethyl-propynyl)benzamide,

[0080] (B1.1.12) terbacil (PM, pp. 937-938), i. e. 3-tert-butyl-5-chloro-6-methyluracil,

and

[0081] (B1.2) soil-acting herbicides which are particularly suitable for pre-emergence application against dicotyledonous harmful plants,

for example one or more compounds selected from the group consisting of

[0082] (B1.2.1) isoxaben (PM, pp. 587-588), i. e. N-[3-(1-ethyl-1-methylpropyl)isoxazol-5-yl]-2,6-dimethoxybenzamide and

[0083] (B1.2.2) flazasulfuron (PM, pp. 437-438), i. e. 1-(4,6-dimethoxypyrimidin-2-yl)-3-(3-trifluoromethyl-2-pyridylsulfonyl)urea,

and

[0084] (B2) foliar-acting herbicides which are particularly suitable for post-emergence application against monocotyledonous or dicotyledonous harmful plants,

for example one or more compounds selected from the group consisting of

[0085] (B2.1) foliar-acting herbicides which are particularly suitable for post-emergence application against monocotyledonous and dicotyledonous harmful plants,

for example one or more compounds selected from the group consisting of

[0086] (B2.1.1) glufosinate (PM, pp. 511-512), i. e. 4-[hydroxy(methyl)phosphinoyl]-DL-homoalanine and its salts, preferably the ammonium salt (B2.1.1.1), the sodium salt (B2.1.1.2), and the active L-isomer and its salts (B2.1.1.3) and the tripeptide bilanafos and its salts (B2.1.1.4), i. e. 4-[hydroxy-(methyl)phosphinoyl]-L-homoalanyl-L-alanyl-L-alanine and its salts,

[0087] (B2.1.2) glyphosate (PM, pp. 513-516), i. e. N-(phosphonomethyl)glycine and its salts, preferably the isopropylammonium salt (B2.1.2.1), the sodium salt (B2.1.2.2), the ammonium salt (B2.1.2.3) and the trimesium salt (B2.1.3)=sulfosate (see below),

[0088] (B2.1.3) sulfosate (PM, pp. 513-516), i. e. N-(phosphonomethyl)glycine trimesium salt (cf. glyphosate),

[0089] (B2.1.4) methylarsonic acid and its salts (PM, pp. 656-658), such as the monosodium salt (B2.1.4.1)=MSMA (sodium hydrogen methylarsonate), but also other salts, such as the calcium hydrogen methylarsonate (B2.1.4.2), the disodium salt (DSMA) (B2.1.4.3), the

monoammonium salt (MAMA) (B2.1.4.4), the calcium bis(hydrogen methylarsonate) (CMA) (B2.1.4.5);

[0090] (B2.1.5) foramsulfuron (PM, pp. 494-495), i. e. 1-(4,6-dimethoxypyrimidin-2-yl)-3-[2-(dimethylcarbamoyl)-5-formamidophenylsulfonyl]urea,

[0091] (B2.1.6) iodosulfuron and its esters and salts (PM, pp. 573-574), i. e. 4-iodo-2-[3-(4-methoxy-6-methyl-1,3,5-triazin-2-yl)ureidosulfonyl]benzoic acid and its esters and salts, preferably the methyl ester iodosulfuron-methyl and its salts (B2.1.6.1), and from among these in particular the sodium salt iodosulfuron-methyl-sodium (B2.1.6.2)

[0092] (B2.1.7) amicarbazone (PM, pp. 26-27), i. e. 4-amino-N-tert-butyl-4,5-dihydro-3-isopropyl-5-oxo-1,2,4-1H-triazole-1-carboxamide,

[0093] (B2.1.8) propoxycarbazone and its salts (PM, pp. 831-832), i. e. (4,5-dihydro-4-methyl-5-oxo-3-propoxy-1H-1,2,4-triazol-1-ylcarbonyl)(2-methoxy-carbonylphenylsulfonyl)azanide and its salts, preferably its sodium salt (B2.1.8.1),

[0094] (B2.1.9) metribuzin (PM, pp. 675-676), i. e. 4-amino-6-tert-butyl-4,5-dihydro-3-methylthio-1,2,4-triazin-5-one;

[0095] (B2.1.10) metsulfuron and its esters and salts (PM, pp. 677-678), i. e. 2-(4-methoxy-6-methyl-1,3,5-triazin-2-ylcarbamoylsulfamoyl)benzoic acid, preferably its methyl ester metsulfuron-methyl (B2.1.10.1),

[0096] (B2.1.11) naproanilide (PM, pp. 695-697), i. e. 2-(2-naphthyloxy)-N-phenyl-propionamide,

[0097] (B2.1.12) imazapyr and its salts (PM, pp. 555-556), i. e. 2-(4-isopropyl-4-methyl-5-oxo-2-imidazolin-2-yl)nicotinic acid and its salts, preferably the free acid (B2.1.12.1) and its isopropylammonium salt (B2.1.12.2),

[0098] (B2.1.13) paraquat salts (PM, pp. 742-743), i. e. 1,1'-dimethyl-4,4'-bipyridylium salts, preferably the dichloride paraquat dichloride (B2.1.13.1),

[0099] (B2.1.14) diquat salts (PM, pp. 341-342), i. e. 1,1'-ethylene-2,2'-bipyridyldiylum salts, preferably the dibromide diquat dibromide (B2.1.14.1),

and

[0100] (B2.2) foliar-acting herbicides which are particularly suitable for the post-emergence application against dicotyledonous harmful plants,

for example one or more compounds selected from the group consisting of

[0101] (B2.2.1) 2,4-D and its esters and salts (PM, pp. 254-258), i. e. 2,4-dichloro-phenoxyacetic acid and its esters and salts,

[0102] (B2.2.2) dicamba and its salts (PM, pp. 278-280), i. e. 3,6-dichloro-2-methoxy-benzoic acid and its salts,

[0103] (B2.2.3) triclopyr and its salts and esters (PM, pp. 1001-1002), i. e. 3,5,6-trichloro-2-pyridyloxyacetic acid and its salts and esters, such as, for example, the free acid (B2.2.3.1), the triethylammonium salt (B2.2.3.2) and the butyl ester (butylethyl ester) (B2.2.3.3),

[0104] (B2.2.4) diflufenzopyr and its salts and esters (PM, pp. 311-312), i.e. 2-[1-[4-(3,5-difluorophenyl)semicarbazono]ethyl]nicotinic acid and its salts and esters, such as, for example, the free acid (B2.2.4.1) and the sodium salt (B2.2.4.2),

[0105] (B2.2.5) fluroxypyr and its salts and esters (PM, pp. 478-481), i. e. 4-amino-3,5-dichloro-6-fluoro-2-pyridylloxyacetic acid and its salts and esters, such as, for example, the free acid (B2.2.5.1), the 2-butoxy-1-methylethyl ester (B2.2.5.2) and the meptyl ester (=1-methylheptyl ester) (B2.2.5.3),

[0106] (B2.2.6) thifensulfuron-methyl (PM, pp. 963-965), i. e. methyl 3-(4-methoxy-6-methyl-1,3,5-triazin-2-ylcarbamoylsulfamoyl)thiophene-2-carboxylate, and also the free acid thifensulfuron (B2.2.6.1),

[0107] (B2.2.7) amidosulfuron (PM, pp. 27-28), i. e. 1-(4,6-dimethoxypyrimidin-2-yl)-3-mesyl(methyl)sulfamoylurea and its salts,

[0108] (B2.2.8) tribenuron and its esters and salts (PM, pp. 996-998), i. e. 2-[4-methoxy-6-methyl-1,3,5-triazin-2-yl(methyl)carbamoylsulfamoyl]benzoic acid and its esters and salts, preferably the methyl ester tribenuron-methyl (B2.2.8.1),

[0109] (B2.2.9) triasulfuron (PM, pp. 990-991), i. e. 1-[2-(2-chloroethoxy)phenylsulfonyl]-3-(4-methoxy-6-methyl-1,3,5-triazin-2-yl)urea,

[0110] (B2.2.10) picloram and its esters and salts (PM, pp. 782-785), i. e. 4-amino-3,5,6-trichloropyridine-2-carboxylic acid (=4-amino-3,5,6-trichloropicolinic acid) and its esters and salts, preferably the free acid (B2.2.10.1), its potassium salt (B2.2.10.2), its dimethylammonium salt (B2.2.10.3), its tris(2-hydroxypropyl)ammonium salt (B2.2.10.4), its tris(2-hydroxyethyl)-ammonium salt (B2.2.10.5) and its isooctyl ester (B2.2.10.6),

[0111] (B2.2.11) carfentrazone and its esters and salts (PM, pp. 143-144), i. e. (RS)-2-chloro-3-[2-chloro-5-(4-difluoromethyl-4,5-dihydro-3-methyl-5-oxo-1H-1,2,4-triazol-1-yl)-4-fluorophenyl]propionic acid and its esters and salts, preferably its ethyl ester carfentrazone-ethyl (B2.2.11.1),

[0112] (B2.2.12) clopyralid and its esters and salts (PM, pp. 194-195), i. e. 3,6-dichloropyridine-2-carboxylic acid and its esters and salts, preferably the free acid (B2.2.12.1) and the ethanolamine ester clopyralid-olamine (B2.2.12.2),

[0113] (B2.2.13) butafenacil (PM, pp. 120-121), i. e. 1-(allyloxycarbonyl)-1-methylethyl 2-chloro-5-[1,2,3,6-tetrahydro-3-methyl-2,6-dioxo-4-(trifluoromethyl)-pyrimidin-1-yl]-benzoate,

[0114] (B2.2.14) amitrole (PM, pp. 30-32), i. e. 1H-1,2,4-triazol-3-ylamine,

and

[0115] (B2.3) foliar-acting herbicides which are particularly suitable for post-emergence application against monocotyledonous harmful plants,

for example the compound

[0116] (B2.3.1) quinclorac (PM, pp. 869-870), i. e. 3,7-dichloroquinoline-8-carboxylic acid,

and

[0117] (B3) soil- and foliar-acting herbicides which are suitable for pre- or post-emergence application against monocotyledonous or dicotyledonous harmful plants,

for example one or more compounds selected from the group consisting of

[0118] (B3.1) soil- and foliar-acting herbicides which are particularly suitable for post-emergence application against monocotyledonous or dicotyledonous harmful plants, for example one or more compounds selected from the group consisting of

[0119] (B3.1.1) oxyfluorfen (PM, pp. 738-739) (=2-chloro-1-(3-ethoxy-4-nitrophenoxy)-4-(trifluoromethyl)benzene),

[0120] (B3.1.2) diuron (PM, pp. 347-348), i. e. 3-(3,4-dichlorophenyl)-1,1-dimethylurea,

[0121] (B3.1.3) bromacil (PM, pp. 106-107), i. e. 5-bromo-3-sec-butyl-6-methyluracil,

[0122] (B3.1.4) norflurazon (PM, pp. 869-870), i. e. 4-chloro-5-methylamino-2-(α,α,α -trifluoro-m-tolyl)pyridazin-3(2H)-one,

[0123] (B3.1.5) azafenidin (PM, pp. 1043), i. e. 2-(2,4-dichloro-5-prop-2-ynyloxyphenyl)-5,6,7,8-tetrahydro-1,2,4-triazolo[4,3-a]pyridin-3(2H)-one,

[0124] (B3.1.6) chlorsulfuron (PM, pp. 176-177), i. e. 1-(2-chlorophenylsulfonyl)-3-(4-methoxy-6-methyl-1,3,5-triazin-2-yl)urea,

[0125] (B3.1.7) imazapic (PM, pp. 554-555), i. e. (RS)-2-(4-isopropyl-4-methyl-5-oxo-2-imidazolin-2-yl)-5-methylnicotinic acid,

[0126] (B3.1.8) oxadiazon (PM, pp. 727-728), i. e. 5-tert-butyl-3-(2,4-dichloro-5-iso-propoxyphenyl)-1,3,4-oxadiazol-2(3H)-one,

[0127] (B3.1.9) diflufenican (PM, pp. 427-311), i. e. 2',4'-difluoro-2-(α,α,α -trifluoro-m-tolylloxy)nicotinilide,

[0128] (B3.1.10) ametryn (PM, pp. 25-26), N²-ethyl-N⁴-isopropyl-6-methylthio-1,3,5-triazine-2,4-diamine,

[0129] (B3.1.11) rimsulfuron (PM, pp. 881-882), 1-(4,6-dimethoxypyrimidin-2-yl)-3-(3-ethylsulfonyl-2-pyridylsulfonyl)urea, and its salts,

[0130] (B3.1.12) trifloxysulfuron (PM, pp. 1008-1009), 1-(4,6-dimethoxypyrimidin-2-yl)-3-[3-(2,2,2-trifluoroethoxy)-2-pyridylsulfonyl]urea, and its salts, preferably its sodium salt (B3.1.12.1),

[0131] (B3.1.13) nicosulfuron (PM, pp. 702-703), 1-(4,6-dimethoxypyrimidin-2-yl)-3-(3-dimethylcarbamoyl-2-pyridylsulfonyl)urea, and its salts,

[0132] (B3.1.14) asulam and its salts (PM, pp. 38-39), preferably asulam, i. e. methyl sulfanilylcarbamate (B3.1.14.1) and its sodium salt (B3.1.14.2),

[0133] (B3.1.15) isoxaflutole (PM, pp. 589-590), (5-cyclopropyl-4-isoxazolyl)-[2-(methylsulfonyl)-4-(trifluoromethyl)phenyl]methanone,

and

[0134] (B3.2) soil- and foliar-acting herbicides which are particularly suitable for the post-emergence application against dicotyledonous harmful plants,

for example one or more compounds selected from the group consisting of

[0135] (B3.2.1) hexazinone (PM, pp. 539-540), i. e. 3-cyclohexyl-6-dimethylamino-1-methyl-1,3,5-triazine-2,4-(1H,3H)-dione,

[0136] (B3.2.2) sulfentrazone (PM, pp. 910-911), i. e. 2',4'-dichloro-5'-(4-difluoromethyl-4,5-dihydro-3-methyl-5-oxo-1H-1,2,4-triazol-1-yl)methanesulfonanilide,

[0137] (B3.2.3) prometon (PM, pp. 810-811), i. e. N²,N⁴-di-isopropyl-6-methoxy-1,3,5-triazine-2,4-diamine.

[0138] From the combinations defined above, preference is given to those which comprise a herbicide from group (A) and a herbicide from group (B). Furthermore, the combinations according to the invention may be used together with other active compounds, such as the active compounds mentioned (herbicides, fungicides, insecticides, acaricides, etc.) and/or plant growth regulators or auxiliaries from the group of the formulation auxiliaries and additives customary in crop protection.

[0139] Accordingly, the invention also provides the herbicidal compositions which comprise the active compound combinations according to the invention together with formulation auxiliaries, if appropriate further additives and if appropriate further crop protection agents.

[0140] The invention also provides the use or the application method where the active compound combinations according to the invention are used as herbicides and plant growth regulators, preferably as herbicides and plant growth regulators comprising a synergistically effective amount of the respective active compound combination contained therein.

[0141] Below, specific herbicide combinations (Aa)+(Bb) are referred to by the term Ka.b, where a is the respective code from the number of the herbicide (A) from Table 1 [codes 1 to 127 of the compounds (A1) to (A127)] and b is the respective code of the herbicide component (B) according to Table 2 below [codes 1 to 103 of the compounds (B1.1.1) to (B3.2.3)]:

TABLE 2

Codes for the herbicide component B (see subtables 2a to 2i)	
Table 2a	
Code	Component B
1	(B1.1.1)
2	(B1.1.2)
3	(B1.1.3)
4	(B1.1.4)
5	(B1.1.5)
Table 2b	
Code	Component B
6	(B1.1.6)
7	(B1.1.7)
8	(B1.1.8)

TABLE 2-continued

Codes for the herbicide component B (see subtables 2a to 2i)	
9	(B1.1.9)
10	(B1.1.10)
Table 2c	
Code	Component B
11	(B1.1.11)
12	(B1.1.12)
13	(B1.2.1)
14	(B1.2.2)
Table 2d	
Code	Component B
15	(B2.1.1)
16	(B2.1.1.1)
17	(B2.1.1.2)
18	(B2.1.1.3)
19	(B2.1.1.4)
20	(B2.1.2)
21	(B2.1.2.1)
22	(B2.1.2.2)
23	(B2.1.2.3)
24	(B2.1.3)
25	(B2.1.4)
26	(B2.1.4.1)
27	(B2.1.4.2)
28	(B2.1.4.3)
29	(B2.1.4.4)
30	(B2.1.4.5)
31	(B2.1.5)
32	(B2.1.6)
33	(B2.1.6.1)
34	(B2.1.6.2)
35	(B2.1.7)
36	(B2.1.8)
37	(B2.1.8.1)
38	(B2.1.9)
Table 2e	
Code	Component B
39	(B2.1.10)
40	(B2.1.10.1)
41	(B2.1.11)
42	(B2.1.12)
43	(B2.1.12.1)
44	(B2.1.12.2)
45	(B2.1.13)
46	(B2.1.13.1)
47	(B2.1.14)
48	(B2.1.14.1)
49	(B2.2.1)
50	(B2.2.2)
51	(B2.2.3)
52	(B2.2.3.1)
53	(B2.2.3.2)
54	(B2.2.3.3)
55	(B2.2.4)
56	(B2.2.4.1)
57	(B2.2.4.2)
58	(B2.2.5)
59	(B2.2.5.1)
60	(B2.2.5.2)
61	(B2.2.5.3)
62	(B2.2.6)

TABLE 2-continued

Codes for the herbicide component B (see subtables 2a to 2i)	
Table 2f	
Code	Component B
63	(B2.2.6.1)
64	(B2.2.7)
65	(B2.2.8)
66	(B2.2.8.1)
67	(B2.2.9)
68	(B2.2.10)
69	(B2.2.10.1)
70	(B2.2.10.2)
71	(B2.2.10.3)
72	(B2.2.10.4)
73	(B2.2.10.5)
74	(B2.2.10.6)
75	(B2.2.11)
76	(B2.2.11.1)
77	(B2.2.12)
78	(B2.2.12.1)
79	(B2.2.12.2)
80	(B2.2.13)
81	(B2.2.14)
82	(B2.3.1)
Table 2g	
Code	Component B
83	(B3.1.1)
84	(B3.1.2)
85	(B3.1.3)
86	(B3.1.4)
87	(B3.1.5)
88	(B3.1.6)
89	(B3.1.7)
90	(B3.1.8)
91	(B3.1.9)
Table 2h	
Code	Component B
92	(B3.1.10)
93	(B3.1.11)
94	(B3.1.12)
95	(B3.1.12.1)
96	(B3.1.13)
97	(B3.1.14)
98	(B3.1.14.1)
99	(B3.1.14.2)
100	(B3.1.15)
Table 2i	
Code	Component B
101	(B3.2.1)
102	(B3.2.2)
103	(B3.2.3)

Example

[0142] Thus, in the short annotation, a combination of the herbicides (A5) and (B2.1.2.3) is referred to as K5.23.

[0143] Examples of preferred combinations are:

[0144] A herbicide from the group of the herbicides (A1) to (A127) and herbicides from the group (B1) or (B2) or (B3), for example a herbicide from the group of the herbi-

cides (A1) to (A127) and herbicides from the group (B1.1), (B1.2), (B2.1), (B2.2), (B2.3), (B3.1) or (B3.2), specifically one of the combinations

[0145] K1.1, K1.2, K1.3, K1.4, K1.5, K1.6, K1.7, K1.8, K1.9, K1.10, K1.11, K1.12, K1.13, K1.14, K1.15, K1.16, K1.17, K1.18, K1.19, K1.20, K1.21, K1.22, K1.23, K1.24, K1.25, K1.26, K1.27, K1.28, K1.29, K1.30, K1.31, K1.32, K1.33, K1.34, K1.35, K1.36, K1.37, K1.38, K1.39, K1.40, K1.41, K1.42, K1.43, K1.44, K1.45, K1.46, K1.47, K1.48, K1.49, K1.50, K1.51, K1.52, K1.53, K1.54, K1.55, K1.56, K1.57, K1.58, K1.59, K1.60, K1.61, K1.62, K1.63, K1.64, K1.65, K1.66, K1.67, K1.68, K1.69, K1.70, K1.71, K1.72, K1.73, K1.74, K1.75, K1.76, K1.77, K1.78, K1.79, K1.80, K1.81, K1.82, K1.83, K1.84, K1.85, K1.86, K1.87, K1.88, K1.89, K1.90, K1.91, K1.92, K1.93, K1.94, K1.95, K1.96, K1.97, K1.98, K1.99, K1.100, K1.101, K1.102, K1.103,

[0146] K2.1, K2.2, K2.3, K2.4, K2.5, K2.6, K2.7, K2.8, K2.9, K2.10, K2.11, K2.12, K2.13, K2.14, K2.15, K2.16, K2.17, K2.18, K2.19, K2.20, K2.21, K2.22, K2.23, K2.24, K2.25, K2.26, K2.27, K2.28, K2.29, K2.30, K2.31, K2.32, K2.33, K2.34, K2.35, K2.36, K2.37, K2.38, K2.39, K2.40, K2.41, K2.42, K2.43, K2.44, K2.45, K2.46, K2.47, K2.48, K2.49, K2.50, K2.51, K2.52, K2.53, K2.54, K2.55, K2.56, K2.57, K2.58, K2.59, K2.60, K2.61, K2.62, K2.63, K2.64, K2.65, K2.66, K2.67, K2.68, K2.69, K2.70, K2.71, K2.72, K2.73, K2.74, K2.75, K2.76, K2.77, K2.78, K2.79, K2.80, K2.81, K2.82, K2.83, K2.84, K2.85, K2.86, K2.87, K2.88, K2.89, K2.90, K2.91, K2.92, K2.93, K2.94, K2.95, K2.96, K2.97, K2.98, K2.99, K2.100, K2.101, K2.102, K2.103,

[0147] K3.1, K3.2, K3.3, K3.4, K3.5, K3.6, K3.7, K3.8, K3.9, K3.10, K3.11, K3.12, K3.13, K3.14, K3.15, K3.16, K3.17, K3.18, K3.19, K3.20, K3.21, K3.22, K3.23, K3.24, K3.25, K3.26, K3.27, K3.28, K3.29, K3.30, K3.31, K3.32, K3.33, K3.34, K3.35, K3.36, K3.37, K3.38, K3.39, K3.40, K3.41, K3.42, K3.43, K3.44, K3.45, K3.46, K3.47, K3.48, K3.49, K3.50, K3.51, K3.52, K3.53, K3.54, K3.55, K3.56, K3.57, K3.58, K3.59, K3.60, K3.61, K3.62, K3.63, K3.64, K3.65, K3.66, K3.67, K3.68, K3.69, K3.70, K3.71, K3.72, K3.73, K3.74, K3.75, K3.76, K3.77, K3.78, K3.79, K3.80, K3.81, K3.82, K3.83, K3.84, K3.85, K3.86, K3.87, K3.88, K3.89, K3.90, K3.91, K3.92, K3.93, K3.94, K3.95, K3.96, K3.97, K3.98, K3.99, K3.100, K3.101, K3.102, K3.103,

[0148] K4.1, K4.2, K4.3, K4.4, K4.5, K4.6, K4.7, K4.8, K4.9, K4.10, K4.11, K4.12, K4.13, K4.14, K4.15, K4.16, K4.17, K4.18, K4.19, K4.20, K4.21, K4.22, K4.23, K4.24, K4.25, K4.26, K4.27, K4.28, K4.29, K4.30, K4.31, K4.32, K4.33, K4.34, K4.35, K4.36, K4.37, K4.38, K4.39, K4.40, K4.41, K4.42, K4.43, K4.44, K4.45, K4.46, K4.47, K4.48, K4.49, K4.50, K4.51, K4.52, K4.53, K4.54, K4.55, K4.56, K4.57, K4.58, K4.59, K4.60, K4.61, K4.62, K4.63, K4.64, K4.65, K4.66, K4.67, K4.68, K4.69, K4.70, K4.71, K4.72, K4.73, K4.74, K4.75, K4.76, K4.77, K4.78, K4.79, K4.80, K4.81, K4.82, K4.83, K4.84, K4.85, K4.86, K4.87, K4.88, K4.89, K4.90, K4.91, K4.92, K4.93, K4.94, K4.95, K4.96, K4.97, K4.98, K4.99, K4.100, K4.101, K4.102, K4.103,

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[0156] K12.1, K12.2, K12.3, K12.4, K12.5, K12.6, K12.7, K12.8, K12.9, K12.10, K12.11, K12.12, K12.13, K12.14, K12.15, K12.16, K12.17, K12.18, K12.19, K12.20, K12.21, K12.22, K12.23, K12.24, K12.25, K12.26, K12.27, K12.28, K12.29, K12.30, K12.31, K12.32, K12.33, K12.34, K12.35, K12.36, K12.37, K12.38, K12.39, K12.40, K12.41, K12.42, K12.43, K12.44, K12.45, K12.46, K12.47, K12.48, K12.49, K12.50, K12.51, K12.52, K12.53, K12.54, K12.55, K12.56, K12.57, K12.58, K12.59, K12.60, K12.61, K12.62, K12.63, K12.64, K12.65, K12.66, K12.67, K12.68, K12.69, K12.70, K12.71, K12.72, K12.73, K12.74, K12.75, K12.76, K12.77, K12.78, K12.79, K12.80, K12.81, K12.82, K12.83, K12.84, K12.85, K12.86, K12.87, K12.88, K12.89, K12.90, K12.91, K12.92,

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[0215] K71.1, K71.2, K71.3, K71.4, K71.5, K71.6, K71.7,
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[0269] K125.1, K125.2, K125.3, K125.4, K125.5, K125.6, K125.7, K125.8, K125.9, K125.10, K125.11, K125.12, K125.13, K125.14, K125.15, K125.16, K125.17, K125.18, K125.19, K125.20, K125.21, K125.22, K125.23, K125.24, K125.25, K125.26, K125.27, K125.28, K125.29, K125.30, K125.31, K125.32, K125.33, K125.34, K125.35, K125.36, K125.37, K125.38, K125.39, K125.40, K125.41, K125.42, K125.43, K125.44, K125.45, K125.46, K125.47, K125.48, K125.49, K125.50, K125.51, K125.52, K125.53, K125.54, K125.55, K125.56, K125.57, K125.58, K125.59, K125.60, K125.61, K125.62, K125.63, K125.64, K125.65, K125.66, K125.67, K125.68, K125.69, K125.70, K125.71, K125.72, K125.73, K125.74, K125.75, K125.76, K125.77, K125.78, K125.79, K125.80, K125.81, K125.82, K125.83, K125.84, K125.85, K125.86, K125.87, K125.88, K125.89, K125.90, K125.91, K125.92, K125.93, K125.94, K125.95, K125.96, K125.97, K125.98, K125.99, K125.100, K125.101, K125.102, K125.103,

[0270] K126.1, K126.2, K126.3, K126.4, K126.5, K126.6, K126.7, K126.8, K126.9, K126.10, K126.11, K126.12, K126.13, K126.14, K126.15, K126.16, K126.17, K126.18, K126.19, K126.20, K126.21, K126.22, K126.23, K126.24, K126.25, K126.26, K126.27, K126.28, K126.29, K126.30, K126.31, K126.32, K126.33, K126.34, K126.35, K126.36, K126.37, K126.38, K126.39, K126.40, K126.41, K126.42, K126.43, K126.44, K126.45, K126.46, K126.47, K126.48, K126.49, K126.50, K126.51, K126.52, K126.53, K126.54, K126.55, K126.56, K126.57, K126.58, K126.59, K126.60, K126.61, K126.62, K126.63, K126.64, K126.65, K126.66, K126.67, K126.68, K126.69, K126.70, K126.71, K126.72, K126.73, K126.74, K126.75, K126.76, K126.77, K126.78, K126.79, K126.80, K126.81, K126.82, K126.83, K126.84, K126.85, K126.86, K126.87, K126.88, K126.89, K126.90, K126.91, K126.92, K126.93, K126.94, K126.95, K126.96, K126.97, K126.98, K126.99, K126.100, K126.101, K126.102, K126.103,

[0271] K127.1, K127.2, K127.3, K127.4, K127.5, K127.6, K127.7, K127.8, K127.9, K127.10, K127.11, K127.12, K127.13, K127.14, K127.15, K127.16, K127.17, K127.18, K127.19, K127.20, K127.21, K127.22, K127.23, K127.24, K127.25, K127.26, K127.27, K127.28, K127.29, K127.30, K127.31, K127.32, K127.33, K127.34, K127.35, K127.36, K127.37, K127.38, K127.39, K127.40, K127.41, K127.42, K127.43, K127.44, K127.45, K127.46, K127.47, K127.48, K127.49, K127.50, K127.51, K127.52, K127.53, K127.54, K127.55, K127.56, K127.57, K127.58, K127.59, K127.60, K127.61, K127.62, K127.63, K127.64, K127.65, K127.66, K127.67, K127.68, K127.69, K127.70, K127.71, K127.72, K127.73, K127.74, K127.75, K127.76, K127.77, K127.78, K127.79, K127.80, K127.81, K127.82, K127.83, K127.84, K127.85, K127.86, K127.87, K127.88, K127.89, K127.90, K127.91, K127.92,

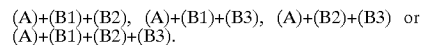
K127.93, K127.94, K127.95, K127.96, K127.97, K127.98, K127.99, K127.100, K127.101, K127.102 and K127.103.

[0272] The application rates of the herbicides (B) are known in principle and are generally in the range from 1 g to 8000 g of AS/ha (g of AS/ha=g of active substance per hectare), preferably in the range from 5 g to 5000 g of AS/ha.

[0273] In the mixtures according to the invention, in the context of the application rates mentioned, lower application rates of the active compound in question are required compared to the individual application. The weight ratios (A):(B) are, depending on the effective application rates, generally in the range from 1:8000 to 800:1, preferably 1:100 to 100:1, and particularly in the range from 1:50 to 50:1.

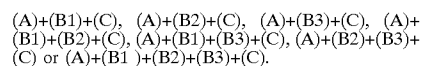
[0274] Preference is given to herbicide combinations of one or more compounds (A) with one or more compounds of group (B1) or (B2) or (B3).

[0275] Preference is furthermore given to combinations of compounds (A) with one or more compounds (B) according to the scheme:



[0276] The combinations according to the invention can furthermore be used together with other active compounds, for example from the group of the herbicides, safeners, fungicides, insecticides and plant growth regulators, or from the group of the formulation auxiliaries and additives customary in crop protection.

[0277] Additives are, for example, fertilizers and colorants. Of particular importance here are combinations to which one or more further active compounds of a different structure or safeners [active compounds (C)] are added, such as, for example, according to the scheme



[0278] For combinations of the last-mentioned type with three or more active compounds, the preferred conditions illustrated below in particular for two-compound combinations according to the invention primarily also apply if they comprise the two-compound combinations according to the invention, and with respect to the two-compound combination in question.

[0279] In some cases, even combinations of different active compounds from the group (A) are synergistic, so that, based on these two-compound combinations, particularly favorable three-compound combinations with additional synergistic effects are possible.

[0280] Preference is given to combinations of active compounds (A) and (B) suitable for non-selective application.

[0281] Particular preference is given to combinations of active compounds (A) with active compounds (B) selected from the group consisting of:

[0282] simazine (B1.1.4), pendimethalin (B1.1.7), oxadiazyl (B1.1.8), isoxaben (B1.2.1), foramsulfuron (B2.1.5), iodosulfuron (B2.1.6), iodosulfuron-methyl sodium salt (B2.1.6.2), amicarbazone (B2.1.7), propoxycarbazone (B2.1.8), propoxycarbazone sodium salt

(B2.1.8.1), metribuzine (B2.1.9), glufosinate (B2.1.1), glufosinate-ammonium (B2.1.1.1), glyphosate (B2.1.2), glyphosate-isopropylammonium (B2.1.2.1), sulfosate (B2.1.3), metsulfuron (B2.1.10), metsulfuron-methyl (B2.1.10.1), imazapyr (B2.1.12), imazapyr acid (B2.1.12.1), imazapyr-isopropylammonium (B2.1.12.2), paraquat (B2.1.13), paraquat dichloride (B2.1.13.1), triclopyr (B2.2.3), triclopyr acid (B2.2.3.1), triclopyr-triethylammonium salt (B2.2.3.2), triclopyr-butyl ester (B2.2.3.3), amidosulfuron (B2.2.7), amitrole (B2.2.14), diuron (B3.2), oxyfluorfen (B3.1.1), oxadiazon (B3.1.8), diflufenican (B3.1.9), bromacil (B3.3) and norflurazon (B3.4).

[0283] Particular preference is given here to the combinations of active compounds (A) with active compounds (B) from the group consisting of:

[0284] oxadiargyl (B1.1.8), glufosinate (B2.1.1), glufosinate-ammonium (B2.1.1.1), glyphosate (B2.1.2), glyphosate-isopropylammonium (B2.1.2.1), sulfosate (B2.1.3), foramsulfuron (B2.1.5), iodosulfuron (B2.1.6), iodosulfuron-methyl sodium salt (B2.1.6.2), amicarbazone (B2.1.7), propoxycarbazone (B2.1.8), propoxycarbazone sodium salt (B2.1.8.1), metribuzine (B2.1.9), amidosulfuron (B2.2.7), oxyfluorfen (B3.1.1), oxadiazon (B3.1.8), diflufenican (B3.1.9) and diuron (B3.2), in particular glufosinate (B2.1.1), glufosinate-ammonium (B2.1.1.1), glyphosate (B2.1.2), glyphosate-isopropylammonium (B2.1.2.1), sulfosate (B2.1.3) and oxyfluorfen (B3.1.1).

[0285] The herbicide combinations according to the invention can also be combined with further herbicides and plant growth regulators, for example to complete the activity spectrum.

[0286] Examples of such further combination partners are herbicidally active compounds or plant growth regulators having a structure different from that of the herbicides (B) contained in the combinations, as described, for example, in the manual "The Pesticide Manual", 13th Edition 2003, The British Crop Protection Council, or in the e-Pesticide Manual Version 3 (2003), or else as trade names and "common names" in the "Compendium of Pesticide Common Names" (searchable on the Internet), and in each case in the literature cited therein.

[0287] Below, examples of herbicides and plant growth regulators are given using their standardized active compound names according to the "International Organization for Standardization" (ISO) or by their chemical names or by a code number: acetochlor; acifluorfen(-sodium); aclonifen; AKH 7088, i.e. [[[1-[5-[2-chloro-4-(tri-fluoromethyl)phenoxy]-2-nitrophenyl]-2-methoxyethylidene]amino]oxy]acetic acid and its methyl ester; alachlor; alloxylidim(-sodium); ametryn; amicarbazone, amidochlor, amidosulfuron; aminopyralid, amitrol (aminotriazine); AMS, i.e. ammonium sulfamate; anilofos; asulam; atrazine; azafenidin; azimsulfuron (DPX-A8947); aziprotryn; barban; BAS 516 H, i.e. 5-fluoro-2-phenyl-4H-3,1-benzoxazin-4-one; beflubutamid; benazolin(-ethyl); benfluralin; benfuresate; bensulfuron(-methyl); bensulide; bentazone(-sodium); benzfendazole, benzobicyclone; benzofenap; **benzofluor**; benzoylprop(-ethyl); benzthiazuron; bialaphos (bilanafos); bifenox; bispyribac(-sodium); bromacil; bromobutide; bromofenoxim; bromoxynil; bromuron; buminafos; busoxinone; butachlor; butafenacil; butamifos; butenachlor; buthidazole; butralin;

butoxydim; butylate; cafenstrole (CH-900); carbetamide; carfentrazone(-ethyl); caloxydim, CDM, i.e. 2-chloro-N,N-di-2-propenylacetamide; CDEC, i.e. 2-chloroallyl diethyldithiocarbamate; chlormethoxyfen; chloramben; chlorazifop-butyl; chlorbromuron; chlorbufam; chlorfenac; chlorfenprop, chlorflurenol-methyl; chloridazon; chlorimuron(-ethyl); chlornitrofen; chlorotoluron; chloroxuron; chlorthal; chlorsulfuron; chlorthal-dimethyl; chlorthiamid; chlortoluron, cinidon(-methyl or -ethyl), cinmethylin; cinosulfuron; clethodim; clefoxydim, clodinafop and its ester derivatives (for example clodinafop-propargyl); clomazone; clomeprop; cloprop, cloproxydim; clopyralid; clopyrasulfuron(-methyl); cloransulam(-methyl); cumyluron (JC 940); cyanazine; cycloate; cyclosulfamuron (AC 104); cycloxydim; cycluron; cyhalofop and its ester derivatives (for example butyl ester, DEH-112); cyperquat; cyprazine; cyprazole; daimuron; 2,4-D; 2,4-DB; dalapon; dazomet, desmedipham; desmetryn; di-allate; dicamba; dichlobenil; dichlorprop(-P); diclofop and its esters such as diclofop-methyl; diclosulam, diethatyl(-ethyl); difenoxuron; difenzoquat; diflufenican; diflufenzopyr; dimefuron; dimepiperate; dimethachlor; dimethametryn; dimethenamid (SAN-582H); dimethenamid(-P); dimethazone, dimethipin; dimexyflam, dimetrasulfuron, dinitramine; dinoseb; dinoterb; diphenamid; dipropetryn; diquat; dithiopyr; diuron; DNOC; eglina-zine-ethyl; EL 77, i.e. 5-cyano-1-(1,1-dimethylethyl)-N-methyl-1H-pyrazole-4-carboxamide; endothal; epoprodan, EPTC; esprocarb; ethalfluralin; ethametsulfuron-methyl; ethidimuron; ethiozin; ethofumesate; ethoxyfen and its esters (for example ethyl ester, HC-252), ethoxysulfuron, etobenzanid (HW 52); F5231, i.e. N-[2-chloro-4-fluoro-5-[4-(3-fluoropropyl)-4,5-dihydro-5-oxo-1H-tetrazol-1-yl]-phenyl]ethanesulfonamide; fenoprop; fenoxan, fenoxaprop and fenoxaprop-P and their esters, for example fenoxaprop-P-ethyl and fenoxaprop-ethyl; fenoxylidim; fentrazamide; fenuron; flamprop(-methyl or -isopropyl or -isopropyl-L); flazasulfuron; florasulam; fluzafop and fluzafop-P and their esters, for example fluzafop-butyl and fluzafop-P-butyl; fluzolate, flucarbazone(-sodium); flucetosulfuron, fluchloralin; flufenacet (FOE 5043), flufenpyr, flumetsulam; flumeturon; flumiclorac(-pentyl); flumioxazin (S-482); flumipropyn; fluometuron; fluorchloridone, fluorodifen; fluoroglycofen(-ethyl); flupoxam (KNW-739); flupropacil (UBIC-4243); fluproanate, flupyrasulfuron(-methyl, or -sodium); flurenol(-butyl); fluridone; fluorchloridone; fluoxypyr(-methyl); flurprimidol, flurtamone; fluthiacet(-methyl); fluthiamide (also known as flufenacet); fomesafen; foramsulfuron; fosamine; furilazole (MON 13900), furyloxyfen; glufosinate (-ammonium); glyphosate(-isopropylammonium); halosafen; halosulfuron(-methyl) and its esters (for example the methyl ester, NC-319); haloxyfop and its esters; haloxyfop-P (=R-haloxyfop) and its esters; HC-252 (diphenyl ether), hexazinone; imazamethabenz(-methyl); imazamethapyr; imazamox; imazapic, imazapyr; imazaquin and salts such as the ammonium salts; imazethamethapyr; imazethapyr, imazosulfuron; indanofan; iodosulfuron(-methyl)-(-sodium), ioxynil; isocarbamid; isopropalin; isoproturon; isouron; isoxaben; isoxachlortole; isoxaflutole; isoxapyrifop; karbutilate; lactofen; lenacil; linuron; MCPA; MCPA-thioethyl, MCPB; mecoprop(-P); mefenacet; mefluidid; mepisulfuron (LGC-42153), mesosulfuron(-methyl); mesotrione; metam, metamifop, metamitron; metazachlor; methabenzthiazuron; methazole; methoxyphenone; methyldymron; metobenzuron, metobromuron; (S-)metolachlor;

metosulam (XRD 511); metoxuron; metribuzin; metsulfuron-methyl; MK-616; molinate; monalide; monocarbamide dihydrogensulfate; monolinuron; monuron; MT 128, i.e. 6-chloro-N-(3-chloro-2-propenyl)-5-methyl-N-phenyl-3-pyridazinamine; MT 5950, i.e. N-[3-chloro-4-(1-methyl-ethyl)-phenyl]-2-methylpentanamide; naproanilide; napropamide; naptalam; NC 310, i.e. 4-(2,4-dichlorobenzoyl)-1-methyl-5-benzoyloxy-pyrazole; neburon; nicosulfuron; nipyraclorphen; nitratin; nitrofen; nitrofluorfen; norflurazon; orbencarb; oryzalin; oxadiargyl (RP-020630); oxadiazon; oxasulfuron; oxaziclomefene; oxyfluorfen; paraquat; pebulate; pelargonic acid; pendimethalin; penoxulam; pentanochlor; pentoxazone; perfluidone; pethoxamid, phenisopham; phenmedipham; picloram; picolinafen; pinoxaden (NOA-407855=flucetsulfuron), piperophos; piributicarb; pirifenop-butyl; pretilachlor; primisulfuron(-methyl); procarbazon(-sodium); procyazine; prodiamine; profluazone, profluralin; proglinazine(-ethyl); prometon; prometryn; propachlor; propanil; propaquizafop; propazine; propham; propisochlor; propoxycarbazon(-sodium), propyzamide; prosulfalin; prosulfocarb; prosulfuron (CGA-152005); prynachlor; pyraclostrobin, pyraflufen(-ethyl); pyrazolate; pyrazon; pyrazosulfuron(-ethyl); pyrazoxyfen; pyribenzoxim; pyributicarb; pyridafol; pyridate; pyrifthalid, pyrimidobac(-methyl); pyriithiobac(-sodium) (KIH-2031); pyroxofop and its esters (for example propargyl ester); quinclorac; quinmerac; quinclamine, quinoxop and its ester derivatives, quizalofop and quizalofop-P and their ester derivatives, for example quizalofop-ethyl; quizalofop-P-tefuryl and -ethyl; renriduron; rimsulfuron (DPX-E 9636); S 275, i.e. 2-[4-chloro-2-fluoro-5-(2-propynyloxy)phenyl]-4,5,6,7-tetrahydro-2H-indazole; secbumeton; sethoxydim; siduron; simazine; simetryn; SN 106279, i.e. 2-[[7-[2-chloro-4-(trifluoromethyl)phenoxy]-2-naphthalenyl]oxy]propanoic acid and its methyl ester; sulcotrione; sulfentrazone (FMC-97285, F-6285); sulfazuron; sulfometuron(-methyl); sulfosate (ICI-A0224); sulfosulfuron; TCA; tebutam (GCP-5544); tebutiuron; tepaloxymid; terbacil; terbucarb; terbutylchlor; terbuturon; terbutylazine; terbutryn; TFH 450, i.e. N,N-diethyl-3-[(2-ethyl-6-methylphenyl)sulfonyl]-1H-1,2,4-triazole-1-carboxamide; thenylchlor (NSK-850); thiafluamide; thiazafuron; thiazopyr (Mon-13200); thidiazimin (SN-24085); thidiazuron, thifensulfuron(-methyl); thiobencarb; tiocarbamil; topramezone (BAS-670H), tralkoxydim; tri-allate; triasulfuron; triaziflam; triazofenamide; tribenuron(-methyl); 2,3,6-trichlorobenzoic acid (2,3,6-TBA), triclopyr; tridiphane; trietazine; trifloxysulfuron(-sodium), trifluralin; triflurosulfuron and esters (e.g. methyl ester, DPX-66037); trimeturon; tritosulfuron; tsitodef; vernolate; WL 110547, i.e. 5-phenoxy-1-[3-(trifluoromethyl)phenyl]-1H-tetrazole; HOK-201, HOK-202, UBH-509; D-489; LS 82-556; KPP-300; NC-324; NC-330; KH-218; DPX-N8189; SC-0774; TH-547, DOWCO-535; DK-8910; V-53482; PP-600; MBH-001; KIH-9201; ET-751; KIH-6127; KIH-2023 and KIH5996.

[0288] If the respective name (common name) includes more than one form of the active compound, the name preferably defines the commercially available form.

[0289] Each of the further active compounds mentioned (=active compounds (C*), (C1*), (C2*) etc.) can then preferably be combined with one of the two-compound combinations K1.1 to K127.103, according to the scheme (A)+(B)+(C*) or else according to scheme (A)+(B)+(C1*)+(C2*) etc. This also includes those multiple combinations in

which the compounds (C*), (C1*) or (C2*) are selected from the group of the compounds (B), but are not identical to the compound (B) present in respective two-compound combinations.

[0290] Multiple combinations of active compounds (A) with a plurality of active compounds (B) are, for example

[0291] (A)+(B3.2)+(B2.1.4), preferably (A)+diuron (B3.2)+MSMA (B2.1.4.1), in particular in amounts of 1-800 g of AS/ha (A) and 500-2000 g of AS/ha (B3.2) and 1000-3000 g of AS/ha (B2.1.4.1);

[0292] (A)+(B3.2)+(B2.1.13), preferably (A)+diuron (B3.2)+paraquat dichloride

[0293] (B2.1.13.1), in particular in amounts of 1-800 g of AS/ha (A) and 100-500 g of AS/ha (B3.2) and 100-1000 g of AS/ha (B2.1.13.1);

[0294] (A)+(B3.2)+(B2.2.14), preferably (A)+diuron (B3.2)+amitrole (B2.2.14) in amounts of 1-800 g of AS/ha (A) and 100-500 g of AS/ha (B3.2) and 100-500 g of AS/ha (B2.2.14);

[0295] (A)+(B3.2)+(B2.1.1), preferably (A)+diuron (B3.2)+glufosinate-ammonium (B2.1.1.1), in particular in amounts of 1-800 g of AS/ha (A) and 500-2000 g of AS/ha (B3.2) and 100-1000 g of AS/ha (B2.1.1.1);

[0296] (A)+(B3.2)+(B2.1.2), preferably (A)+diuron (B3.2)+glyphosate-isopropylammonium (B2.1.2.1), in particular in amounts of 1-800 g of AS/ha (A) and 500-2000 g of AS/ha (B3.2) and 500-1500 g of AS/ha (B2.1.2.1);

[0297] (A)+(B3.2)+(B2.1.2)+petroleum, preferably (A)+diuron (B3.2)+glyphosate-isopropylammonium (B2.1.2.1)+mineral oil, in particular in amounts of 1-800 g of AS/ha (A) and 500-2000 g of AS/ha (B3.2) and 500-1500 g of AS/ha (B2.1.2.1) and 100-500 g/ha mineral oil;

[0298] (A)+(B3.1.9)+(B2.1.2), preferably (A)+diflufenican (B3.1.9)+glyphosate-isopropylammonium (B2.1.2.1), in particular in amounts of 1-800 g of AS/ha (A) and 50-500 g of AS/ha (B3.1.9) and 500-1500 g of AS/ha (B2.1.2.1);

[0299] (A)+(B1.1.4)+(B3.1.10), preferably (A)+simazine (B1.1.4)+ametryn (B3.1.10) in amounts of 1-800 g of AS/ha (A) and 1000-2500 g of AS/ha (B1.1.4) and 1000-2500 g of AS/ha (B3.1.10);

[0300] (A)+(B1.2.1)+(B1.1.10), preferably (A)+isoxaben (B1.2.1)+oryzalin (B1.1.10) in amounts of 1-800 g of AS/ha (A) and 10-250 g of AS/ha (B1.2.1) and 1000-3500 g of AS/ha (B1.1.10);

[0301] (A)+(B3.1.1)+(B1.1.10), preferably (A)+oxyfluorfen (B3.1.1)+oryzalin (B1.1.10), in particular in amounts of 1-800 g of AS/ha (A) and 500-2000 g of AS/ha (B3.1.1) and 1000-5000 g of AS/ha (B1.1.10).

[0302] The stated amounts are application rates (g of AS/ha=gram of active compound per hectare) and thus also define the ratios in a coformulation, a pre-mix, a tank mix or a sequential application of the combined active compounds.

[0303] The combinations can be applied both by the pre-emergence method and by the post-emergence method.

This applies both to pre- and post-emergence with respect to the harmful plants and, in the selective control of harmful plants, to the pre- or post-emergence of the crop plants. Mixed forms are also possible, for example after the emergence of the crop plants the control of the harmful plants at their pre- or post-emergence stage.

[0304] Other suitable combination partners include crop plant-protecting active compounds (called “safeners” or “antidotes”) which are able to prevent or reduce phytotoxic effects of the herbicides in crop plants.

[0305] Suitable safeners for the above-mentioned herbicidally active compounds (A) or combinations of herbicides (A) and (B) or generally for the combinations according to the invention are, for example, the following groups of compounds:

[0306] a) compounds of the type of the dichlorophenylpyrazoline-3-carboxylic acid, preferably compounds such as ethyl 1-(2,4-dichlorophenyl)-5-(ethoxycarbonyl)-5-methyl-2-pyrazoline-3-carboxylate (S1-1) (“mefenpyr-diethyl”, PM, pp. 622-623), and related compounds, as described in WO 91/07874,

[0307] b) derivatives of dichlorophenylpyrazolecarboxylic acid, preferably compounds such as ethyl 1-(2,4-dichlorophenyl)-5-methylpyrazole-3-carboxylate (S1-2), ethyl 1-(2,4-dichlorophenyl)-5-isopropylpyrazole-3-carboxylate (S1-3), ethyl 1-(2,4-dichlorophenyl)-5-(1,1-dimethylethyl)pyrazole-3-carboxylate (S1-4), ethyl 1-(2,4-dichlorophenyl)-5-phenylpyrazole-3-carboxylate (S1-5) and related compounds, as described in EP-A-333 131 and EP-A-269 806.

[0308] c) compounds of the type of the triazolecarboxylic acids, preferably compounds such as fenchlorazole (ethyl ester), i.e. ethyl 1-(2,4-dichlorophenyl)-5-trichloromethyl-1,2,4-triazole-3-carboxylate (S1-6), and related compounds (EP-A-174 562 and EP-A-346 620);

[0309] d) compounds of the type of the 5-benzyl- or 5-phenyl-2-isoxazoline-3-carboxylic acid, or of the 5,5-diphenyl-2-isoxazoline-3-carboxylic acid, preferably compounds such as ethyl 5-(2,4-dichlorobenzyl)-2-isoxazoline-3-carboxylate (S1-7) or ethyl 5-phenyl-2-isoxazoline-3-carboxylate (S1-8) and related compounds, as described in WO 91/08202, or of ethyl 5,5-diphenyl-2-isoxazolinecarboxylate (S1-9) (“isoxadifen-ethyl”, PM, p. 588) or n-propyl 5,5-diphenyl-2-isoxazolinecarboxylate (S1-10) or ethyl 5-(4-fluorophenyl)-5-phenyl-2-isoxazoline-3-carboxylate (S1-11), as described in the German patent application (WO-A-95/07897).

[0310] e) compounds of the type of the 8-quinolineoxyacetic acid (S2), preferably 1-methylhex-1-yl (5-chloro-8-quinolineoxy) acetate (common name “cloquintocet-mexyl” (S2-1) (see PM, pp. 196-197)

[0311] 1,3-dimethylbut-1-yl (5-chloro-8-quinolineoxy)acetate (S2-2),

[0312] 4-allyloxybutyl (5-chloro-8-quinolineoxy)acetate (S2-3),

[0313] 1-allyloxyprop-2-yl (5-chloro-8-quinolineoxy)acetate (S2-4),

[0314] ethyl (5-chloro-8-quinolineoxy)acetate (S2-5),

[0315] methyl (5-chloro-8-quinolineoxy)acetate (S2-6),

[0316] allyl (5-chloro-8-quinolineoxy)acetate (S2-7),

[0317] 2-(2-propyldieniminoxy)-1-ethyl (5-chloro-8-quinolineoxy)acetate (S2-8),

[0318] 2-oxoprop-1-yl (5-chloro-8-quinolineoxy)acetate (S2-9)

and related compounds, as described in EP-A-86 750, EP-A-94 349 and EP-A-191 736 or EP-A-0 492 366.

[0319] f) compounds of the type of the (5-chloro-8-quinolineoxy)malonic acid, preferably compounds such as diethyl (5-chloro-8-quinolineoxy)malonate, diallyl (5-chloro-8-quinolineoxy)malonate, methyl ethyl (5-chloro-8-quinolineoxy)malonate and related compounds, as described in EP-A-0 582 198.

[0320] g) active compounds of the type of the phenoxyacetic or -propionic acid derivatives or the aromatic carboxylic acids, such as, for example, 2,4-dichlorophenoxyacetic acid (ester) (2,4-D), 4-chloro-2-methylphenoxypropionic ester (mecoprop), MCPA or 3,6-dichloro-2-methoxybenzoic acid (ester) (dicamba).

[0321] h) active compounds of the type of the pyrimidines, such as, for example, “fenclorim” (PM, p. 406) (=4,6-dichloro-2-phenylpyrimidine),

[0322] i) active compounds of the type of the dichloroacetamides, such as, for example,

[0323] “dichlormid” (PM, p. 284) (=N,N-diallyl-2,2-dichloroacetamide),

[0324] “R-29148” (=3-dichloroacetyl-2,2,5-trimethyl-1,3-oxazolidine from Stauffer),

[0325] “benoxacor” (PM, pp. 72-73) (=4-dichloroacetyl-3,4-dihydro-3-methyl-2H-1,4-benzoxazine)

[0326] “PPG-1292” (=N-allyl-N-[(1,3-dioxolan-2-yl)methyl]dichloroacetamide from PPG Industries),

[0327] “DK-24” (=N-allyl-N-[(allylaminocarbonyl)methyl]dichloroacetamide from Sagro-Chem),

[0328] “AD-67” or “MON 4660” (=3-dichloroacetyl-1-oxa-3-azaspiro[4,5]decane from Nitrokemia or Monsanto),

[0329] “diclonon” or “BAS145138” or “LAB145138” (=3-dichloroacetyl-2,5,5-trimethyl-1,3-diazabicyclo[4.3.0]nonane from BASF) and

[0330] “furilazole” or “MON 13900” (see PM, 507) (=RS)-3-dichloroacetyl-5-(2-furyl)-2,2-dimethyloxazolidine)

[0331] j) active compounds of the type of the dichloroacetone derivatives, such as, for example,

[0332] “MG 191” (CAS-Reg. No. 96420-72-3) (=2-dichloromethyl-2-methyl-1,3-dioxolane from Nitrokemia),

[0333] k) active compounds of the type of the oxyimino compounds, which are known as seed dressings, such as, for example,

[0334] “oxabetrinil” (PM, pp. 724-725) (=Z)-1,3-dioxolan-2-ylmethoxyimino(phenyl)-acetonitrile),

[0335] “fluxofenim” (PM, p. 490) (=1-(4-chlorophenyl)-2,2,2-trifluoro-1-ethanone O-(1,3-dioxolan-2-ylmethyl)oxime, and

[0336] “cyometrinil” or “-CGA-43089” (PM, p. 1056) (= (Z)-cyanomethoxyimino(phenyl)-acetonitrile),

[0337] l) active compounds of the type of the thiazolecarboxylic acid esters, which are known as seed dressings, such as, for example,

[0338] “flurazole” (PM, pp. 473-474) (=benzyl 2-chloro-4-trifluoromethyl-1,3-thiazole-5-carboxylate), which is known as seed dressing safener for millet against damage caused by alachlor and metolachlor,

[0339] m) active compounds of the type of the naphthalenedicarboxylic acid derivatives, which are known as seed dressings, such as, for example,

[0340] “naphthalic anhydride” (PM, p. 1083) (=1,8-naphthalenedicarboxylic anhydride),

[0341] n) active compounds of the type of the chromanacetic acid derivatives, such as, for example,

[0342] “CL 304415” (CAS-Reg. No. 31541-57-8) (=2-(4-carboxychroman-4-yl)acetic acid from American Cyanamid),

[0343] o) active compounds which have partial herbicidal action against harmful plants, such as, for example,

[0344] “dimepiperate” or “MY-93” (PM, pp. 315-317) (=S-1-methyl-1-phenylethyl piperidine-1-thiocarboxylate),

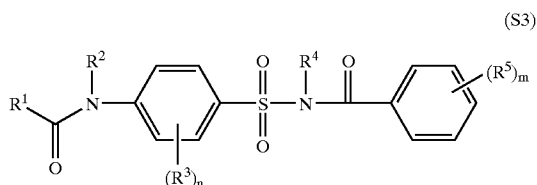
[0345] “daimuron” or “SK 23” (PM, p. 259) (=1-(1-methyl-1-phenylethyl)-3-p-tolylurea),

[0346] “cumyluron”=“JC-940” (=3-(2-chlorophenylmethyl)-1-(1-methyl-1-phenylethyl)urea, see JP-A-60087254),

[0347] “methoxyphenone” or “NK 049” (=3,3'-dimethyl-4-methoxybenzophenone),

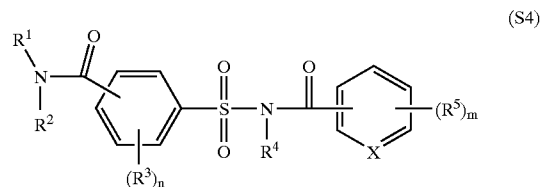
[0348] “CSB” (=1-bromo-4-(chloromethylsulfonyl)benzene) (CAS-Reg. No. 54091-06-4 from Kumiai),

[0349] p) N-acylsulfonamides of the formula (S3) and salts thereof,



as known from WO-A-97/45016 and

[0350] q) acylsulfamoylbenzamides of the formula (S4) or salts thereof,



as known from WO-A-99/16744, for example the compound 4-(2-methoxybenzoylsulfamoyl)-N-cyclopropylbenzamide (S3).

[0351] From among the safeners mentioned, (S1-1), (S1-9), (S2-1) and (S3), in particular (S1-1) and (S1-9), are of particular interest.

[0352] Some of the safeners have already been mentioned above as herbicides and, accordingly, in addition to the herbicidal action on harmful plants, also have a protective action on the crop plants.

[0353] Each of the safeners of groups a) to q) mentioned can be combined as further active compound (C) preferably with one of the two-compound combinations K1.1 to K127.103 mentioned which comprises a compound (B) having a structure different from the compound (C) in question, according to the scheme (A)+(B)+(C).

[0354] The herbicide combinations according to the invention may comprise further components, for example other active compounds against harmful organisms such as harmful plants, plant-damaging animals or plant-damaging fungi, in particular active compounds from the group of the herbicides, fungicides, insecticides, acaricides, nematocides and miticides, and related substances.

[0355] Fungicidally active compounds which can be used in combination with the herbicide combinations according to the invention are preferably commercially available active compounds, for example (analogously to the herbicides, the compounds are generally referred to by their common names):

[0356] 2-phenylphenol; 8-hydroxyquinoline sulfate; acibenzolar-S-methyl; actinovate; aldimorph; amidoflumet; ampropylfos; ampropylfos-potassium; andoprim; anilazine; azaconazole; azoxystrobin; benalaxyl; benodanil; benomyl; benthialdicarb-isopropyl; benzamacril; benzamacril-isobutyl; binapacryl; biphenyl; bitertanol; blasticidin-S; boscalid; bromuconazole; bupirimate; buthiobate; butylamine; calcium polysulfide; capsimycin; captafol; captan; carbendazim; carboxin; carpropamid; carvone; chinomethionat; chlo-benthiazole; chlorfenazole; chloroneb; chlorothalonil; chlozolinate; cis-1-(4-chlorophenyl)-2-(1H-1,2,4-triazol-1-yl)cycloheptanol; clozylacon; cyazofamid; cyflufenamid; cymoxanil; cyproconazole; cyprodinil; cyprofuram; Dagger G; debacarb; dichlofluanid; dichlone; dichlorophen; diclo-cymet; diclomezine; dicloran; diethofencarb; difenocona-zole; diflumetorim; dimethirimol; dimethomorph; dimox-ystrobin; diniconazole; diniconazole-M; dinocap; diphenylamine; dipyrithione; ditalimfos; dithianon; dodine; draxoxolon; edifenphos; epoxiconazole; ethaboxam; ethiri-mol; etridiazole; famoxadone; fenamidone; fenapanil; fena-rimol; fenbuconazole; fenfuram; fenhexamid; fenitropan;

fenoxanil; fenpiclonil; fenpropidin; fenpropimorph; ferbam; fluazinam; flubenzimine; fludioxonil; flumetover; flumorph; fluoromide; fluoxastrobil; fluquinconazole; flurprimidol; flusilazole; flusulfamide; flutolanil; flutriafol; folpet; fosetyl-Al; fosetyl-sodium; fuberidazole; furalaxyl; furametpyr; furcarbanil; furmecyclox; guazatine; hexachlorobenzene; hexaconazole; hymexazol; imazalil; imibenconazole; iminocadine triacetate; iminocadine tris(albesilate); iodocarb; ipconazole; iprobenfos; iprodione; iprovalicarb; irumamycin; isoprothiolane; isovaldione; kasugamycin; kresoxim-methyl; mancozeb; maneb; meferimzone; mepanipyrim; mepronil; metalaxyl; metalaxyl-M; metconazole; methasulfocarb; methfuroxam; methyl 1-(2,3-dihydro-2,2-dimethyl-1H-inden-1-yl)-1H-imidazole-5-carboxylate; methyl 2-[[[cyclopropyl]-(4-methoxyphenyl)imino]methyl]thio[methyl]- α -(methoxymethylene)benzeneacetate; methyl 2-[2-[3-(4-chlorophenyl)-1-methyl-allylideneaminoxymethyl]phenyl]-3-methoxyacrylate; metiram; metominostrobin; metrafenone; metsulfovax; mildiomicin; monopotassium carbonate; myclobutanil; myclozolin; nabam, N-(3-ethyl-3,5,5-trimethylcyclohexyl)-3-formylamino-2-hydroxy-benzamide; N-(6-methoxy-3-pyridinyl)cyclopropanecarboxamide; N-butyl-8-(1,1-dimethylethyl)-1-oxaspiro[4.5]decan-3-amine; natamycin; nitrothal-isopropyl; noviflumuron; nuarimol; ofurace; orysastrobil; oxadixyl; oxolinic acid; oxpoconazole; oxycarboxin; oxyfenthiin; paclobutrazol; pefurazate; penconazole; pencycuron; penhiopyrad; phosdiphen; phthalide; picobenzamid; picoxystrobin; piperalin; polyoxins; polyoxorim; probenazole; prochloraz; procymidone; propamocarb; propanosine-sodium; propiconazole; propineb; proquinazid; prothioconazole; pyraclostrobin; pyrazophos; pyrifenoxy; pyrimethanil; pyroquilon; pyroxyfur; pyrrolnitrin; quinconazole; quinoxifen; quintozone; silthiofam; simeconazole; sodium tetrathiocarbonate; spiroxamine; sulfur; tebuconazole; tecloftalam; tecnazene; tetcyclacis; tetraconazole; thia-bendazole; thicyofen; thifluzamide; thiophanate-methyl; thiram; tiadinil; tioxyimid; tolclofos-methyl; tolylfluanid; triadimefon; triadimenol; triazbutyl; triazoxide; tricyclaz-mide; tricyclazole; tridemorph; trifloxystrobin; triflumizol; triforine; triticonazole; uniconazole; validamycin A; vinclozolin; zineb; ziram; zoxamide; (2S)-N-[2-[4-[[3-(4-chlorophenyl)-2-propynyl]oxy]-3-methoxyphenyl]ethyl]-3-methyl-2-[(methylsulfonyl)amino]-butanamide; 1-(1-naphthalenyl)-1H-pyrrole-2,5-dione; 2,3,5,6-tetrachloro-4-(methylsulfonyl)pyridine; 2,4-dihydro-5-methoxy-2-methyl-4-[[[1-[3-(trifluoro-methyl)phenyl]ethylidene]amino]oxy]methyl]phenyl]-3H-1,2,3-triazol-3-one; 2-amino-4-methyl-N-phenyl-5-thiazolecarboxamide; 2-chloro-N-(2,3-dihydro-1,1,3-trimethyl-1H-inden-4-yl)-3-pyridinecarboxamide; 3,4,5-trichloro-2,6-pyridinedicarbo-nitrile; 3-[(3-bromo-6-fluoro-2-methyl-1H-indol-1-yl)sulfonyl]-N,N-dimethyl-1H-1,2,4-triazole-1-sulfonamide; copper salts and copper preparations, such as Bordeaux mixture; copper hydroxide; copper naphthenate; copper oxychloride; copper sulfate; cufraneb; copper(I) oxide; man-copper; oxine-copper.

[0357] Preferred fungicides are selected from the group consisting of benalaxyl, bitertanol, bromuconazole, captafol, carbendazim, carpropamid, cyazofamid, cyproconazole, diethofencarb, edifenphos, fenpropimorph, fentine, fluquinconazole, fosetyl, fluoroimide, folpet, iminocadine, iprodione, iprovalicarb, kasugamycin, maneb, nabam, pencycuron, prochloraz, propamocarb, propineb, pyrimethanil,

spiroxamine, quintozone, tebuconazole, tolylfluanid, triadimefon, triadimenol, trifloxystrobin, zineb.

[0358] Insecticidal, acaricidal, nematocidal, miticidal and related active compounds are, for example (analogously to the herbicides and fungicides, the compounds are, if possible, referred to by their common names):

[0359] alanycarb, aldicarb, aldoxycarb, allylcarb, aminocarb, bendiocarb, benfuracarb, bufencarb, butacarb, butocarboxim, butoxycarboxim, carbaryl, carbofuran, carbosulfan, cloethocarb, dimetilan, ethiofencarb, fenobucarb, fenothiocarb, formetanate, furathiocarb, isoprocarb, metam-sodium, methiocarb, methomyl, metolcarb, oxamyl, pirimicarb, promecarb, propoxur, thiodicarb, thiofanox, trimethacarb, XMC, xylylcarb, acephate, azamethiphos, azinphos (-methyl-ethyl), bromophos-ethyl, bromfenvinfos (-methyl), butathiofos, cadusafos, carbophenothion, chlorethoxyfos, chlorfenvinphos, chlor-mephos, chlorpyrifos (-methyl-ethyl), coumaphos, cyanofenphos, cyanophos, chlorfenvinphos, demeton-S-methyl, demeton-S-methylsulphon, dialifos, diazinon, dichlofenthion, dichlorvos/DDVP, dicrotophos, dimethoate, dimethylvinphos, dioxabenzofos, disulfoton, EPN, ethion, ethoprophos, etrimfos, famphur, fenamiphos, fenitrothion, fensulfothion, fenthion, flupyrazofos, fonofos, formothion, fosmethilan, fothiazate, heptenophos, iodofenphos, iprobenfos, isazofos, isofenphos, isopropyl O-salicylate, isoxathion, malathion, mecarbam, methacrifos, methamidophos, methidathion, mevinphos, monocrotophos, naled, omethoate, oxydemeton-methyl, parathion (-methyl-ethyl), phenthoate, phorate, phosalone, phosmet, phosphamidon, phosphocarb, phoxim, pirimiphos (-methyl-ethyl), profenofos, propaphos, propetamphos, prothiofos, prothoate, pyraclofos, pyridaphenthion, pyridathion, quinalphos, sebufos, sulfotep, sulprofos, tebupirimfos, temephos, terbufos, tetrachlorvinphos, thiometon, triazophos, triclofon, vamidot-hion, acrinathrin, allethrin (d-cis-trans, d-trans), beta-cyfluthrin, bifenthrin, bioallethrin, bioallethrin-S-cyclopentyl-isomer, bioethanomethrin, biopermethrin, bioresmethrin, chlovaporthrin, cis-cypermethrin, cis-resmethrin, cis-permethrin, clopythrin, cycloprothrin, cyfluthrin, cyhalothrin, cypermethrin (alpha-, beta-, theta-, zeta-), cyphenothrin, deltamethrin, emperthrin (1R-isomer), esfenvalerate, etofenprox, fenfluthrin, fenpropathrin, fenpyrithrin, fenvalerate, flubrocyrthinate, flucythrinate, flufenprox, flumethrin, fluvallinate, fubfenprox, gamma-cyhalothrin, imiprothrin, kadethrin, lambda-cyhalothrin, metofluthrin, permethrin (cis-, trans-), phenothrin (1R-trans isomer), prallethrin, profluthrin, protrifenbutate, pyresmethrin, resmethrin, RU 15525, silafluofen, tau-fluvalinate, tefluthrin, terallethrin, tetramethrin (-1R-isomer), tralomethrin, transfluthrin, ZXI 8901, pyrethrins (pyrethrum), DDT, indoxacarb, acetamiprid, clothianidin, dinotefuran, imidacloprid, nitenpyram, nithiazine, thiacloprid, thiamethoxam, nicotine, bensul-tap, cartap, camphechlor, chlordane, endosulfan, gamma-HCH, HCH, heptachlor, lindane, methoxychlor spinosad, acetoprole, ethiprole, fipronil, vaniliprole, avermectin, emamectin, emamectin-benzoate, ivermectin, milbemy-cin, diofenolan, epofenonane, fenoxycarb, hydroprene, kinoprene, methoprene, pyriproxifen, triprene, chroma-fenozide, halofenozide, methoxyfenozide, tebufenozide, bistrifluron, chlofluaazuron, diflubenzuron, fluazuron, flucycloxuron, flufenoxuron, hexaflumuron, lufenuron,

novaluron, noviflumuron, penfluron, teflubenzuron, triflumuron, buprofezin, cyromazine, diafenthiuron, azocyclostin, cyhexatin, fenbutatin-oxide, chlorfenapyr, binapacryl, dinobuton, dinocap, DNOC, fenazaquin, fenpyroximate, pyrimidifen, pyridaben, tebufenpyrad, tolfenpyrad, hydramethylnon, dicofol, rotenone, acequinocyl, flucacrypyrim, *Bacillus thuringiensis* strains, spiroadiclofen, spiromesifen, 3-(2,5-dimethylphenyl)-8-methoxy-2-oxo-1-azaspiro[4.5]dec-3-en-4-yl ethyl carbonate (alias: carbonic acid, 3-(2,5-dimethylphenyl)-8-methoxy-2-oxo-1-azaspiro[4.5]dec-3-en-4-yl ethyl ester, CAS-Reg.-No.: 382608-10-8) and carbonic acid, cis-3-(2,5-dimethylphenyl)-8-methoxy-2-oxo-1-azaspiro[4.5]dec-3-en-4-yl ethyl ester (CAS-Reg.-No.: 203313-25-1), flonicamid, amitraz, propargite, N2-[1,1-dimethyl-2-(methylsulfonyl)ethyl]-3-iodo-N1-[2-methyl-4-[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]phenyl]-1,2-benzenedicarboxamide (CAS-Reg.-No.: 272451-65-7), thiocyclam hydrogen oxalate, thiosultap-sodium, azadirachtin, *Bacillus* spec., *Beauveria* spec., codlemone, *Metarrhizium* spec., *Paecilomyces* spec., thuringiensin, *Verticillium* spec., aluminum phosphide, methyl bromide, sulfurly fluoride, cryolite, flonicamid, pymetrozine, clofentezine, etoxazole, hexythiazox, amidoflumet, benclothiaz, benzoximate, bifentazate, bromopropylate, buprofezin, chinomethionat, chlordinform, chlorobenzilate, chloropicrin, clothiazoben, cycloprene, dicyclanil, fenoxacrim, fentrifanil, flubenzimine, flufenimer, flutenzin, gossypure, hydramethylnone, japonilure, metoxadiazone, petroleum, piperonyl butoxide, potassium oleate, pyridalyl, sulfluramid, tetradifon, tetrasul, triarathene, verbutin.

[0360] Insecticides which may preferably be used together with the herbicides are, for example, the following:

[0361] acetamiprid, acrinathrin, aldicarb, amitraz, acinphos-methyl, cyfluthrin, carbaryl, cypermethrin, deltamethrin, endosulfan, ethoprophos, fenamiphos, fenthion, fipronil, imidacloprid, methamidophos, methiocarb, niclosamide, oxydemeton-methyl, prothiophos, silaflufen, thiacloprid, thiodicarb, tralomeethrin, triazophos, trichlorfon, triflumuron, terbufos, fonofos, phorate, chlorpyrifos, carbofuran, tefluthrin.

[0362] The active compound combinations according to the invention are suitable for controlling a broad spectrum of weeds on non-crop land, on paths, rail tracks, industrial terrain ("industrial weed control") or in plantation crops, such as moderate, subtropical and tropical climates or geographies. Examples of plantation crops are oil palms, nuts (for example almonds, hazelnuts, walnuts, macadamia), coconut, berries, oil palms, rubber tree, citrus (for example orange, lemon, mandarin), bananas, pineapples, cotton, sugarcane, tea, coffee, cacao and the like. They are also suitable for use in the cultivation of fruits (for example pome fruit, such as apple, pear, cherry, mango, kiwi) and viticulture. The compositions can also be used for preparing the soil for sowing ("burn-down" "no-till" or "zero-till" method) or for treatment after harvest ("chemical fallow"). Potential applications of the active compound combinations extend to weed control in tree crops, for example young Christmas tree crops or eucalyptus plantations, in each case prior to planting or after transplanting (also by over-top treatment).

[0363] The compositions can also be used in selective crops of economically important crops, such as cereals

(wheat, barley, rye), corn, rice, sugarbeet, sugarcane, oil seed rape, cotton and soybean. When using the active compounds (A) and (B) in crop plants such as cereals and corn, it may, depending on the crop plant, be expedient to apply a safener above certain application rates to prevent or reduce damage to the crop plant.

[0364] The multiple combinations according to the invention (=herbicidal compositions) are synergistically effective with respect to herbicide action and selectivity and have a favorable action with a view to the weed spectrum. They have excellent herbicidal activity against a broad spectrum of economically important monocotyledonous or dicotyledonous harmful plants. The active compounds even act efficiently on perennial weeds which produce shoots from rhizomes, root stocks or other perennial organs and which are difficult to control. In this context, it does not matter whether the substances are applied before sowing, pre-emergence or post-emergence. Application by the early post-sowing pre-emergence method or by the post-emergence method of plantation crops against harmful plants which have not yet emerged or which have already emerged is preferred. The application may also be integrated into weed management systems with repeat split applications (sequence applications, sequential).

[0365] Specifically, examples may be mentioned of some representatives of the monocotyledonous and dicotyledonous weed flora which can be controlled by the active compound combinations according to the invention, without the enumeration being a restriction to certain species.

[0366] From among the monocotyledonous weed species, for example, the compositions control *Agrostis*, *Alopecurus*, *Apera*, *Avena*, *Brachicaria*, *Bromus*, *Dactyloctenium*, *Digitaria*, *Echinochloa*, *Eleocharis*, *Eleusine*, *Festuca*, *Fimbristylis*, *Ischaemum*, *Lolium*, *Monochoria*, *Panicum*, *Paspalum*, *Phalaris*, *Phleum*, *Poa*, *Sagittaria*, *Scirpus*, *Setaria*, *Sphenoclea* and *Cyperus* species from the annual group and, from the perennial weeds, *Agropyron*, *Cynodon*, *Imperata* and *Sorghum*, and also perennial *Cyperus* species.

[0367] In the case of dicotyledonous weed species, the activity spectrum extends to species such as, for example, *Galium*, *Viola*, *Veronica*, *Lamium*, *Stellaria*, *Amaranthus*, *Sinapis*, *Ipomoea*, *Matricaria*, *Abutilon* and *Sida* from the annual and *Convolvulus*, *Cirsium*, *Rumex* and *Artemisia* from the perennial weeds.

[0368] A herbicidal action is also observed against dicotyledonous harmful plants, such as *Ambrosia*, *Anthemis*, *Carduus*, *Centaurea*, *Chenopodium*, *Datura*, *Emex*, *Galeopsis*, *Galinsoga*, *Kochia*, *Lepidium*, *Lindernia*, *Papaver*, *Portulaca*, *Polygonum*, *Ranunculus*, *Rorippa*, *Rotala*, *Senecio*, *Sesbania*, *Solanum*, *Sonchus*, *Taraxacum*, *Trifolium*, *Urtica* and *Xanthium*.

[0369] If the active compound combinations according to the invention are applied to the soil surface before germination, then the weed seedlings are either prevented completely from emerging, or the weeds grow until they have reached the cotyledonous stage but then their growth stops, and, eventually, after three to four weeks have elapsed, they die completely.

[0370] If the active compounds are applied post-emergence to the green parts of the plants, growth likewise stops drastically a very short time after the treatment and the weed

plants remain at the growth stage of the point of time of application, or they die completely after a certain time, so that in this manner competition by the weeds, which is harmful to the crop plants, is eliminated at a very early point in time and in a sustained manner.

[0371] The herbicidal compositions according to the invention are distinguished by a rapidly commencing and long-lasting herbicidal action. As a rule, the rain fastness of the active compounds in the combinations according to the invention is advantageous. A particular advantage is that the dosages of compounds (A) and (B), which are used in the combinations and are effective, can be adjusted to such a low quantity that their soil action is optimally low. Not only does this allow them to be employed in sensitive crops in the first place, but ground water contaminations are virtually avoided. The combination according to the invention of active compounds allows the application rate of the active compounds required to be reduced considerably.

[0372] When herbicides of type (A)+(B) are used jointly superadditive (=synergistic) effects are observed. This means that the activity of the combinations exceeds the expected total of the activities of the individual herbicides employed. The synergistic effects allow the application rate to be reduced, a broader spectrum of broad-leaf weeds and grass weeds to be controlled, a more rapid onset of the herbicidal action, a longer duration of action, a better control of the harmful plants using only one, or few, application(s), and the possible application period to be extended. In some cases, by using the compositions, the amount of harmful ingredients, such as nitrogen or oleic acid, and their introduction into the soil are reduced, too.

[0373] The identified properties and advantages are of benefit for weed control practice to keep agricultural crops free from undesired competing plants and thus to safeguard and/or increase the quality and quantity of the yields. These novel combinations markedly exceed the technical state of the art with a view to the properties described.

[0374] While the combinations according to the invention have an outstanding herbicidal activity against monocotyledonous and dicotyledonous weeds, crop plants are damaged only to a minor extent, if at all.

[0375] Some of the compositions according to the invention additionally have outstanding growth-regulatory properties in crop plants. They engage in a plant's metabolism in a regulatory fashion and can thus be employed for targeted influencing of plant constituents and for facilitating harvesting, such as, for example, by triggering desiccation and stunted growth. Moreover, they are also suitable for generally controlling and inhibiting unwanted vegetative growth without destroying the plants in the process. Inhibiting the vegetative growth plays an important role in many monocotyledonous and dicotyledonous crops, allowing lodging to be reduced or prevented completely.

[0376] On account of their herbicidal and plant growth-regulatory properties, the compositions can also be employed for controlling harmful plants in crops of known genetically modified plants or genetically modified plants yet to be developed. As a rule, the transgenic plants are distinguished by particularly advantageous properties, in addition to resistances to the compositions according to the invention, for example by resistances to plant diseases or

plant pathogens, such as certain insects or microorganisms such as fungi, bacteria or viruses. Other particular properties relate, for example, to the harvested material with respect to quantity, quality, storability, composition and specific constituents. Thus, transgenic plants with an increased starch content or in which the quality of the starch is altered, or those having a different fatty acid composition of the harvested material, are known.

[0377] Traditional ways of generating novel plants which have modified characteristics in comparison with existing plants consist, for example, in traditional breeding methods and the generation of mutants. Alternatively, novel plants with modified characteristics can be generated using recombinant procedures (see, for example, EP-A-0221044, EP-A-0131624). For example, a number of cases have been described of

[0378] recombinant modifications of crop plants for the purpose of modifying the starch synthesized in the plants (for example WO 92/11376, WO 92/14827, WO 91/19806),

[0379] transgenic crop plants which are resistant to other herbicides, for example to sulfonylureas (EP-A-0257993, U.S. Pat. No. 5,013,659),

[0380] transgenic crop plants, with the capability of producing *Bacillus thuringiensis* toxins (Bt toxins) which make the plants resistant to certain pests (EP-A-0142924, EP-A-0193259),

[0381] transgenic crop plants having a modified fatty acid composition (WO 91/13972).

[0382] A large number of molecular-biological techniques with which novel transgenic plants with modified properties can be generated are known in principle; see, for example, Sambrook et al., 1989, Molecular Cloning, A Laboratory Manual, 2nd Ed., Cold Spring Harbor Laboratory Press, Cold Spring Harbor, N.Y.; or Winnacker "Gene und Klon" [Genes and Clones], VCH Weinheim 2nd Edition 1996 or Christou, "Trends in Plant Science" 1 (1996) 423-431.

[0383] To carry out such recombinant manipulations, nucleic acid molecules which permit a mutagenesis or a sequence modification by recombination of DNA sequences can be introduced into plasmids. For example, it is possible with the aid of the abovementioned standard methods to carry out base exchanges, to remove subsequences or to add natural or synthetic sequences. Adapters or linkers may be added in order to link the DNA fragments to each other.

[0384] For example, plant cells with a reduced activity of a gene product can successfully be generated by expressing at least one suitable antisense RNA, a sense RNA to achieve a cosuppression effect or by expressing at least one suitably constructed ribozyme which specifically cleaves transcripts of the abovementioned gene product.

[0385] To this end, it is possible to use firstly DNA molecules which encompass all of the coding sequence of a gene product including any flanking sequences which may be present and secondly DNA molecules which only encompass parts of the coding sequence, it being necessary for these parts to be of sufficient length to cause an antisense effect in the cells. Also possible is the use of DNA sequences which have a high degree of homology with the coding sequences of a gene product which are not entirely identical thereto.

[0386] When expressing nucleic acid molecules in plants, the protein synthesized may be localized in any compartment of the plant cell. However, to achieve localization in a particular compartment, it is possible for example to link the coding region with DNA sequences which guarantee localization in a certain compartment. Sequences of this type are known to the person skilled in the art, (see, for example, Braun et al., *EMBO J.* 11 (1992), 3219-3227; Wolter et al., *Proc. Natl. Acad. Sci. USA* 85 (1988), 846-850; Sonnewald et al., *Plant J.* 1 (1991), 95-106).

[0387] The transgenic plant cells can be regenerated by known techniques to give intact plants. In principle, the transgenic plants can be plants of any desired plant species, i.e. both monocotyledonous and dicotyledonous plants. Transgenic plants are thus obtainable which have modified properties as a result of overexpression, suppression or inhibition of homologous (=natural) genes or gene sequences, or expression of heterologous (=foreign) genes or gene sequences.

[0388] Accordingly, the invention also provides a method for controlling unwanted vegetation, preferably on non-crop land or in plantation crops, wherein one or more herbicides of type (A) and one or more herbicides of type (B) are applied to the harmful plants, to parts of plants or plant seeds thereof, or to the area under cultivation.

[0389] The invention also provides the use of the novel combinations of compounds (A)+(B) for controlling harmful plants, preferably on non-crop land and in plantation crops.

[0390] The active compound combinations according to the invention can also be present as mixed formulations of the two components, if appropriate with further active compounds, additives and/or customary formulation auxiliaries, which are then applied in a customary manner diluted with water, or are produced as tank mixes by joint dilution of the separately formulated or partially separately formulated components with water.

[0391] The compounds (A) and (B) or their combinations can be formulated in various ways, depending on the prevailing biological and/or chemico-physical parameters. Examples of suitable formulations which are possible are: wettable powders (WP), emulsifiable concentrates (EC), aqueous solutions (SL), emulsions (EW), such as oil-in-water and water-in-oil emulsions, sprayable solutions or emulsions, oil- or water-based dispersions, oil dispersions (OD), suspoemulsions, suspension concentrates (SC), dusts (DP), seed-dressing products, granules for spreading and soil application or water-dispersible granules (WG), ULV formulations, microcapsules and waxes.

[0392] The individual formulation types are known in principle and are described, for example, in Winnacker-Küchler, "Chemische Technologie" [Chemical Engineering], Volume 7, C. Hanser Verlag Munich, 4th Ed. 1986, van Valkenburg, "Pesticide Formulations", Marcel Dekker, N.Y., 1973; K. Martens, "Spray Drying" Handbook, 3rd Ed. 1979, G. Goodwin Ltd. London.

[0393] The formulation auxiliaries required, such as inert materials, surfactants, solvents and further additives, are likewise known and are described, for example, in:

[0394] Watkins, "Handbook of Insecticide Dust Diluents and Carriers", 2nd Ed., Darland Books, Caldwell N. J., H. v.

Olphen, "Introduction to Clay Colloid Chemistry"; 2nd Ed., J. Wiley & Sons, N.Y.; Marsden, "Solvents Guide"; 2nd Ed., Interscience, N.Y. 1950; McCutcheon's "Detergents and Emulsifiers Annual", MC Publ. Corp., Ridgewood N.J.; Sisley and Wood, "Encyclopedia of Surface Active Agents", Chem. Publ. Co. Inc., N.Y. 1964; Schönfeldt, "Grenzflächenaktive Äthylenoxidaddukte" [Surface-active ethylene oxide adducts], Wiss. Verlagsgesell., Stuttgart 1976; Winnacker-Küchler, "Chemische Technologie", Volume 7, C. Hanser Verlag Munich, 4th Ed. 1986.

[0395] Based on these formulations, it is also possible to prepare combinations with other pesticidally active compounds such as other herbicides, fungicides or insecticides, and with safeners, fertilizers and/or growth regulators, for example in the form of a readymix or a tank mix.

[0396] Wettable powders are preparations which are uniformly dispersible in water and which, in addition to the active compound, also contain ionic and/or nonionic surfactants (wettters, dispersants), for example polyoxyethylated alkylphenols, polyoxyethylated fatty alcohols, polyoxyethylated fatty amines, alkanesulfonates, alkylbenzenesulfonates, sodium lignosulfonate, sodium 2,2'-dinaphthylmethane-6,6'-disulfonate, sodium dibutyl-naphthalenesulfonate or else sodium oleoylmethyl-taurate, in addition to a diluent or inert substance.

[0397] Emulsifiable concentrates are prepared by dissolving the active compound in an organic solvent, e.g. butanol, cyclohexanone, dimethylformamide, xylene or else higher-boiling aromatics or hydrocarbons with addition of one or more ionic and/or nonionic surfactants (emulsifiers). Examples of emulsifiers which can be used are:

[0398] calcium alkylarylsulfonates such as calcium dodecylbenzenesulfonate, or nonionic emulsifiers such as fatty acid polyglycol esters, alkylaryl polyglycol ethers, fatty alcohol polyglycol ethers, propylene oxide/ethylene oxide condensates, alkyl polyethers, sorbitan fatty acid esters, polyoxyethylene sorbitan fatty acid esters or polyoxyethylene sorbitan esters.

[0399] Dusts are obtained by grinding the active compound with finely divided solid materials, for example talc, natural clays such as kaolin, bentonite and pyrophyllite, or diatomaceous earth.

[0400] Granules can be prepared either by spraying the active compound onto adsorptive, granulated inert material or by applying active compound concentrates to the surface of carriers such as sand, kaolinites or granulated inert material with the aid of stickers, for example polyvinyl alcohol, sodium polyacrylate or else mineral oils. Suitable active compounds can also be granulated in the fashion which is conventional for the production of fertilizer granules, if desired as a mixture with fertilizers. Water-dispersible granules are generally prepared by customary methods such as spray drying, fluidized-bed granulation, disk granulation, mixing with high-speed stirrers and extrusion without solid inert material.

[0401] As a rule, the agrochemical preparations comprise 0.1 to 99% by weight, in particular 2 to 95% by weight, of active compounds of types A and/or B, the following concentrations being customary depending on the type of formulation. In wettable powders, the active compound concentration is, for example, approximately 10 to 95% by

weight, the remainder to 100% by weight being composed of customary formulation constituents. In the case of emulsifiable concentrates, the active compound concentration can amount to, for example, 5 to 80% by weight. Formulations in the form of dusts comprise in most cases 5 to 20% by weight of active compound, and sprayable solutions comprise approximately 0.2 to 25% by weight of active compound.

[0402] In the case of water-dispersible granules, the active compound content depends partly on whether the active compound is in liquid or solid form and on the granulation auxiliaries and fillers which are being used. In the case of the water-dispersible granules, the active compound content is generally between 10 and 90% by weight.

[0403] In addition, the active compound formulations mentioned comprise, if appropriate, the auxiliaries which are conventional in each case, such as stickers, wetters, dispersants, emulsifiers, preservatives, antifreeze agents, solvents, fillers, carriers, colorants, antifoams, evaporation inhibitors, and pH and viscosity regulators.

[0404] For use, the formulations, which are present in commercially available form, are optionally diluted in the customary manner, for example using water in the case of wettable powders, emulsifiable concentrates, dispersions and water-dispersible granules. Preparations in the form of dusts, soil granules, granules for broadcasting and sprayable solutions are usually not diluted further with other inert substances prior to use.

[0405] The active compounds can be applied to the plants, parts of the plants, seeds of the plants or the area under cultivation (soil of a field), preferably to the green plants and parts of the plants and, if appropriate, additionally to the soil of the field.

[0406] One possible use is the joint application of the active compounds in the form of tank mixes, the concentrated formulations of the individual active compounds, in optical formulations, jointly being mixed with water in the tank and the resulting spray mixture being applied.

[0407] A joint herbicidal formulation of the combination according to the invention of the active compounds (A) and (B) has the advantage of being easier to apply since the quantities of the components are already presented in the correct ratio to each other. Moreover, the adjuvants in the formulation can be matched optimally to each other, whereas a tank mix of different formulations may result in undesirable combinations of adjuvants.

A. General Formulation Examples

[0408] a) A dust is obtained by mixing 10 parts by weight of an active compound/active compound mixture and 90 parts by weight of talc as inert material and comminuting the mixture in a hammer mill.

[0409] b) A wettable powder which is readily dispersible in water is obtained by mixing 25 parts by weight of an active compound/active compound mixture, 64 parts by weight of kaolin-containing quartz as inert material, 10 parts by weight of potassium lignosulfonate and 1 part by weight of sodium oleoylmethyltaurate as wetter and dispersant, and grinding the mixture in a pinned-disk mill.

[0410] c) A dispersion concentrate which is readily dispersible in water is obtained by mixing 20 parts by weight of an active compound/active compound mixture with 6 parts by weight of alkylphenol polyglycol ether (® Triton X 207), 3 parts by weight of isotridecanol polyglycol ether (8 EO) and 71 parts by weight of paraffinic mineral oil (boiling range for example approx. 255 to 277° C.), and grinding the mixture in a ball mill to a fineness of below 5 microns.

[0411] d) An emulsifiable concentrate is obtained from 15 parts by weight of an active compound/active compound mixture, 75 parts by weight of cyclohexanone as solvent and 10 parts by weight of oxethylated nonylphenol as emulsifier.

[0412] e) Water-dispersible granules are obtained by mixing

[0413] 75 parts by weight of an active compound/active compound mixture,

[0414] 10 parts by weight of calcium lignosulfonate,

[0415] 5 parts by weight of sodium lauryl sulfate,

[0416] 3 parts by weight of polyvinyl alcohol and

[0417] 7 parts by weight of kaolin,

grinding the mixture on a pinned-disk mill and granulating the powder in a fluidized bed by spraying on water as granulation liquid.

[0418] f) Water-dispersible granules are also obtained by homogenizing and precomminuting, in a colloid mill,

[0419] 25 parts by weight of an active compound/active compound mixture,

[0420] 5 parts by weight of sodium 2,2'-dinaphthylmethane-6,6'-disulfonate,

[0421] 2 parts by weight of sodium oleoylmethyltaurate,

[0422] 1 part by weight of polyvinyl alcohol,

[0423] 17 parts by weight of calcium carbonate and

[0424] 50 parts by weight of water,

subsequently grinding the mixture in a bead mill and atomizing and drying the resulting suspension in a spray tower by means of a single-substance nozzle.

B. Biological Examples

1. Pre-Emergence Herbicidal Action

[0425] Seeds or rhizome pieces of monocotyledonous and dicotyledonous harmful plants are placed in sandy loam in pots and covered with soil. The compositions, formulated as concentrated aqueous solutions, wettable powders or emulsion concentrates, are then applied to the surface of the covering soil as an aqueous solution, suspension or emulsion at an application rate of 300 to 800 l of water/ha (converted) in a variety of dosages. After the treatment, the pots are placed in a greenhouse and kept under good growth conditions for the weeds. Visual scoring of plant or emergence damage is carried out after the test plants have emerged after an experimental period of 3 to 4 weeks in comparison with untreated controls. As demonstrated by the test results, the

compositions according to the invention have an outstanding pre-emergence herbicidal action against a broad spectrum of weed grasses and broad-leaf weeds.

Scoring and Assessing of the Synergistic Herbicidal Effects:

[0426] The herbicidal efficacy of the active compounds or active compound mixtures was scored visually by comparing the treated pots (soil) with untreated controls. The damage and development of all above-ground plant parts was recorded. Scoring was done on a percentage scale (100% action=all plants dead or not emerged; 50% action=50% of the plants and green plant parts dead or not emerged; 0% action=no discernible action=like control plot). The score figures of in any case 4 repetitions (pots) were averaged.

[0427] When applying the combinations according to the invention, herbicidal effects are frequently observed on a harmful plant species which exceed the formal total of the effects of the herbicides present when these are applied by themselves. Alternatively, it is observed in some cases that a lower application rate is required for the herbicide combination in order to achieve the same effect on a harmful plant species in comparison with the individual products. Such increases in action or efficacy, or reduced application rates, strongly suggest a synergistic effect. When the data observed already exceed the formal total of the data in the experiments with individual applications, they likewise exceed the expected value according to Colby, which is calculated using the formula below and is likewise regarded as an indication of synergism (cf. S. R. Colby; in Weeds 15 (1967) pp. 20 to 22):

$$E=A+B-(A \cdot B/100)$$

[0428] In this formula:

[0429] A=action of active compound (A) in % at an application rate of a g of AS/ha;

[0430] B=action of active compound (B) in % at an application rate of b g of AS/ha;

[0431] E=expected value of the action of the combination (A)+(B) in % at the combined application rate a+b g of AS/ha.

[0432] The data observed in the experiments show, at suitably low dosages, an action of the combinations which exceeds the expected values according to Colby.

2. Post-Emergence Herbicidal Action

[0433] Seeds or rhizome pieces of monocotyledonous and dicotyledonous weeds are placed in sandy loam in pots, covered with soil and grown in the greenhouse under good growth conditions (temperature, atmospheric humidity, water supply). Three weeks after sowing, the test plants are treated in the three-leaf stage with the compositions according to the invention. The compositions according to the invention, formulated as wettable powders or emulsion concentrates, are sprayed onto the green plant parts in various dosages using an application rate of 300 to 800 l of water/ha (converted). After the test plants have remained in the greenhouse under optimum growth conditions for about 3 to 4 weeks, the effect of the preparations is scored visually in comparison with untreated controls (scoring as in Example 1). The compositions according to the invention

also have good herbicidal post-emergence action against a broad spectrum of economically important weed grasses and broad-leaf weeds.

[0434] Here, effects of the combinations according to the invention are frequently observed which exceed the formal total of the effects of the herbicides when these are applied by themselves. The observed values for the tests show, at suitably low dosages, an effect of the combinations which exceeds the expected values according to Colby (cf. scoring in Example 1).

3. Pre- and Post-Emergence Herbicidal Action (Outdoor Trials)

[0435] Corresponding to the greenhouse experiments of sections 1 and 2, the tests were carried out in the open on plots. Scoring was carried out analogously to the tests in sections 1 and 2.

4. Herbicidal Action and Crop Plant Tolerance (Outdoor Trials)

[0436] Crop plants were grown in the open on plots under natural outdoor conditions, and seeds or rhizome pieces of typical harmful plants were laid out or the natural weed growth was utilized. Treatment with the compositions according to the invention was carried out after the harmful plants had emerged and the crop plants were, generally, at the 2- to 4-leaf stage; in some cases (as stated), application of individual active compounds or active compound combinations was carried out pre-emergence or as a sequential treatment partly pre-emergence and/or post-emergence.

[0437] In the case of plantation crops, it was generally only the soil between the individual crop plants that was treated with the active compounds.

[0438] After the application, for example 2, 4, 6 and 8 weeks after application, the effect of the preparations was scored visually by comparison with untreated controls (cf. scoring in Example 1). In the outdoor trial as well, the compositions according to the invention have synergistic herbicidal activity against a broad spectrum of economically important weed grasses and broad-leaf weeds. The comparison showed that the combinations according to the invention in most cases have a higher, in some cases a considerably higher, herbicidal activity than the total of the activities of the individual herbicides, thus indicating synergism. Moreover, the effects in essential phases of the scoring period were above the expected values according to Colby (cf. scoring in Example 1), also indicating synergism. In contrast, the crop plants were, as a consequence of the treatments with the herbicidal compositions, damaged only to a small degree, if at all.

5. Specific Test Examples

[0439] The following abbreviations are used in the description and the tables below:

[0440] g of AS/ha=grams of active substance (=100% active compound) per hectare;

[0441] the total of the activities of the individual applications is given as E_A ;

[0442] the expected values according to Colby are in each case given as E_C ;

Example 5.1

[0443] Certain combinations were tested for their herbicidal activity in accordance to the general example in section 3 in combination with section 2 (post-emergence method). The results are summarized in Table 2.

TABLE 2

Active	Application rate	<u>Herbicidal action [%] against</u>	
compound(s)	[g of AS/ha]	<i>Poa trivialis</i>	<i>Festuca rubra</i>
(A11)	200	0	0
(B2.1.1.1)	600	88	87
(A11) + (B2.1.1.1)	200 + 600	94	95
		(E ^A = 88, E ^C = 88)	(E ^A = 87, E ^C = 87)

Abbreviations in Table 2:
 Conditions: Outdoor trial, Application at stage 21 (Beginning of stocking)
 of the harmful plants, evaluation 35 days after treatment
 (A11) = Compound (A11) from Table 1 (compound (A)) = 2-amino-4-
 [(1R)-6-methylindan-1-yl-amino]-6-[(1R)-1-fluoroethyl]-1,3,5-triazine
 (B2.1.1.1) = Glufosinate-ammonium

Example 5.2

[0444] Certain combinations were tested for their herbicidal activity in accordance to the general example in section 3 in combination with section 2 (post-emergence method). The results are summarized in Table 3.

TABLE 3

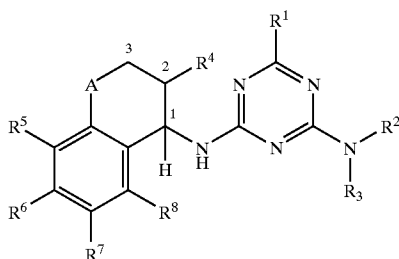
Active compound(s)	Application rate [g of AS/ha]	Herbicidal action [%] against <i>Lolium multiflorum</i>
(A11)	200	20
	300	50
(B2.1.2.1)	1080	18
(A11) + (B2.1.2.1)	200 + 1080	88
		(E ^A = 38, E ^C = 35)

Abbreviations in Table 3:
 Conditions: Outdoor trial, Application at the 2–5-leaf stage (post-emergence) of the harmful plants, evaluation 55 days after treatment
 (A11) = Compound (A11) from Table 1 (compound (A)) = 2-amino-4-[(1R)-6-methylindan-1-ylamino]-6-[(1R)-1-fluoroethyl]-1,3,5-triazine (B2.1.2.1) = Glyphosate-isopropylammonium

1. A herbicide combination comprising an effective amount of components (A) and (B), where

component (A) is one or more herbicides of the formula (I) or salts thereof

[herbicides (A)]



in which

R^1 is H or a group of the formula $CZ^1Z^2Z^3$, where

Z¹ is H, halogen, (C₁-C₆)-alkyl, (C₁-C₆)-haloalkyl, [(C₁-C₄)-alkoxy]-(C₁-C₆)-alkyl, (C₃-C₆)-cycloalkyl which is unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, (C₁-C₄)-alkyl and (C₁-C₄)-haloalkyl, or is (C₂-C₆)-alkenyl, (C₂-C₆)-alkynyl, (C₂-C₆)-haloalkenyl, (C₄-C₆)-cycloalkenyl, (C₄-C₆)-halocycloalkenyl, (C₁-C₆)-alkoxy or (C₁-C₆)-haloalkoxy.

Z² is H, halogen, (C₁-C₆)-alkyl or (C₁-C₄)-alkoxy; or

Z¹ and Z² together with the carbon atom of the group CZ¹Z²Z³ are a (C₃-C₆)-cycloalkyl radical or (C₄-C₆)-cycloalkenyl radical, where each of the two last-mentioned radicals is unsubstituted or substituted by one or more radicals selected from the group consisting of (C₁-C₄)-alkyl, and

Z³ is H, (C₁-C₆)-alkyl, (C₁-C₄)-alkoxy or halogen,

R² and R³ are each independently of one another H, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₃-C₄)-alkenyl, (C₃-C₄)-haloalkenyl, (C₃-C₄)-alkynyl, (C₃-C₄)-haloalkynyl or an acyl radical,

R⁴ is H, (C₁-C₆)-alkyl or (C₁-C₆)-alkoxy,

R⁵, R⁶, R⁷ and R⁸ are each independently of one another H, (C₁-C₄)-alkyl, (C₁-C₃)-haloalkyl, halogen, (C₁-C₃)-alkoxy, (C₁-C₃)-haloalkoxy or cyano and

A is a divalent group of the formula CH₂ or O or a direct bond, and

component (B) is one or more herbicides (B) which are structurally different from the herbicides (A) present in each case, selected from the group of compounds consisting of

(B1) soil-acting herbicides particularly suitable for pre-emergence application against monocotyledonous or dicotyledonous harmful plants,

(B2) foliar-acting herbicides particularly suitable for post-emergence application against monocotyledonous or dicotyledonous harmful plants, and

(B3) soil-acting and foliar-acting herbicides suitable for pre- or post-emergence application against monocotyledonous or dicotyledonous harmful plants.

2. The herbicide combination as claimed in claim 1 wherein

R^1 is H or a group of the formula $CZ^1Z^2Z^3$ in which

Z¹ is H, halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, [(C₁-C₄)-alkoxy]-(C₁-C₆)-alkyl, (C₃-C₆)-cycloalkyl, which is unsubstituted or substituted by one or more radicals selected from the group consisting of (C₁-C₄)-alkyl, or is (C₂-C₄)-alkenyl, (C₂-C₄)-alkynyl, (C₁-C₄)-alkoxy or (C₁-C₄)-haloalkoxy;

Z² is H, halogen or (C₁-C₄)-alkyl, or

Z^1 and Z^2 together with the carbon atom attached to the radicals are a (C_3 - C_6)-cycloalkyl radical and

Z³ is H, (C₁-C₄)-alkyl, (C₁-C₂)-alkoxy or halogen,

R² is H, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₃-C₄)-alkenyl, (C₃-C₄)-haloalkenyl, (C₃-C₄)-alkynyl, (C₃-C₄)-haloalkynyl or an acyl radical having 1 to 12 carbon atoms,

R³ is H, (C₁-C₄)-alkyl or (C₁-C₄)-haloalkyl,

R⁴ is H, (C₁-C₃)-alkyl or (C₁-C₃)-alkoxy;

R⁵, R⁶, R⁷ and R⁸ are each independently of one another H, (C₁-C₃)-alkyl, halogen, (C₁-C₃)-alkoxy,

A is a divalent group of the formula CH₂ or O or a direct bond, preferably CH₂ or a direct bond, in particular a direct bond.

3. The herbicide combination as claimed in claim 1 wherein component (B) is one or more herbicides (B) which are structurally different from the herbicides (A) present in each case, selected from the group of compounds consisting of

(B1.1.1) tebuthiuron,

(B1.1.2) sulfometuron(-methyl),

(B1.1.3) flumioxazine,

(B1.1.4) simazine,

(B1.1.5) dichlobenil,

(B1.1.6) trifluralin,

(B1.1.7) pendimethalin,

(B1.1.8) oxadiargyl,

(B1.1.9) thiazopyr,

(B1.1.10) oryzalin,

(B1.1.11) propyzamide,

(B1.1.12) terbacil,

(B1.2.1) isoxaben,

(B1.2.2) flazasulfuron,

(B2.1.1) glufosinate and its salts,

(B2.1.1.4) bilanafos and its salts,

(B2.1.2) glyphosate and its salts,

(B2.1.3) sulfosate,

(B2.1.4) methylarsonic acid and its salts,

(B2.1.5) foramsulfuron,

(B2.1.6) iodosulfuron and its esters and salts,

(B2.1.7) amicarbazone,

(B2.1.8) propoxycarbazone and its salts,

(B2.1.9) metribuzin,

(B2.1.10) metsulfuron and its esters and salts,

(B2.1.11) naproanilide,

(B2.1.12) imazapyr and its salts,

(B2.1.13) paraquat salts,

(B2.1.14) diquat salts,

(B2.2.1) 2,4-D and its esters and salts,

(B2.2.2) dicamba and its salts,

(B2.2.3) triclopyr and its salts and esters,

(B2.2.4) diflufenzopyr and its salts and esters,

(B2.2.5) fluroxypyr and its salts and esters,

(B2.2.6) thifensulfuron-methyl,

(B2.2.7) amidosulfuron and its salts,

(B2.2.8) tribenuron and its esters and salts,

(B2.2.9) triasulfuron,

(B2.2.10) picloram and its esters and salts,

(B2.2.11) carfentrazone and its esters and salts,

(B2.2.12) clopyralid and its esters and salts,

(B2.2.13) butafenacil,

(B2.2.14) amitrole,

(B2.3.1) quinclorac,

(B3.1.1) oxyfluorfen,

(B3.1.2) diuron,

(B3.1.3) bromacil,

(B3.1.4) norflurazon,

(B3.1.5) azafenidin,

(B3.1.6) chlorsulfuron,

(B3.1.7) imazapic,

(B3.1.8) oxadiazon,

(B3.1.9) diflufenican,

(B3.1.10) ametryn,

(B3.1.11) rimsulfuron and its salts,

(B3.1.12) trifloxysulfuron and its salts,

(B3.1.13) nicosulfuron and its salts,

(B3.1.14) asulam and its salts,

(B3.1.15) isoxaflutole

(B3.2.1) hexazinone,

(B3.2.2) sulfentrazone and

(B3.2.3) prometon.

4. The herbicide combination as claimed in claim 1, which comprises, as component (B), one or more active compounds selected from the group consisting of simazine (B1.1.4), pendimethalin (B1.1.7), oxadiargyl (B1.1.8), isoxaben (B1.2.1), foramsulfuron (B2.1.5), iodosulfuron (B2.1.6), iodosulfuron-methyl sodium salt (B2.1.6.2), amicarbazone (B2.1.7), propoxycarbazone (B2.1.8), propoxycarbazone sodium salt (B2.1.8.1), metribuzin (B2.1.9), glufosinate (B2.1.1), glufosinate-ammonium (B2.1.1.1), glyphosate (B2.1.2), glyphosate-isopropylammonium (B2.1.2.1), sulfosate (B2.1.3), metsulfuron (B2.1.10), metsulfuron-methyl (B2.1.10.1), imazapyr (B2.1.12), imazapyr acid (B2.1.12.1), imazapyr-isopropylammonium (B2.1.12.2), paraquat (B2.1.13), paraquat dichloride (B2.1.13.1), triclopyr (B2.2.3), triclopyr acid (B2.2.3.1), triclopyr-triethylammonium salt (B2.2.3.2), triclopyr-butoxyl ester (B2.2.3.3), amidosulfuron (B2.2.7), amitrole

(B2.2.14), diuron (B3.2), oxyfluorfen (B3.1.1), oxadiazon (B3.1.8), diflufenican (B3.1.9), bromacil (B3.3) and norflurazon (B3.4).

5. The herbicide combination as claimed in claim 1, wherein active compound components (A) and (B) are present in a weight ratio of from 1:8000 to 800:1.

6. The herbicide combination as claimed in claim 1, which comprises one or more further components selected from the group consisting of crop protection agents of a different type and formulation auxiliaries and additives customary in crop protection.

7. A method for controlling harmful plants which comprises applying the herbicides of the herbicide combination as defined in claim 1 together or separately by the pre-emergence method, by the post-emergence method or by the pre-emergence and the post-emergence method onto the plants, parts of plants, plant seeds or the area where the plants grow.

8. The method as claimed in claim 7 for the control of harmful plants on non-crop land or in plantation crops.

9. The use of the herbicide combinations defined in claim 1 for controlling harmful plants.

* * * * *



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HACKER et al.(10) **Pub. No.: US 2010/0069246 A1**(43) **Pub. Date: Mar. 18, 2010**(54) **HERBICIDE COMBINATION COMPRISING
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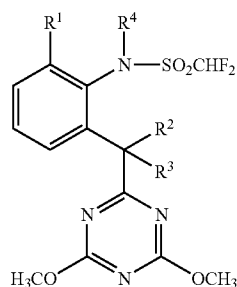
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A01N 43/66 (2006.01)(52) **U.S. Cl.** **504/133**(57) **ABSTRACT**

The present invention relates to a herbicide combination comprising components (A) and (B) where (A) denotes one or more compounds or salts thereof from the group described by the general formula (I):



in which

 R^1 is halogen, preferably fluorine or chlorine, R^2 is hydrogen and R^3 is hydroxyl or R^2 and R^3 together with the carbon atom to which they are attached are a carbonyl group $C=O$ and R^4 is hydrogen or methyl; and

(B) denotes one or more herbicides from the group of the (thio)ureas consisting of:

(B1-1) cumyluron, (B2-1) chlorbromuron, (B2-2) chlor-toluron, (B2-3) chloroxuron, (B2-4) daimuron, (B2-5) diflufenzopyr, (B2-6) dimefuron, (B2-7) diuron, (B2-8) fluometuron, (B2-9) forchlorfenuron, (B2-10) isoproturon, (B2-11) karbutilate, (B2-12) linuron, (B2-13) methyldymron, (B2-14) metobromuron, (B2-15) metoxuron, (B2-16) monolinuron, (B2-17) neburon, (B2-18) siduron, (B2-19) thidiazuron, (B3-1) methiuron, (B4-1) tebuthiuron, (B5-1) methabenzthiazuron.

HERBICIDE COMBINATION COMPRISING DIMETHOXYTRIAZINYL-SUBSTITUTED DIFLUOROMETHANESULFONYLANILIDES

[0001] The present invention is in the technical field of crop protection compositions which can be used against unwanted vegetation, for example by the pre-sowing method (with or without incorporation), by the pre-emergence method or by the post-emergence method in sown and/or planted crop plants such as, for example, in wheat (durum wheat and common wheat), corn, soybeans, sugar beet, sugar cane, cotton, rice (planted or sown under upland or paddy conditions using indica and/or japonica varieties and also hybrids/mutants/GMOs), beans (such as, for example, bush beans and broad beans), flax, barley, oats, rye, triticale, oilseed rape, potatoes, millet (sorghum), pasture grass, greens/lawns, in fruit plantations (plantation crops) or on non-crop areas (for example squares of residential areas or industrial sites, rail tracks). In addition to the single application, sequential applications are also possible.

[0002] It relates to a herbicide combination comprising at least two herbicides and to their use for controlling unwanted vegetation, in particular a herbicide combination comprising N-{2-[4,6-dimethoxy-(1,3,5)triazine-2(-carbonyl- or -hydroxymethyl)]-6-halophenyl}difluoromethanesulfonamides or their N-methyl derivatives and/or their salts, hereinbelow also referred to as “dimethoxytriazinyl-substituted difluoromethanesulfonylanilides”, and to herbicidally active compounds from the group of the (thio)ureas.

[0003] It is known that cyclicly substituted sulfonamides have herbicidal properties (for example WO 93/09099 A2, WO 96/41799 A1). These also include the phenyldifluoromethanesulfonamides, which are also referred to as difluoromethanesulfonylanilides. The lastmentioned compounds are, for example, phenyl derivatives which are mono- or polysubstituted, inter alia by dimethoxypyrimidinyl (for example WO 00/006553 A1) or dimethoxytriazinyl and also a further halogen substitution (for example WO 2005/096818 A1, WO 2007/031208 A2).

[0004] However, specific compounds from the group of the N-{2-[4,6-dimethoxy-(1,3,5)triazine-2(-carbonyl- or -hydroxymethyl)]-6-halophenyl}difluoromethanesulfonamides, as described in WO 2005/096818 A1, and their N-methyl derivatives, as described for the first time in WO 2006/008159 A1 in connection with fungicides and in WO 2007/031208 A2 and JP 2007-213330 (unpublished) as herbicides, are not entirely satisfactory in all respects with regard to their herbicidal properties.

[0005] The herbicidal activity of the dimethoxytriazinyl-substituted difluoromethanesulfonylanilides against harmful plants (broad-leaved weeds, weed grasses, *Cyperaceae*; hereinbelow collectively also referred to as “weed”) is already at a high level, but depends in general on the application rate, the formulation in question, the harmful plants to be controlled in each case or the spectrum of harmful plants, the climatic and soil conditions and the like. Further criteria in this context are duration of action, or the breakdown rate, of the herbicide, the general crop plant compatibility and the speed of action (more rapid onset of action), the activity spectrum and behavior toward follower crops (replanting problems) or the general flexibility of application (control of weeds in their various growth stages). If appropriate, changes in the susceptibility of harmful plants, which may occur on pro-

longed use of the herbicides or in limited geographical regions (control of tolerant or resistant weed species) may also have to be taken into account. The compensation of losses in action in the case of individual plants by increasing the application rates of the herbicides is only possible to a certain degree, for example because such a procedure reduces the selectivity of the herbicides or because the action is not improved, even when applying higher rates.

[0006] Thus, there is frequently a need for targeted synergistic activity against specific weed species, weed control with better overall selectivity, generally lower amounts of active compounds used for equally good control results and for a reduced active compound input into the environment to avoid, for example, leaching and carry-over effects. There is also a need for developing one-shot applications to avoid labor-intensive multiple applications, and also to develop systems for controlling the rate of action, where, in addition to an initial rapid control of weeds there is also a slower, residual control.

[0007] A possible solution to the problems mentioned above may be to provide herbicide combinations, that is mixtures of a plurality of herbicides and/or other components from the group of the agrochemically active compounds of a different type and of formulation auxiliaries and additives customary in crop protection which contribute the desired additional properties. However, in the combined use of a plurality of active compounds, there are frequently phenomena of chemical, physical or biological incompatibility, for example lack of stability of a joint formulation, decomposition of an active compound or antagonism in the biological activity of the active compounds. For these reasons, potentially suitable combinations have to be selected in a targeted manner and tested experimentally for their suitability, it not being possible to safely discount a priori negative or positive results.

[0008] Mixtures of non-N-methyl derivatives of the compounds mentioned above are known in principle (for example WO 2007/079965 A2); however, their effectiveness in mixtures with other herbicides has only been confirmed in individual cases for dimethoxypyrimidinyl-substituted phenyl derivatives. In addition, there are also mixtures of selected N-methyl derivatives of the compounds mentioned above with some combination partners (PCT/EP2008/000870, unpublished).

[0009] It was the object of the present invention to provide crop protection compositions as alternatives to the prior art, or as an improvement thereof.

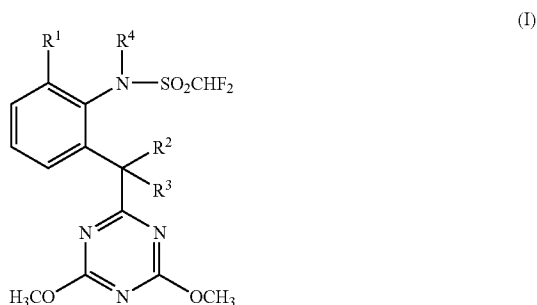
[0010] Surprisingly, it has now been found that this object can be achieved by herbicide combinations of dimethoxytriazinyl-substituted difluoromethanesulfonylanilides in combination with structurally different herbicides from the group of the (thio)ureas which act together in a particularly favorable manner, for example when they are used for controlling unwanted vegetation in sown and/or planted crop plants such as wheat (durum wheat and common wheat), corn, soybeans, sugar beet, sugar cane, cotton, rice (planted or sown under upland or paddy conditions using indica and/or japonica varieties and also hybrids/mutants/GMOs), beans (such as, for example, bush beans and broad beans), flax, barley, oats, rye, triticale, oilseed rape, potatoes, millet (sorghum), pasture grass, greens/lawns, in fruit plantations (plantation crops) or on non-crop areas (for example squares of residential areas or industrial sites, rail tracks), in particular in rice crops (planted

or sown under upland or paddy conditions using indica and/or japonica varieties and also hybrids/mutants/GMOs).

[0011] Compounds from the group of the (thio)ureas are already known as herbicidally active compounds for controlling unwanted vegetation, see, for example, JP 85172919, DE 1793602, DE 1905598, JP 7335454, U.S. Pat. No. 5,098,466, DE 2101938, U.S. Pat. No. 2,655,445, GB 914779, U.S. Pat. No. 4,193,788, GB 1407587, U.S. Pat. No. 3,434,822, DE 1028986, JP 7242493, DE 1210793, GB 1165160, DE 1028986, U.S. Pat. No. 2,655,444, U.S. Pat. No. 3,309,192, DE 2506690, GB 1266172, GB 1085430 and the literature cited in the publications mentioned above.

[0012] Accordingly, the present invention provides a herbicide combination comprising components (A) and (B) where

[0013] (A) denotes one or more compounds or salts thereof from the group described by the general formula (I):



in which

[0014] R¹ is halogen, preferably fluorine or chlorine,

[0015] R² is hydrogen and R³ is hydroxyl or

[0016] R² and R³ together with the carbon atom to which they are attached are a carbonyl group C=O and

[0017] R⁴ is hydrogen or methyl; and

[0018] (B) denotes one or more herbicides from the group of the (thio)ureas consisting of:

[0019] the subgroup of the dialkylureas (subgroup 1) consisting of:

[0020] (B1-1) cumyluron (PM #183), for example N'-[(2-chlorophenyl)methyl]-N'-(1-methyl-1-phenylethyl)urea (application rate: 10-5000 g of AS/ha, preferably 30-4000 g of AS/ha; weight ratio A:B=1:5000-50:1, preferably 1:800-7:1);

[0021] the subgroup of the phenylureas (subgroup 2), consisting of:

[0022] (B2-1) chlorbromuron (PM #992), for example N'-(4-bromo-3-chlorophenyl)-N-methoxy-N-methylurea (application rate: 10-5000 g of AS/ha, preferably 30-4000 g of AS/ha; weight ratio A:B=1:5000-50:1, preferably 1:800-7:1);

[0023] (B2-2) chlortoluron (PM #147), for example N'-(3-chloro-4-methylphenyl)-N,N-dimethylurea (application rate: 25-5000 g of AS/ha, preferably 50-3000 g of AS/ha; weight ratio A:B=1:5000-20:1, preferably 1:600-4:1);

[0024] (B2-3) chloroxuron (PM #1016), for example N'-[4-(4-chlorophenoxy)phenyl]-N,N-dimethylurea (application rate: 10-5000 g of AS/ha, preferably 30-4000 g of AS/ha; weight ratio A:B=1:5000-50:1, preferably 1:800-7:1);

[0025] (B2-4) daimuron (PM #216), syn. dymron, for example N-(4-methylphenyl)-N'-(1-methyl-1-phenylethyl)urea (application rate: 10-5000 g of AS/ha, preferably 30-4000 g of AS/ha; weight ratio A:B=1:5000-50:1, preferably 1:800-7:1);

[0026] (B2-5) diflufenzopyr (PM #259), for example 2-[1-[[[(3,5-difluorophenyl)amino]carbonyl]hydrazono]ethyl]-3-pyridinecarboxylic acid, also including its salts (for example the Na salt) (application rate: 1-500 g of AS/ha, preferably 2-300 g of AS/ha; weight ratio A:B=1:500-500:1, preferably 1:60-100:1);

[0027] (B2-6) dimefuron (PM #264), for example N'-[3-chloro-4-[5-(1,1-dimethylethyl)-2-oxo-1,3,4-oxadiazol-3(2H)-yl]phenyl]-N,N-dimethylurea (application rate: 20-4000 g of AS/ha, preferably 30-3000 g of AS/ha; weight ratio A:B=1:4000-25:1, preferably 1:600-7:1);

[0028] (B2-7) diuron (PM #291), for example N'-(3,4-dichlorophenyl)-N,N-dimethylurea (application rate 100-5000 g of AS/ha, preferably 200-4000 g of AS/ha; weight ratio A:B=1:5000-5:1, preferably 1:800-1:1);

[0029] (B2-8) fluometuron (PM #390), for example N,N-dimethyl-N'-[3-(trifluoromethyl)phenyl]urea (application rate: 10-3000 g of AS/ha, preferably 20-2500 g of AS/ha; weight ratio A:B=1:3000-50:1, preferably 1:500-10:1);

[0030] (B2-9) forchlorfenuron (PM #415), for example N-(2-chloro-4-pyridinyl)-N'-phenylurea (application rate: 10-5000 g of AS/ha, preferably 30-4000 g of AS/ha; weight ratio A:B=1:5000-5:1, preferably 1:800-7:1);

[0031] (B2-10) isoproturon (PM #491), for example N,N-dimethyl-N'-[4-(1-methylethyl)phenyl]urea (application rate: 50-5,000 g of AS/ha, preferably 75-3,000 g of AS/ha; weight ratio A:B=1:5000-10:1, preferably 1:600-3:1);

[0032] (B2-11) karbutilate (PM #499), for example 3-[[[(dimethylamino)carbonyl]amino]phenyl (1,1-dimethylethyl)carbamate (application rate: 10-5000 g of AS/ha, preferably 30-4000 g of AS/ha; weight ratio A:B=1:5000-50:1, preferably 1:800-7:1);

[0033] (B2-12) linuron (PM #506), for example N'-(3,4-dichlorophenyl)-N-methoxy-N-methylurea (application rate: 10-5000 g of AS/ha, preferably 20-4000 g of AS/ha; weight ratio A:B=1:5000-50:1, preferably 1:800-7:1);

[0034] (B2-13) methyldymron (PM #559), for example N-methyl-N'-(1-methyl-1-phenylethyl)-N-phenylurea (application rate: 10-5000 g of AS/ha, preferably 30-4000 g of AS/ha; weight ratio A:B=1:5000-50:1, preferably 1:800-7:1);

[0035] (B2-14) metobromuron (PM #1329), for example N'-(4-bromophenyl)-N-methoxy-N-methylurea (application rate: 10-5000 g of AS/ha, preferably 30-4000 g of AS/ha; weight ratio A:B=1:5000-50:1, preferably 1:800-7:1);

[0036] (B2-15) metoxuron (PM #571), for example N'-(3-chloro-4-methoxyphenyl)-N,N-dimethylurea (application rate: 10-5000 g of AS/ha, preferably 30-4000 g of AS/ha; weight ratio A:B=1:5000-50:1, preferably 1:800-7:1);

[0037] (B2-16) monolinuron (PM #580), for example N'-(4-chlorophenyl)-N-methoxy-N-methylurea (ap-

plication rate: 10-5000 g of AS/ha, preferably 30-4000 g of AS/ha; weight ratio A:B=1:5000-50:1, preferably 1:800-7:1);

[0038] (B2-17) neburon (PM #591), for example N-butyl-N'-(3,4-dichlorophenyl)-N-methylurea (application rate: 10-5000 g of AS/ha, preferably 30-4000 g of AS/ha; weight ratio A:B=1:5000-50:1, preferably 1:800-7:1);

[0039] (B2-18) siduron (PM #747), for example N-(2-methylcyclohexyl)-N'-phenylurea (application rate: 10-5000 g of AS/ha, preferably 30-4000 g of AS/ha; weight ratio A:B=1:5000-50:1, preferably 1:800-7:1);

[0040] (B2-19) thidiazuron (PM #814), for example N-phenyl-N'-1,2,3-thiadiazol-5-ylurea (application rate: 10-5000 g of AS/ha, preferably 30-4000 g of AS/ha; weight ratio A:B=1:5000-50:1, preferably 1:800-7:1);

[0041] the subgroup of the thioureas (subgroup 3) consisting of:

[0042] (B3-1) methiuron (PM #1313), for example N,N-dimethyl-N'-(3-methylphenyl)thiourea (application rate: 10-5000 g of AS/ha, preferably 30-4000 g of AS/ha; weight ratio A:B=1:5000-50:1, preferably 1:800-7:1);

[0043] the subgroup of the thiadiazolylureas (subgroup 4) consisting of:

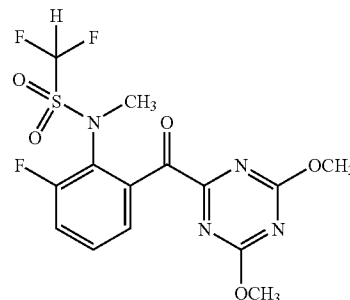
[0044] (B4-1) tebuthiuron (PM #785), for example N-[5-(1,1-dimethylethyl)-1,3,4-thiadiazol-2-yl]-N,N'-dimethylurea (application rate: 10-5000 g of AS/ha, preferably 30-4000 g of AS/ha; weight ratio A:B=1:5000-50:1, preferably 1:800-7:1);

[0045] the subgroup of the benzothiazolylureas (subgroup 5) consisting of:

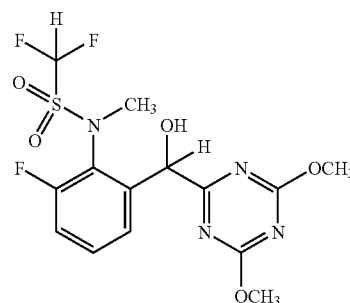
[0046] (B5-1) methabenzthiazuron (PM #545), for example N-2-benzothiazolyl-N,N'-dimethylurea (application rate: 10-5000 g of AS/ha, preferably 30-4000 g of AS/ha; weight ratio A:B=1:5000-50:1, preferably 1:800-7:1).

[0047] The compounds mentioned above in group B are referred to either by the "common name" according to the International Organization for Standardization (ISO) or by the chemical name or by a code number (development code); as known, for example, from the following sources "The Pesticide Manual", 14th edition 2006/2007 or "The e-Pesticide Manual", version 4.0 (2006-07), each published by the British Crop Protection Council (abbreviation: "PM # . . . " with the respective sequential entry number, and the literature cited therein, from "The Compendium of Pesticide Common Names" (abbreviation: "CPCN"; internet URL: <http://www.alanwood.net/pesticides/>) and/or other sources. The use of the names mentioned above, for example in the short form of the "common names", includes in each case all use forms (derivatives) such as acids, salts, esters and isomers such as stereoisomers and optical isomers, unless not already more specifically defined. The commercial use forms of the herbicides mentioned in group B are preferred. Here, the abbreviation "AS/ha" above means "active substance per hectare" and is based on 100% pure active compound.

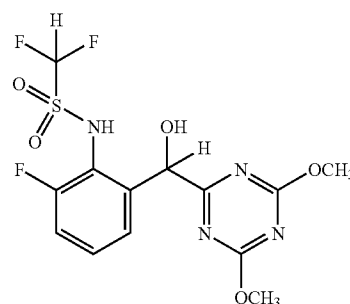
[0048] Preferred components (A) are the following compounds (A-1) to (A-8) of the formulae (A1), (A2), (A3), (A4), (A5), (A6), (A7) and (A8) or their salts:



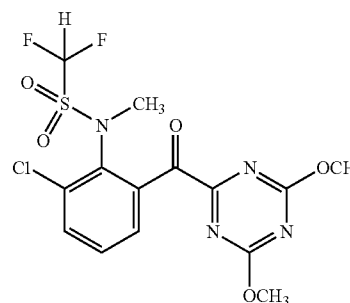
(A1)



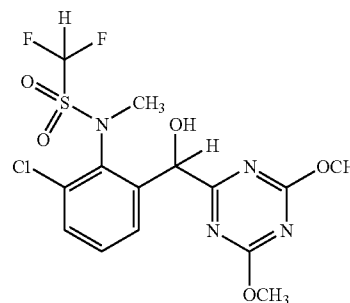
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(A3)

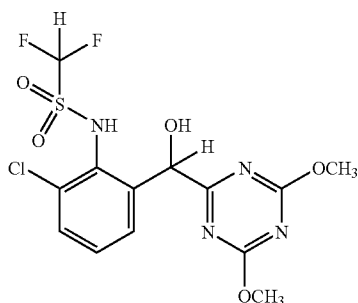


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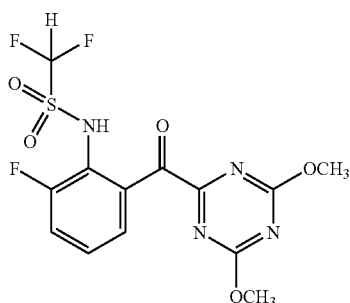


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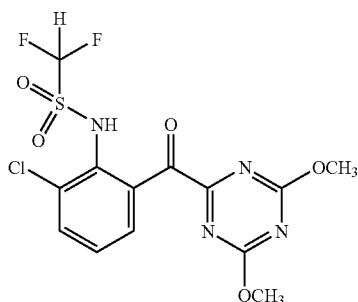
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(A6)



(A7)



(A8)

Particularly preferred as components (A) are the compounds (A-1), (A-2) and (A-3).

[0049] Compounds preferred as components (B) are:

(B1-1) cumyluron, (B2-4) daimuron, (B2-5) diflufenzopyr, (B2-7) diuron, (B2-10) isoproturon, (B2-16) monolinuron, (B2-19) thidiazuron, (B5-1) methabenzthiazuron; particularly preferably (B1-1) cumyluron, (B2-4) daimuron.

[0050] The herbicide combinations according to the invention may additionally comprise further components: for example agrochemically active compounds of a different type and/or formulation auxiliaries and/or additives customary in crop protection, or they may be employed together with these. Hereinbelow, the use of the term “herbicide combination(s)” or “combination(s)” also includes the “herbicidal compositions” formed in this manner.

[0051] The compounds of the formula (I) are capable of forming salts. The salt formation may take place by allowing a base to act on those compounds of the formula (I) carrying an acidic hydrogen atom. Suitable bases are, for example, organic amines, such as trialkylamines, morpholine, piperidine or pyridine, and also ammonium, alkali metal or alkaline earth metal hydroxides, carbonates and bicarbonates, in particular sodium hydroxide and potassium hydroxide, sodium carbonate and potassium carbonate and sodium bicarbonate and potassium bicarbonate, alkali metal or alkaline earth

metal alkoxides, in particular sodium methoxide, ethoxide, n-propoxide, isopropoxide, n-butoxide or t-butoxide or potassium methoxide, ethoxide, n-propoxide, isopropoxide, n-butoxide or t-butoxide. These salts are compounds in which the acidic hydrogen is replaced by an agriculturally suitable cation, for example metal salts, in particular alkali metal salts or alkaline earth metal salts, especially sodium salts or potassium salts, or else ammonium salts, salts with organic amines or quaternary ammonium salts, for example with cations of the formula $[NRR'R'']^+$ in which R to R'' are in each case independently of one another organic radicals, in particular alkyl, aryl, arylalkyl or alkylaryl. Also suitable are alkylsulfonium and alkylsulfoxonium salts, such as (C₁-C₄)-trialkylsulfonium and (C₁-C₄)-trialkylsulfoxonium salts. By a suitable inorganic or organic acid, such as, for example, mineral acids such as, for example, HCl, HBr, H₂SO₄, H₃PO₄ or HNO₃, or organic acids, for example carboxylic acids such as formic acid, acetic acid, propionic acid, oxalic acid, lactic acid or salicylic acid or sulfonic acids, such as, for example, p-toluenesulfonic acid, forming an adduct with a basic group such as, for example, amino, alkylamino, dialkylamino, piperidino, morpholino or pyridino, the compounds of the formula (I) are also capable of forming salts. These salts then contain the conjugated base of the acid as anion.

[0052] Hereinbelow, the terms “herbicide(s)”, “individual herbicide(s)”, “compound(s)” or “active compound(s)” are also used synonymously for the term “components(s)” in the context.

[0053] In a preferred embodiment, the herbicide combinations according to the invention comprise effective amounts of the herbicides (A) and (B) and/or have synergistic actions. The synergistic actions can be observed, for example, when applying the herbicides (A) and (B) together, for example as a coformulation or as a tank mix; however, they can also be observed when the active compounds are applied at different times (splitting). It is also possible to apply the herbicides or the herbicide combinations in a plurality of portions (sequential application), for example pre-emergence applications followed by post-emergence applications or early post-emergence applications followed by medium or late post-emergence applications. Preference is given here to the joint or almost simultaneous application of the herbicides (A) and (B) of the combination in question, and the joint application is particularly preferred.

[0054] The synergistic effects permit a reduction of the application rates of the individual herbicides, a higher efficacy at the same application rate, the control of species which were as yet uncontrolled (gaps), control of species which are tolerant or resistant to individual herbicides or to a number of herbicides, an extension of the period of application and/or a reduction in the number of individual applications required and—as a result for the user—weed control systems which are more advantageous economically and ecologically.

[0055] For example, the combinations according to the invention of herbicides (A)+(B) allow the activity to be enhanced synergistically in a manner which, by far and in an unexpected manner, exceeds the activities which can be achieved using the individual herbicides (A) and (B).

[0056] The formula (I) mentioned embraces all stereoisomers and their mixtures, in particular also racemic mixtures, and—if enantiomers are possible—the respective enantiomer which is biologically active. This also applies to possible rotamers of the formula (I).

[0057] The herbicides of group (A) inhibit mainly the enzyme acetolactate synthase (ALS) and thus the protein biosynthesis in plants. The application rate of the herbicides (A) can vary within a wide range, for example between 0.1 g and 1000 g of AS/ha (hereinbelow, AS/ha means “active substance per hectare”—based on 100% pure active compound). Applied at application rates of from 0.1 g to 1000 g of AS/ha, the herbicides (A), preferably the compounds (A-1) to (A-8), control, when used in the pre-sowing pre-planting or the pre- and post-emergence method, a relatively wide spectrum of harmful plants, for example of annual and perennial mono- or dicotyledonous broad-leaved weeds, weed grasses and *Cyperaceae*, and also of unwanted crop plants. For the combinations according to the invention, the application rates are generally lower, for example in the range of from 0.1 g to 500 g of AS/ha, preferably from 0.5 g to 200 g of AS/ha, particularly preferably from 1 g to 150 g of AS/ha.

[0058] The herbicides of group (B) have an effect, for example, on cell division, photo system II and auxin transport, and they are suitable both for pre-emergence and post-emergence application. The application rate of the herbicides (B) can vary within a wide range, for example between 1 g and 5,000 g of AS/ha (hereinbelow, AS/ha means “active substance per hectare”—based on 100% pure active compound). Applied at application rates of from 2 g to 4000 g of AS/ha, the herbicides (B), preferably the compounds (B1-1), (B2-4), (B2-5), (B2-7), (B2-10), (B2-16), (B2-19) and (B5-1), control, when used in the pre- and post-emergence method, a relatively wide spectrum of harmful plants, for example of annual and perennial mono- or dicotyledonous broad-leaved weeds, weed grasses and *Cyperaceae*, and also of unwanted crop plants. For the combinations according to the invention, the application rates are generally lower, for example in the range of from 1 g to 5000 g of AS/ha, preferably from 2 g to 4000 g of AS/ha, particularly preferably from 3 g to 3000 g of AS/ha.

[0059] Preference is given to herbicide combinations of one or more herbicides (A) and one or more herbicides (B). More preference is given to combinations of herbicides (A) with one or more herbicides (B). Here, combinations additionally comprising one or more further agrochemically active compounds which differ from the herbicides (A) and (B) but also act as selective herbicides are likewise in accordance with the invention.

[0060] For combinations of three or more active compounds, the preferred conditions illustrated below in particular for two-component combinations according to the invention primarily also apply, provided they comprise the two-component combinations according to the invention.

[0061] Ranges of suitable ratios of the compounds (A) and (B) can be found, for example, by looking at the application rates mentioned for the individual compounds. In the combinations according to the invention, the application rates can generally be reduced. Preferred mixing ratios of the combined herbicides (A):(B) in the combinations according to the invention are characterized by the following weight ratios:

The weight ratio (A):(B) of the components (A) and (B) is generally in the range of from 1:5000 to 500:1, preferably 1:4000 to 100:1, in particular 1:3000 to 50:1.

[0062] Of particular interest is the use of herbicide combinations having a content of the following compounds (A)+(B):

[0063] (A-1)+(B1-1), (A-1)+(B2-1), (A-1)+(B2-2), (A-1)+(B2-3), (A-1)+(B2-4), (A-1)+(B2-5), (A-1)+(B2-6), (A-1)+(B2-7), (A-1)+(B2-8), (A-1)+(B2-9), (A-1)+(B2-10), (A-1)+(B2-11), (A-1)+(B2-12), (A-1)+(B2-13), (A-1)+(B2-14), (A-1)+(B2-15), (A-1)+(B2-16), (A-1)+(B2-17), (A-1)+(B2-18), (A-1)+(B2-19), (A-1)+(B3-1), (A-1)+(B4-1), (A-1)+(B5-1);

(A-2)+(B1-1), (A-2)+(B2-1), (A-2)+(B2-2), (A-2)+(B2-3), (A-2)+(B2-4), (A-2)+(B2-5), (A-2)+(B2-6), (A-2)+(B2-7), (A-2)+(B2-8), (A-2)+(B2-9), (A-2)+(B2-10), (A-2)+(B2-11), (A-2)+(B2-12), (A-2)+(B2-13), (A-2)+(B2-14), (A-2)+(B2-15), (A-2)+(B2-16), (A-2)+(B2-17), (A-2)+(B2-18), (A-2)+(B2-19), (A-2)+(B3-1), (A-2)+(B4-1), (A-2)+(B5-1);

[0064] (A-2)+(B1-1), (A-2)+(B2-1), (A-2)+(B2-2), (A-2)+(B2-3), (A-2)+(B2-4), (A-2)+(B2-5), (A-2)+(B2-6), (A-2)+(B2-7), (A-2)+(B2-8), (A-2)+(B2-9), (A-2)+(B2-10), (A-2)+(B2-11), (A-2)+(B2-12), (A-2)+(B2-13), (A-2)+(B2-14), (A-2)+(B2-15), (A-2)+(B2-16), (A-2)+(B2-17), (A-2)+(B2-18), (A-2)+(B2-19), (A-2)+(B3-1), (A-2)+(B4-1), (A-2)+(B5-1);

[0065] (A-3)+(B1-1), (A-3)+(B2-1), (A-3)+(B2-2), (A-3)+(B2-3), (A-3)+(B2-4), (A-3)+(B2-5), (A-3)+(B2-6), (A-3)+(B2-7), (A-3)+(B2-8), (A-3)+(B2-9), (A-3)+(B2-10), (A-3)+(B2-11), (A-3)+(B2-12), (A-3)+(B2-13), (A-3)+(B2-14), (A-3)+(B2-15), (A-3)+(B2-16), (A-3)+(B2-17), (A-3)+(B2-18), (A-3)+(B2-19), (A-3)+(B3-1), (A-3)+(B4-1), (A-3)+(B5-1);

[0066] (A-4)+(B1-1), (A-4)+(B2-1), (A-4)+(B2-2), (A-4)+(B2-3), (A-4)+(B2-4), (A-4)+(B2-5), (A-4)+(B2-6), (A-4)+(B2-7), (A-4)+(B2-8), (A-4)+(B2-9), (A-4)+(B2-10), (A-4)+(B2-11), (A-4)+(B2-12), (A-4)+(B2-13), (A-4)+(B2-14), (A-4)+(B2-15), (A-4)+(B2-16), (A-4)+(B2-17), (A-4)+(B2-18), (A-4)+(B2-19), (A-4)+(B3-1), (A-4)+(B4-1), (A-4)+(B5-1);

[0067] (A-5)+(B1-1), (A-5)+(B2-1), (A-5)+(B2-2), (A-5)+(B2-3), (A-5)+(B2-4), (A-5)+(B2-5), (A-5)+(B2-6), (A-5)+(B2-7), (A-5)+(B2-8), (A-5)+(B2-9), (A-5)+(B2-10), (A-5)+(B2-11), (A-5)+(B2-12), (A-5)+(B2-13), (A-5)+(B2-14), (A-5)+(B2-15), (A-5)+(B2-16), (A-5)+(B2-17), (A-5)+(B2-18), (A-5)+(B2-19), (A-5)+(B3-1), (A-5)+(B4-1), (A-5)+(B5-1);

[0068] (A-6)+(B1-1), (A-6)+(B2-1), (A-6)+(B2-2), (A-6)+(B2-3), (A-6)+(B2-4), (A-6)+(B2-5), (A-6)+(B2-6), (A-6)+(B2-7), (A-6)+(B2-8), (A-6)+(B2-9), (A-6)+(B2-10), (A-6)+(B2-11), (A-6)+(B2-12), (A-6)+(B2-13), (A-6)+(B2-14), (A-6)+(B2-15), (A-6)+(B2-16), (A-6)+(B2-17), (A-6)+(B2-18), (A-6)+(B2-19), (A-6)+(B3-1), (A-6)+(B4-1), (A-6)+(B5-1);

[0069] (A-7)+(B1-1), (A-7)+(B2-1), (A-7)+(B2-2), (A-7)+(B2-3), (A-7)+(B2-4), (A-7)+(B2-5), (A-7)+(B2-6), (A-7)+(B2-7), (A-7)+(B2-8), (A-7)+(B2-9), (A-7)+(B2-10), (A-7)+(B2-11), (A-7)+(B2-12), (A-7)+(B2-13), (A-7)+(B2-14), (A-7)+(B2-15), (A-7)+(B2-16), (A-7)+(B2-17), (A-7)+(B2-18), (A-7)+(B2-19), (A-7)+(B3-1), (A-7)+(B4-1), (A-7)+(B5-1);

[0070] (A-8)+(B1-1), (A-8)+(B2-1), (A-8)+(B2-2), (A-8)+(B2-3), (A-8)+(B2-4), (A-8)+(B2-5), (A-8)+(B2-6), (A-8)+(B2-7), (A-8)+(B2-8), (A-8)+(B2-9), (A-8)+(B2-10), (A-8)+(B2-11), (A-8)+(B2-12), (A-8)+(B2-13), (A-8)+(B2-14), (A-8)+(B2-15), (A-8)+(B2-16), (A-8)+(B2-17), (A-8)+(B2-18), (A-8)+(B2-19), (A-8)+(B3-1), (A-8)+(B4-1), (A-8)+(B5-1).

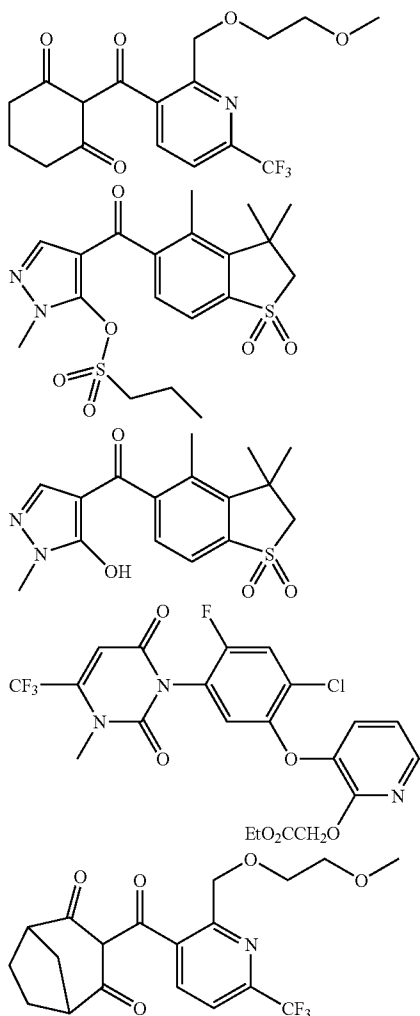
[0071] The herbicide combinations according to the invention may furthermore comprise, as additional further components, various agrochemically active compounds, for example from the group of the safeners, fungicides, insecticides, acaricides, nematocides, bird repellants, soil structure improvers, plant nutrients (fertilizers), and herbicides which differ structurally from herbicides (A) and (B), and plant growth regulators, or from the group of the formulation auxiliaries and additives customary in crop protection.

[0072] Thus, suitable further herbicides are, for example, the following herbicides which differ structurally from the herbicides (A) and (B), preferably herbicidally active compounds whose action is based on inhibition of, for example, acetolactate synthase, acetyl coenzyme A carboxylase, cellulose synthase, enolpyruvylshikimate 3-phosphate synthase, glutamine synthetase, p-hydroxyphenylpyruvate dioxygenase, phytoene desaturase, photosystem I, photosystem II, protoporphyrinogen oxidase, as described, for example, in Weed Research 26 (1986) 441-445 or "The Pesticide Manual", 13th edition 2003 or 14th edition 2006/2007, or in the corresponding "The e-Pesticide Manual", version 4.0 (2006-07), all published by the British Crop Protection Council, and the literature cited therein, can be used. Lists of common names are also available in "The Compendium of Pesticide Common Names" on the internet. Here, the herbicides are referred to either by the "common name" in accordance with the International Organization for Standardization (ISO) or by the chemical name or by the code number, and in each case include all use forms, such as acids, salts, esters and isomers, such as stereoisomers and optical isomers. Here, by way of example, one and in some cases a plurality of use forms are mentioned:

acetochlor, acibenzolar, acibenzolar-S-methyl, acifluorfen, acifluorfen-sodium, aclonifen, alachlor, allidochlor, alloxymid, alloxymid-sodium, ametryne, amicarbazone, amidochlor, amidosulfuron, aminocyclopyrachlor, aminopyralid, amitrole, ammonium sulfamate, ancymidol, anilofos, asulam, atrazine, azafenidin, azimsulfuron, aziprotryne, BAH-043, BAS-140H, BAS-693H, BAS-714H, BAS-762H, BAS-776H, beflubutamid, benazolin, benazolin-ethyl, bencarbazone, benfluralin, benfuresate, bensulide, bensulfuron-methyl, bentazone, benzfendazole, benzobicyclon, benzofenap, benzofluor, benzoylprop, bifenoxy, bilanafos, bilanafos-sodium, bispyribac, bispyribac-sodium, bromacil, bromobutide, bromofenoxim, bromoxynil, bromuron, buminafos, busoxinone, butachlor, butafenacil, butamifos, butenachlor, butralin, butoxydim, butylate, cafenstrole, carbetamide, carfentrazone, carfentrazone-ethyl, chlormethoxyfen, chloramben, chlorazifop, chlorazifop-butyl, chlorbufam, chlorfenac, chlorfenac-sodium, chlorfenprop, chlorflurenol, chlorflurenol-methyl, chloridazon, chlorimuron, chlorimuron-ethyl, chlormequat-chloride, chlornitrofen, chlorthalalim, chlorthal-dimethyl, chlorsulfuron, cinidon, cinidon-ethyl, cinmethylin, cinosulfuron, clethodim, clodinafop, clodinafop-propargyl, clofencet, clomazone, clomeprop, clopprop, clocyralid, cloransulam, cloransulam-methyl, cyanamide, cyanazine, cyclanilide, cycloate, cyclosulfamuron, cycloxydim, cycluron, cyhalofop, cyhalofop-butyl, cyperquat, cyprazine, cyprazole, 2,4-D, 2,4-DB, dalapon, daminonide, dazomet, n-decanol, desmedipham, desmetryn, detosyl-pyrazolate (DTP), diallate, dicamba, dichlobenil, dichlorprop, dichlorprop-P, diclofop, diclofop-methyl, diclofop-P-methyl, diclosulam, diethatyl, diethatyl-ethyl, difenoxuron, difenzoquat, diflufenican, dimefuron, dikegulac-sodium, dimepiperate, dimethachlor, dimethametryn, dimethenamid, dimethenamid-P, dimethipin, dimetrasulfuron, dinitramine, dinoseb, dinoterb, diphenamid, dipropetryn, diquat, diquat-dibromide, dithiopyr, DNOC, eglazine-ethyl, endothal, EPTC, esprocarb, ethalfuralin, ethametsulfuron-methyl, ethephon, ethidimuron, ethiozin, ethofumesate, ethoxyfen, ethoxyfen-ethyl, ethoxysulfuron, etobenzanid, F-5331, i.e. N-[2-chloro-4-fluoro-5-[4-(3-fluoropropyl)-4,5-dihydro-5-oxo-1H-tetrazol-1-yl]phenyl]

ethanesulfonamide, fenoprop, fenoxaprop, fenoxaprop-P, fenoxaprop-ethyl, fenoxaprop-P-ethyl, fentrazamide, fenuron, flamprop, flamprop-M-isopropyl, flamprop-M-methyl, flazasulfuron, florasulam, fluazifop, fluazifop-P, fluazifop-butyl, fluazifop-P-butyl, fluazolate, flucarbazone, flucarbazone-sodium, flucetosulfuron, fluchloralin, flufenacet (thiaflumide), flufenpyr, flufenpyr-ethyl, flumetralin, flumetsulam, flumiclorac, flumiclorac-pentyl, flumioxazin, flumipropyn, fluorodifen, fluoroglycofen, fluoroglycofen-ethyl, flupoxam, flupropacil, flupropanate, flupyrsulfuron, flupyrsulfuron-methyl-sodium, flurenol, flurenol-butyl, fluridone, flurochloridone, fluroxypyr, fluroxypyr-meptyl, flurprimidol, flurtamone, fluthiacet, fluthiacet-methyl, fluthiamide, fomesafen, foramsulfuron, fosamine, furyloxyfen, gibberellic acid, glufosinate, glufosinate-ammonium, glufosinate-P, glufosinate-P-ammonium, glufosinate-P-sodium, glyphosate, glyphosate-isopropylammonium, H-9201, halosafen, halosulfuron, halosulfuron-methyl, haloxyfop, haloxyfop-P, haloxyfop-ethoxyethyl, haloxyfop-P-ethoxyethyl, haloxyfop-methyl, haloxyfop-P-methyl, hexazinone, HNPC-9908, HW-02, imazamethabenz, imazamethabenz-methyl, imazamox, imazapic, imazapyr, imazaquin, imazethapyr, imazosulfuron, inabenfide, indanofan, indoleacetic acid (IAA), 4-indol-3-ylbutyric acid (IBA), iodosulfuron, iodosulfuron-methyl-sodium, ioxynil, ipfen-carbazone, isocarbamid, isopropalin, isouron, isoxaben, isoxachlortole, isoxaflutole, isoxapyrifop, KUH-043, KUH-071, ketospiradox, lactofen, lenacil, maleic hydrazide, MCPA, MCPB, MCPB-methyl, -ethyl and -sodium, mecoprop, mecoprop-sodium, mecoprop-butotyl, mecoprop-P-butotyl, mecoprop-P-dimethylammonium, mecoprop-P-2-ethyl-hexyl, mecoprop-P-potassium, mefenacet, mefluidide, mepiquat-chloride, mesosulfuron, mesosulfuron-methyl, mesotrione, metam, metamifop, metamitron, metazachlor, methazole, methoxyphenone, 1-methylcyclopropene, methyl isothiocyanate, metobenzuron, metolachlor, S-metolachlor, metosulam, metribuzin, metsulfuron, metsulfuron-methyl, molinate, monalide, monocarbamide, monocarbamide dihydrogensulfate, monosulfuron, monuron, MT 128, MT-5950, i.e. N-[3-chloro-4-(1-methylethyl)phenyl]-2-methylpentanamide, NGGC-011, naproanilide, napropamide, naptalam, NC-310, i.e. 4-(2,4-dichlorobenzoyl)-1-methyl-5-benzoyloxypyrazole, nicosulfuron, nipyraclufen, nitralin, nitrofen, nitrophenolate-sodium (isomer mixture), nitrofluorfen, nonanoic acid, norflurazon, orbencarb, orthosulfamuron, oryzalin, oxadiargyl, oxadiazon, oxasulfuron, oxaziclonmefone, oxyfluorfen, paclobutrazole, paraquat, paraquat dichloride, pelargonic acid (nonanoic acid), pendimethalin, pendralin, penoxsulam, pentanochlor, pentoxazone, perfluidone, pethoxamid, phenisopham, phenmedipham, phenmedipham-ethyl, picloram, picolinafen, pinoxaden, piperophos, pirifenop, pirifenop-butyl, pretilachlor, primisulfuron, primisulfuron-methyl, probenazole, proflunazol, procyazine, prodiamine, prifluraline, profoxydim, prohexadione, prohexadione-calcium, prohydrojasmone, prometon, prometryn, propachlor, propanil, propaquizafop, propazine, propham, propisochlor, propoxycarbazone, propoxycarbazone-sodium, propyzamide, prosulfalin, prosulfocarb, prosulfuron, prynachlor, pyraclostrobin, pyraflufen, pyraflufen-ethyl, pyrasulfotole, pyrazolynate (pyrazolate), pyrazosulfuron-ethyl, pyrazoxyfen, pyribambenz, pyribambenz-isopropyl, pyribenzoxim, pyributicarb, pyridafol, pyridate, pyrifthalid, pyriminobac, pyriminobac-methyl, pyrimisulfan, pyriothiobac, pyriothiobac-sodium, pyroxasulfone,

pyroxsulam, quinclorac, quinmerac, quinclamine, quizalofop, quizalofop-ethyl, quizalofop-P, quizalofop-P-ethyl, quizalofop-P-tefuryl, rimsulfuron, saflufenacil, sebumeton, sethoxydim, **simazine**, **simetryn**, SN-106279, sulcotrione, sulfallate (CDEC), sulfentrazone, sulfometuron, sulfometuron-methyl, sulfosate (glyphosate-trimesium), sulfosulfuron, SYN-449, SYN-523, SYP-249, SYP-298, SYP-300, tebutam, tecnazene, tefuryltrione, tembotrione, tepraloxym, terbacil, terbucarb, terbutylchlor, **terbumeton**, **terbutylazine**, **terbutryne**, TH-547, thenylchlor, thiafluamide, thiazafuron, thiazopyr, thidiazimin, thiencarbazone, thiencarbazone-methyl, thifensulfuron, thifensulfuron-methyl, thiobencarb, tiocarbazil, topramezone, tralkoxydim, triallate, triasulfuron, triaziflam, triazofenamide, tribenuron, tribenuron-methyl, trichloroacetic acid (TCA), triclopyr, tridiphane, **trietazine**, trifloxysulfuron, trifloxysulfuron-sodium, trifluralin, triflusulfuron, triflusulfuron-methyl, trimeturon, trinexapac, trinexapac-ethyl, tritosulfuron, tsitodef, uniconazole, uniconazole-P, vernolate, ZJ-0166, ZJ-0270, ZJ-0543, ZJ-0862 and the following compounds



Of particular interest is the selective control of harmful plants in crops of useful plants and ornamental plants. Although the

herbicides (A) and (B) have already demonstrated very good to sufficient selectivity in a large number of crops, in principle, in some crops and in particular also in the case of mixtures with other, less selective herbicides, phytotoxicities on the crop plants may occur. In this respect, combinations of herbicides (A) and (B) comprising the herbicidally active compounds combined according to the invention and one or more safeners are of particular interest. The safeners, which are used in an antidotically effective amount, reduce the phytotoxic side effects of the herbicides/pesticides employed, for example in economically important crops, such as cereals (wheat, barley, rye, oats, corn, rice, millet), sugar beet, sugar cane, oilseed rape, cotton, soybeans or in fruit plantations (plantation crops), preferably cereals, in particular rice. [0073] The following groups of compounds are, for example, suitable as safeners (including possible stereoisomers and agriculturally customary esters or salts):

- [0074] benoxacor
- [0075] cloquintocet (-mexyl)
- [0076] cyometrinil
- [0077] cyprosulfamide
- [0078] dichlormid
- [0079] dicyclonon
- [0080] dietholate
- [0081] disulfoton (=O,O-diethyl S-2-ethylthioethyl phosphordithioate)
- [0082] fenchlorazole (-ethyl)
- [0083] fenclorim
- [0084] flurazole
- [0085] fluxofenim
- [0086] furilazole
- [0087] isoxadifen (-ethyl)
- [0088] mefenpyr (-diethyl)
- [0089] mephenate
- [0090] naphthalic anhydride
- [0091] oxabetrinil
- [0092] "R-29148" (=3-dichloroacetyl-2,2,5-trimethyl-1,3-oxazolidine),
- [0093] "R-28725" (=3-dichloroacetyl-2,2-dimethyl-1,3-oxazolidine),
- [0094] "PPG-1292" (=N-allyl-N-[(1,3-dioxolan-2-yl)methyl]dichloroacetamide),
- [0095] "DKA-24" (=N-allyl-N-[(allylaminocarbonyl)methyl]dichloroacetamide),
- [0096] "AD-67" or "MON 4660" (=3-dichloroacetyl-1-oxa-3-azaspiro[4,5]decane),
- [0097] "TI-35" (=1-dichloroacetylazepane),
- [0098] "dimepiperate" or "MY-93" (=S-1-methyl-1-phenylethyl piperidine-1-thiocarboxylate),
- [0099] "daimuron" or "SK 23" (=1-(1-methyl-1-phenylethyl)-3-p-tolylurea),
- [0100] "cumyluron"="JC-940" (=3-(2-chlorophenylmethyl)-1-(1-methyl-1-phenylethyl)urea),
- [0101] "methoxyphenon" or "NK 049" (=3,3'-dimethyl-4-methoxybenzophenone),
- [0102] "CSB" (=1-bromo-4-(chloromethylsulfonyl)benzene)
- [0103] "CL-304415" (=4-carboxy-3,4-dihydro-2H-1-benzopyran-4-acetic acid; CAS reg no: 31541-57-8)
- [0104] "MG-191" (=2-dichloromethyl-2-methyl-1,3-dioxolane)
- [0105] "MG-838" (=2-propenyl 1-oxa-4-azaspiro[4.5]decane-4-carbodithioate; CAS reg no: 133993-74-5)

[0106] methyl (diphenylmethoxy)acetate (CAS reg no: 41858-19-9 from WO-A-1998/38856) methyl [(3-oxo-1H-2-benzothiopyran-4(3H)-ylidene)methoxy]acetate (CAS reg no: 205121-04-6 from WO-A-1998/13361)

[0107] 1,2-dihydro-4-hydroxy-1-methyl-3-(5-tetrazolyl-carbonyl)-2-quinolone (CAS reg no: 95855-00-8 from WO-A-1999/000020).

[0108] Some of the safeners are already known as herbicides and accordingly, in addition to the herbicidal action against harmful plants, also act by protecting the crop plants.

[0109] The weight ratios of herbicide combination to safener generally depend on the herbicide application rate and the effectiveness of the safener in question and may vary within wide limits, for example in the range from 90 000:1 to 1:5000, preferably from 7000:1 to 1:1600, in particular from 3000:1 to 1:500. The safeners may be formulated analogously to the compounds of the formula (I) or their mixtures with other herbicides/pesticides and be provided and used as a finished formulation or as a tank mix with the herbicides or separately be applied as a seed, soil or foliar application.

[0110] The herbicide combinations according to the invention (=herbicidal compositions) have excellent herbicidal activity against a broad spectrum of economically important monocotyledonous and dicotyledonous harmful plants, such as broad-leaved weeds, weed grasses or *Cyperaceae*, including species which are resistant to herbicidally active compounds such as glyphosate, glufosinate, atrazine, imidazolinone herbicides, sulfonylureas, (hetero) aryloxyaryloxyalkylcarboxylic acids or -phenoxyalkylcarboxylic acids ('fops'), cyclohexanedione oximes ('dims') or auxin inhibitors. The active compounds also act efficiently on perennial weeds which produce shoots from rhizomes, root stocks and other perennial organs and which are difficult to control. Here, the substances can be applied, for example, by the pre-sowing method, the pre-emergence method or the post-emergence method, for example jointly or separately. Preference is given, for example, to application by the post-emergence method, in particular to the emerged harmful plants.

[0111] Specific examples may be mentioned of some representatives of the monocotyledonous and dicotyledonous weed flora which can be controlled by the compounds according to the invention, without the enumeration being restricted to certain species.

[0112] Examples of weed species on which the herbicidal compositions act efficiently are, from amongst the monocotyledonous weed species, *Avena* spp., *Alopecurus* spp., *Apera* spp., *Brachiaria* spp., *Bromus* spp., *Digitaria* spp., *Lolium* spp., *Echinochloa* spp., *Leptochloa* spp., *Fimbristylis* spp., *Panicum* spp., *Phalaris* spp., *Poa* spp., *Setaria* spp. and also *Cyperus* species from the annual group, and, among the perennial species, *Agropyron*, *Cynodon*, *Imperata* and *Sorghum* and also perennial *Cyperus* species.

[0113] In the case of the dicotyledonous weed species, the spectrum of action extends to genera such as, for example, *Abutilon* spp., *Amaranthus* spp., *Chenopodium* spp., *Chrysanthemum* spp., *Galium* spp., *Ipomoea* spp., *Kochia* spp., *Lamium* spp., *Matricaria* spp., *Pharbitis* spp., *Polygonum* spp., *Sida* spp., *Sinapis* spp., *Solanum* spp., *Stellaria* spp., *Veronica* spp., *Eclipta* spp., *Sesbania* spp., *Aeschynomene* spp. and *Viola* spp., *Xanthium* spp. among the annuals, and *Convolvulus*, *Cirsium*, *Rumex* and *Artemisia* in the case of the perennial weeds.

[0114] If the active compounds of the herbicide combinations according to the invention are applied to the soil surface before germination, the weed seedlings are either prevented completely from emerging or else the weeds grow until they have reached the cotyledon stage, but then their growth stops, and, eventually, after two to four weeks have elapsed, they die completely.

[0115] If the active compounds are applied post-emergence to the green parts of the plants, growth likewise stops drastically a very short time after the treatment, and the weed plants remain at the growth stage of the point of time of application, or they die completely after a certain time, so that in this manner competition by the weeds, which is harmful to the crop plants, is eliminated very early and in a sustained manner. In the case of rice, the active compounds can also be applied into the water, and they are then taken up via soil, shoot and roots.

[0116] The herbicidal compositions according to the invention are distinguished by a rapidly commencing and long-lasting herbicidal action. As a rule, the rainfastness of the active compounds in the combinations according to the invention is favorable. A particular advantage is that the dosages used in the combinations and the effective dosages of compounds (A) and (B) can be adjusted to such a low level that their soil action is optimally low. This does not only allow them to be employed in sensitive crops in the first place, but ground water contaminations are virtually avoided. The combinations according to the invention of active compounds allow the required application rate of the active compounds to be reduced considerably.

[0117] In a preferred embodiment, the herbicide combinations according to the invention of the herbicides (A) and (B) are highly suitable for the selective control of harmful plants in rice crops. These include all possible forms of rice cultivation under the most diverse conditions, such as upland cultivation, dry cultivation or paddy cultivation, where the irrigation may be natural (rainfall) and/or artificial (irrigated, flooded). The rice used for this purpose may be conventionally cultivated seed, hybrid seed, or else resistant, at least tolerant, seed (obtained by mutagenesis or transgenically) which can be derived from the indica or japonica variety or from crossbreeds thereof.

[0118] The herbicide combinations according to the invention can be applied by all application methods customary for rice herbicides. Particularly preferably, they are applied by spray application and/or by submerged application. In the submerged application, the paddy water already covers the ground by up to 3-20 cm at the time of the application. The herbicide combinations according to the invention are then directly placed in the paddy water, for example in the form of granules. Worldwide, the spray application is used predominantly with direct seeded rice and the submerged application is used predominantly with transplanted rice.

[0119] The herbicide combinations according to the invention cover a broad weed spectrum which is specific in particular for rice crops. From among the monocotyledonous weeds, genera such as, for example, *Echinochloa* spp., *Panicum* spp., *Poa* spp., *Leptochloa* spp., *Brachiaria* spp., *Digitaria* spp., *Setaria* spp., *Cyperus* spp., *Monochoria* spp., *Fimbristylis* spp., *Sagittaria* spp., *Eleocharis* spp., *Scirpus* spp., *Alisma* spp., *Aneilema* spp., *Blyxa* spp., *Eriocaulon* spp., *Potamogeton* spp. and the like are controlled well, in particular the species *Echinochloa oryzicola*, *Monochoria vaginalis*, *Eleocharis acicularis*, *Eleocharis kuroguwai*, *Cyperus diffor-*

mis, *Cyperus serotinus*, *Sagittaria pygmaea*, *Alisma canaliculatum*, *Scirpus juncooides*. In the case of the dicotyledonous weeds, the activity spectrum extends to genera such as, for example, *Polygonum* spp., *Rorippa* spp., *Rotala* spp., *Lindernia* spp., *Bidens* spp., *Sphenoclea* spp., *Dopatrium* spp., *Eclipta* spp., *Elatine* spp., *Gratiola* spp., *Lindernia* spp., *Ludwigia* spp., *Oenantho* spp., *Ranunculus* spp., *Deinostema* spp. and the like. In particular species such as *Rotala indica*, *Sphenoclea zeylanica*, *Lindernia procumbens*, *Ludwigia prostrate*, *Potamogeton distinctus*, *Elatine triandra*, *Oenantho javanica* are controlled well.

[0120] When herbicides of group (A) and those of group (B) are applied jointly, there are preferably superadditive (=synergistic) effects. Here, the activity in the combinations is higher than the expected sum of the activities of the individual herbicides employed. The synergistic effects allow the application rate to be reduced, a broader spectrum of broad-leaved weeds, weed grasses and *Cyperaceae* to be controlled, a more rapid onset of the herbicidal action, a longer persistency, a better control of the harmful plants with only one or a few applications and a widening of the application period possible. To some extent, by using the compositions, the amount of harmful ingredients, such as nitrogen or oleic acid, and their introduction into the soil are likewise reduced.

[0121] The abovementioned properties and advantages are necessary for weed control practice to keep agricultural/forestry/horticultural crops or green land/meadows free of unwanted competing plants, and thus to ensure and/or increase yield levels from the qualitative and quantitative angle. These novel herbicide combinations markedly exceed the technical state of the art with a view to the properties described.

[0122] Owing to their herbicidal and plant growth-regulatory properties, the herbicide combinations according to the invention can be employed for controlling harmful plants in known plant crops or in tolerant or genetically modified crop and energy plants still to be developed. In general, the transgenic plants (GMOs) are distinguished by specific advantageous properties, in addition to resistances to the herbicide combinations according to the invention, for example, by resistances to plant diseases or the causative organisms of plant diseases such as certain insects or microorganisms, such as fungi, bacteria or viruses. Other specific characteristics relate, for example, to the harvested material with regard to quantity, quality, storability, and the composition of specific constituents. Thus, transgenic plants are known whose starch content is increased, or whose starch quality is altered, or those where the harvested material has a different fatty acid composition, or increased vitamin content or energetic properties. In the same manner, owing to their herbicidal and plant growth-regulatory properties, the active compounds can also be used for controlling harmful plants in crops of known plants or plants still to be developed by mutant selection, and also crossbreeds of mutagenic and transgenic plants.

[0123] Conventional methods of generating novel plants which have modified properties in comparison to plants occurring to date consist, for example, in traditional breeding methods and the generation of mutants. Alternatively, novel plants with altered properties can be generated with the aid of recombinant methods (see, for example, EP-A-0221044, EP-

A-0131624). For example, the following have been described in several cases:

[0124] the modification, by recombinant technology, of crop plants with the aim of modifying the starch synthesized in the plants (for example WO 92/11376, WO 92/14827, WO 91/19806),

[0125] transgenic crop plants which exhibit resistances to herbicides, for example to sulfonylureas (EP-A-0257993, U.S. Pat. No. 5,013,659),

[0126] transgenic crop plants with the capability of producing *Bacillus thuringiensis* toxins (Bt toxins), which make the plants resistant to certain pests (EP-A-0142924, EP-A-0193259),

[0127] transgenic crop plants with a modified fatty acid composition (WO 91/13972).

[0128] A large number of techniques in molecular biology are known in principle with the aid of which novel transgenic plants with modified properties can be generated; see, for example, Sambrook et al., 1989, Molecular Cloning, A Laboratory Manual, 2nd Edition, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, N.Y.; or Winnacker "Gene and Klone", VCH Weinheim 2nd Edition 1996 or Christou, "Trends in Plant Science" 1 (1996) 423-431). To carry out such recombinant manipulations, nucleic acid molecules which allow mutagenesis or sequence changes by recombination of DNA sequences can be introduced into plasmids. For example, the abovementioned standard methods allow base exchanges to be carried out, subsequences to be removed, or natural or synthetic sequences to be added. To connect the DNA fragments to each other, adapters or linkers may be added to the fragments.

[0129] For example, the generation of plant cells with a reduced activity of a gene product can be achieved by expressing at least one corresponding antisense RNA, a sense RNA for achieving a cosuppression effect or by expressing at least one suitably constructed ribozyme which specifically cleaves transcripts of the abovementioned gene product.

[0130] To this end, it is possible to use DNA molecules which encompass the entire coding sequence of a gene product inclusive of any flanking sequences which may be present, and also DNA molecules which only encompass portions of the coding sequence, it being necessary for these portions to be long enough to have an antisense effect in the cells. The use of DNA sequences which have a high degree of homology to the coding sequences of a gene product, but are not completely identical to them, is also possible.

[0131] When expressing nucleic acid molecules in plants, the protein synthesized can be localized in any desired compartment of the plant cell. However, to achieve localization in a particular compartment, it is possible, for example, to link the coding region with DNA sequences which ensure localization in a particular compartment. Such sequences are known to those skilled in the art (see, for example, Braun et al., EMBO J. 11 (1992), 3219-3227; Wolter et al., Proc. Natl. Acad. Sci. USA 85 (1988), 846-850; Sonnewald et al., Plant J. 1 (1991), 95-106).

[0132] The transgenic plant cells can be regenerated by known techniques to give rise to entire plants. In principle, the transgenic plants can be plants of any desired plant species, i.e. not only monocotyledonous, but also dicotyledonous, plants. Thus, transgenic plants can be obtained whose properties are altered by overexpression, suppression or inhibition of homologous (=natural) genes or gene sequences or the expression of heterologous (=foreign) genes or gene sequences.

[0133] The present invention furthermore provides a method for the selective control of unwanted plants, preferably in crop plants, in particular in rice crops (planted or sown under upland or paddy conditions using indica and/or japonica species and/or hybrids/mutants/GMOs), which comprises applying the herbicides as components (A) and (B) of the herbicide combinations according to the invention to the plants (for example harmful plants, such as monocotyledonous or dicotyledonous broad-leaved weeds, weed grasses, *Cyperaceae* or unwanted crop plants), the seed (for example grains, seeds or vegetative propagation organs, such as tubers or shoot parts with buds) or to the area in which the plants grow (for example the area under cultivation, which may also be covered by water), for example together or separately. One or more herbicides (A) may be applied before, after or simultaneously with the herbicide(s) (B) to the plants, the seed or the area in which the plants grow (for example the area under cultivation).

[0134] Unwanted plants are to be understood as meaning all plants which grow in locations where they are unwanted. These can, for example, be harmful plants (for example monocotyledonous or dicotyledonous weeds, weed grasses, *Cyperaceae* or unwanted crop plants), including, for example, those which are resistant to certain herbicidally active compounds, such as glyphosate, glufosinate, atrazine, imidazolinone herbicides, sulfonylureas, (hetero)aryloxyaryloxyalkylcarboxylic acids or -phenoxyalkylcarboxylic acids ('fops'), cyclohexanedione oximes ('dime') or auxin inhibitors.

[0135] The herbicide combinations according to the invention are employed selectively for controlling unwanted vegetation, for example in crop plants such as farm crops, for example monocotyledonous farm crops, such as cereals (for example wheat, barley, rye, oats, rice, corn, millet), or dicotyledonous farm crops, such as sugar beet, sugar case, oilseed rape, cotton, sunflowers and leguminous plants, for example of the genera *Glycine* (for example *Glycine max.* (soybean), such as non-transgenic *Glycine max.* (for example conventional cultivars, such as STS cultivars) or transgenic *Glycine max.* (for example RR-soybean or LL-soybean) and cross-breeds thereof), *Phaseolus*, *Pisum*, *Vicia* and *Arachis*, or vegetable crops from various botanical groups, such as potato, leek, cabbage, carrot, tomato, onion, in fruit plantations (plantation crops), greens, lawns and pasture areas, or on non-crop areas (for example squares of residential areas or industrial sites, rail tracks) in particular in rice crops (planted or sown under upland or paddy conditions using indica or japonica varieties and also hybrids/mutants/GMOs). The application is preferably carried out both prior to the emergence of the harmful plants and to the emerged harmful plants (for example broad-leaved weeds, weed grasses, *Cyperaceae* or unwanted crop plants), independently of the stage of the sown/planted crop.

[0136] The invention also provides the use of the herbicide combinations according to the invention for selectively controlling unwanted vegetation, preferably in crop plants, in particular in rice crops (planted or sown under upland or paddy conditions using indica or japonica varieties and also hybrids/mutants/GMOs).

[0137] The herbicide combinations according to the invention can be prepared by known processes, for example as mixed formulations of the individual components, if appropriate with further active compounds, additives and/or customary formulation auxiliaries, which combinations are then

applied in a customary manner diluted with water, or as tank mixes by joint dilution of the components, formulated separately or formulated partially separately, with water. Also possible is the split application of the separately formulated or partially separately formulated individual components. It is also possible to use the herbicides or the herbicide combinations in a plurality of portions (sequential application), for example after application as seed dressing or pre-sowing/planting treatment or pre-emergence applications followed by post-emergence applications or early post-emergence applications followed by medium or late post-emergence applications. Preference is given here to the joint or almost simultaneous use of the active compounds of the combination in question, and the joint use is particularly preferred.

[0138] The herbicides (A) and (B) can be converted jointly or separately into customary formulations, such as solutions, emulsions, suspensions, powders, foams, pastes, granules, aerosols, natural and synthetic materials impregnated with active compound and microencapsulations in polymeric materials. Mention may also be made of formulations specific for the cultivation of rice, such as, for example, granules for scattering, jumbo granules, floating granules, floating suspensions applied via shaker bottles and dissolved in and distributed via the paddy water. The formulations may comprise the customary auxiliaries and additives.

[0139] These formulations are produced in a known manner, for example by mixing the active compounds with extenders, that is, liquid solvents, liquefied gases under pressure, and/or solid carriers, optionally with the use of surfactants, that is emulsifiers and/or dispersants, and/or foam formers.

[0140] If the extender used is water, it is also possible to employ, for example, organic solvents as auxiliary solvents. Essentially, suitable liquid solvents are: 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.

[0141] Suitable solid carriers are: 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 highly-disperse silica, alumina and silicates; suitable solid carriers for granules are: for example crushed and fractionated natural rocks such as calcite, marble, pumice, sepiolite and dolomite, and also 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, alkyl sulfonates, alkyl sulfates, aryl sulfonates, and also protein hydrolysates; suitable dispersants are: for example lignosulphite waste liquors and methyl cellulose.

[0142] Tackifiers, such as carboxymethyl cellulose, natural and synthetic polymers in the form of powders, granules or latices, such as gum arabic, polyvinyl alcohol and polyvinyl acetate, and also natural phospholipids, such as cephalins and

lecithins, and synthetic phospholipids can be used in the formulations. Other possible additives are mineral and vegetable oils.

[0143] The herbicidal action of the herbicide combinations according to the invention can be improved, for example, by surfactants, preferably by wetting agents from the group of the fatty alcohol polyglycol ethers. The fatty alcohol polyglycol ethers preferably comprise 10-18 carbon atoms in the fatty alcohol radical and 2-20 ethylene oxide units in the polyglycol ether moiety. The fatty alcohol polyglycol ethers may be present in nonionic form, or ionic form, for example in the form of fatty alcohol polyglycol ether sulfates, which may be used, for example, as alkali metal salts (for example sodium salts and potassium salts) or ammonium salts, or even as alkaline earth metal salts, such as magnesium salts, such as C_{12}/C_{14} -fatty alcohol diglycol ether sulfate sodium (Genapol® LRO, Clariant GmbH); see, for example, EP-A-0476555, EP-A-0048436, EP-A-0336151 or U.S. Pat. No. 4,400,196 and also Proc. EWRS Symp. "Factors Affecting Herbicidal Activity and Selectivity", 227-232 (1988). Non-ionic fatty alcohol polyglycol ethers are, for example, (C_{10} - C_{18})-, preferably (C_{10} - C_{14})-fatty alcohol polyglycol ethers (for example isotridecyl alcohol polyglycol ethers) which comprise, for example, 2-20, preferably 3-15, ethylene oxide units, for example those from the Genapol® X-series, such as Genapol® X-030, Genapol® X-060, Genapol® X-080 or Genapol® X-150 (all from Clariant GmbH).

[0144] The present invention further comprises the combination of components (A) and (B) with the wetting agents mentioned above from the group of the fatty alcohol polyglycol ethers which preferably contain 10-18 carbon atoms in the fatty alcohol radical and 2-20 ethylene oxide units in the polyglycol ether moiety and which may be present in non-ionic or ionic form (for example as fatty alcohol polyglycol ether sulfates). Preference is given to C_{12}/C_{14} -fatty alcohol diglycol ether sulfate sodium (Genapol® LRO, Clariant GmbH) and isotridecyl alcohol polyglycol ether having 3-15 ethylene oxide units, for example from the Genapol® X-series, such as Genapol® X-030, Genapol® X-060, Genapol® X-080 and Genapol® X-150 (all from Clariant GmbH).

[0145] Furthermore, it is known that fatty alcohol polyglycol ethers, such as nonionic or ionic fatty alcohol polyglycol ethers (for example fatty alcohol polyglycol ether sulfates) are also suitable for use as penetrants and activity enhancers for a number of other herbicides (see, for example, EP-A-0502014). Accordingly, the present invention also embraces the combination with suitable penetrants and activity enhancers, preferably in commercially available form.

[0146] The herbicide combinations according to the invention can also be used together with vegetable oils. The term vegetable oils is to be understood as meaning oils of oleaginous plant species, such as soybean oil, rapeseed oil, corn oil, sunflower oil, cottonseed oil, linseed oil, coconut oil, palm oil, thistle oil or castor oil, in particular rapeseed oil, and also their transesterification products, for example alkyl esters, such as rapeseed oil methyl ester or rapeseed oil ethyl ester.

[0147] The vegetable oils are preferably esters of C_{10} - C_{22} -, preferably C_{12} - C_{20} -, fatty acids. The C_{10} - C_{22} -fatty acid esters are, for example, esters of unsaturated or saturated C_{10} - C_{22} -fatty acids, in particular those having an even number of carbon atoms, for example erucic acid, lauric acid, palmitic acid and in particular C_{18} -fatty acids, such as stearic acid, oleic acid, linoleic acid or linolenic acid.

[0148] Examples of C_{10} - C_{22} -fatty acid esters are esters obtained by reacting glycerol or glycol with the C_{10} - C_{22} -fatty acids contained, for example, in oils of oleaginous plant species, or C_1 - C_{20} -alkyl- C_{10} - C_{22} -fatty acid esters which can be obtained, for example, by transesterification of the aforementioned glycerol- or glycol- C_{10} - C_{22} -fatty acid esters with C_1 - C_{20} -alcohols (for example methanol, ethanol, propanol or butanol). The transesterification can be carried out by known methods as described, for example, in Römpp Chemie Lexikon, 9th edition, Volume 2, page 1343, Thieme Verlag Stuttgart.

[0149] Preferred C_1 - C_{20} -alkyl- C_{10} - C_{22} -fatty acid esters are methyl esters, ethyl esters, propyl esters, butyl esters, 2-ethylhexyl esters and dodecyl esters. Preferred glycol- and glycerol- C_{10} - C_{22} -fatty acid esters are the uniform or mixed glycol esters and glycerol esters of C_{10} - C_{22} -fatty acids, in particular fatty acids having an even number of carbon atoms, for example erucic acid, lauric acid, palmitic acid and, in particular, C_{18} -fatty acids, such as stearic acid, oleic acid, linoleic acid or linolenic acid.

[0150] In the herbicidal compositions according to the invention, the vegetable oils can be present, for example, in the form of commercially available oil-containing formulation additives, in particular those based on rapeseed oil, such as Hasten® (Victorian Chemical Company, Australia, hereinbelow referred to as Hasten, main ingredient: rapeseed oil ethyl ester), Actirob®B (Novance, France, hereinbelow referred to as ActirobB, main ingredient: rapeseed oil methyl ester), Rako-Binol® (Bayer AG, Germany, hereinbelow referred to as Rako-Binol, main ingredient: rapeseed oil), Renol® (Stefes, Germany, hereinbelow referred to as Renol, vegetable oil ingredient: rapeseed oil methyl ester) or Stefes Mero® (Stefes, Germany, hereinbelow referred to as Mero, main ingredient: rapeseed oil methyl ester).

[0151] In a further embodiment, the present invention also comprises combinations with the vegetable oils mentioned above, such as rapeseed oil, preferably in the form of commercially available oil-containing formulation additives, in particular those based on rapeseed oil, such as Hasten® (Victorian Chemical Company, Australia, hereinbelow referred to as Hasten, main ingredient: rapeseed oil ethyl ester), Actirob®B (Novance, France, hereinbelow referred to as ActirobB, main ingredient: rapeseed oil methyl ester), Rako-Binol® (Bayer AG, Germany, hereinbelow referred to as Rako-Binol, main ingredient: rapeseed oil), Renol® (Stefes, Germany, hereinbelow referred to as Renol, vegetable oil ingredient: rapeseed oil methyl ester) or Stefes Mero® (Stefes, Germany, hereinbelow referred to as Mero, main ingredient: rapeseed oil methyl ester).

[0152] It is possible to use colorants such as inorganic pigments, for example iron oxide, titanium oxide and Prussian Blue, and organic colorants such as alizarin colorants, azo colorants and metal phthalocyanine colorants, and trace nutrients such as salts of iron, manganese, boron, copper, cobalt, molybdenum and zinc.

[0153] In general, the formulations comprise between 0.1 and 95% by weight of active compound, preferably between 0.5 and 90% by weight.

[0154] As such or in their formulations, the herbicides (A) and (B) can also be used as a mixture with other agrochemically active compounds, such as known herbicides, for controlling unwanted vegetation, for example for controlling weeds or for controlling unwanted crop plants, finished formulations or tank mixes, for example, being possible.

[0155] Mixtures with other known active compounds, such as fungicides, insecticides, acaricides, nematocides, safeners, bird repellents, plant nutrients and agents which improve soil structure, are also possible.

[0156] The herbicides (A) and (B) can be used as such, in the form of their formulations or in the use forms prepared therefrom by further dilution, such as ready-to-use solutions, suspensions, emulsions, powders, pastes and granules. They are used in a customary manner, for example by watering, spraying, atomizing or broadcasting.

[0157] The active compounds can be applied to the plants (for example harmful plants, such as monocotyledonous or dicotyledonous broad-leaved weeds, weed grasses, *Cyperaceae* or unwanted crop plants), the seed (for example grains, seeds or vegetative propagation organs, such as tubers or shoot parts with buds) or the area under cultivation (for example the soil), preferably to the green plants and parts of plants and, if appropriate, additionally the soil. One possible use is the joint application of the active compounds in the form of tank mixes, where the optimally formulated concentrated formulations of the individual active compounds are, together, mixed in a tank with water, and the spray liquor obtained is applied.

[0158] A joint herbicidal formulation of the combination according to the invention of herbicides (A) and (B) has the advantage that it is easier to apply, since the amounts of the components are already in an optimum ratio. Moreover, the auxiliaries in the formulation can be adjusted optimally to one another.

BIOLOGICAL EXAMPLES

[0159] Post-Emergence Action Against Weeds

[0160] Method

[0161] Seeds or rhizome pieces of mono- and dicotyledonous harmful and useful plants were placed in peat pots (diameter 4 cm) filled with sandy loam and then covered with soil. The pots were kept in a greenhouse under optimum conditions. In addition, harmful plants encountered in paddy rice cultivation were cultivated in pots with a water level 2 cm above the soil surface.

[0162] About three weeks after the start of the cultivation, the test plants were treated at the 2- to 3-leaf stage. The herbicides, formulated as powder or liquid concentrates, were, either alone or in the combinations according to the invention, sprayed in various dosages on to the green parts of the plants using an application rate of 600 l of water/ha (converted). For further cultivation of the plants, the pots were then again kept under optimum conditions in a greenhouse.

[0163] The visual scoring of the herbicidal effects was carried out in intervals up to 21 days after the treatment. Scoring was carried out in percent in comparison to the untreated control plants. 0%=no herbicidal activity, 100%=complete herbicidal activity=complete kill.

[0164] The percentages from the treatments with the herbicides alone (=individual application) and with the combinations according to the invention (=mixtures) were employed to calculate interactions using the method of Colby. When the observed efficacies of the mixtures exceed the formal sum of the values of the tests with individual applications, they also exceed the expected value according to Colby, which is calculated using the formula below (cf. S. R. Colby; in Weeds 15 (1967) pp. 20 to 22):

$$E = A + B - (A \times B / 100)$$

[0165] Here:

[0166] A, B=activity of components A and B in percent at a dosage of a and b g of ai/ha (=gramm of active substance per hectare), respectively.

[0167] E=expected value in % at a dosage of a+b g of ai/ha.

[0168] Results

[0169] The combinations according to the invention of herbicides from group (A) with herbicides from group (B) were tested on a broad spectrum of important harmful plants (weed grasses, broad-leaved weeds/*Cyperaceae*) and useful plants: *Triticum aestivum* (TRZAS), *Stellaria media* (STEME), *Lolium multiflorum* (LOLMU), *Veronica persica* (VERPE), *Alopecurus myosuroides* (ALOMY), *Matricaria inodora* (MATIN), *Brassica napus* (BRSNW), *Viola tricolor* (VIOTR), *Avena fatua* (AVEFA), *Amaranthus retroflexus* (AMARE), *Zea mays* (ZEAMX), *Pharbitis purpurea* (PHBPU), *Setaria viridis* (SETVI), *Fallopia* (ex *Polygonum*) *convolvulus* (POLCO), *Echinochloa crus-galli* (ECHCG), *Abutilon theophrasti* (ABUTH), *Cyperus esculentus* (CYPES), *Oryza sativa* (ORYSA).

[0170] Of particular interest are the results shown in the tables (Tab.) below, where the following key is used:

[0171] (1) EPPO code (former Bayer code) for the treated plant (see above)

[0172] (2) Time of scoring: DAT (days after treatment)

[0173] (3) Component A tested (identifying number)

[0174] (4) Component B tested (identifying number)

[0175] (5) Dosage component A [g of ai/ha]

[0176] (6) Dosage component B [g of ai/ha]

[0177] (7) % activity found

[0178] (8) E value (calculated according to Colby; see above)

[0179] (9) Comments: "SYNERGY"=synergistic interaction (E value<% activity found); "SAFENING"=safener action on useful plant (E value>% activity found)

TABLE 1

	(1) TRZAS - (2) 10 DAT - (3) A-1 - (4) B1-1			
	(5)	(6)	(7)	(8)
(3)	12	—	0	—
(4)	—	900	5	—
(3) + (4)	12	900	15	5

(9) SYNERGY

TABLE 2

	(1) VERPE - (2) 10 DAT - (3) A-1 - (4) B1-1			
	(5)	(6)	(7)	(8)
(3)	12	—	60	—
(4)	—	900	0	—
	—	300	0	—
(3) + (4)	12	900	70	60
	12	300	70	60

(9) SYNERGY

TABLE 3

(1) ALOMY - (2) 10 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	12	—	40	—
	4	—	40	—
(4)	—	900	0	—
	—	300	0	—
(3) + (4)	12	900	70	40
	12	300	70	40
	4	900	70	40
	4	300	70	40

(9) SYNERGY

TABLE 4

(1) MATIN - (2) 10 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	4	—	60	—
(4)	—	300	20	—
(3) + (4)	4	300	80	68

(9) SYNERGY

TABLE 5

(1) AVEFA - (2) 10 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	4	—	40	—
(4)	—	900	0	—
	—	300	0	—
(3) + (4)	4	900	50	40
	4	300	55	40

(9) SYNERGY

TABLE 6

(1) ZEAMX - (2) 10 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	12	—	0	—
	4	—	0	—
(4)	—	900	0	—
	—	300	0	—
(3) + (4)	12	900	10	0
	12	300	40	0
	4	900	10	0
	4	300	20	0

(9) SYNERGY

TABLE 7

(1) PHBPU - (2) 10 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	4	—	60	—
(4)	—	300	0	—
(3) + (4)	4	300	70	60

(9) SYNERGY

TABLE 8

(1) PHBPU - (2) 10 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	12	—	60	—
(4)	—	900	0	—
	—	300	0	—
(3) + (4)	12	900	70	60
	12	300	70	60

(9) SYNERGY

TABLE 9

(1) SETVI - (2) 10 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	4	—	50	—
(4)	—	900	0	—
	—	300	0	—
(3) + (4)	4	900	60	50
	4	300	60	50

(9) SYNERGY

TABLE 10

(1) ABUTH - (2) 10 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	12	—	70	—
	4	—	70	—
(4)	—	300	0	—
(3) + (4)	12	300	80	70
	4	300	80	70

(9) SYNERGY

TABLE 11

(1) ORYSA - (2) 10 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	4	—	10	—
(4)	—	300	0	—
(3) + (4)	4	300	0	10

(9) SAFENING

TABLE 12

(1) LOLMU - (2) 21 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	12	—	10	—
	4	—	0	—
(4)	—	900	0	—
(3) + (4)	12	900	20	10
	4	900	10	0

(9) SYNERGY

TABLE 13

(1) VERPE - (2) 21 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	12	—	40	—
	4	—	30	—
(4)	—	900	0	—
	—	300	0	—
(3) + (4)	12	900	70	40
	12	300	70	40
	4	900	70	30
	4	300	70	30

(9) SYNERGY

TABLE 14

(1) ALOMY - (2) 21 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	12	—	50	—
	4	—	40	—
(4)	—	900	0	—
	—	300	0	—
(3) + (4)	12	900	90	50
	12	300	90	50
	4	900	60	40
	4	300	60	40

(9) SYNERGY

TABLE 15

(1) MATIN - (2) 21 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	12	—	60	—
	4	—	50	—
(4)	—	900	0	—
	—	300	0	—
(3) + (4)	12	900	95	60
	12	300	85	60
	4	900	95	50
	4	300	95	50

(9) SYNERGY

TABLE 16

(1) VIOTR - (2) 21 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	4	—	0	—
(4)	—	900	10	—
(3) + (4)	4	900	20	10

(9) SYNERGY

TABLE 17

(1) AMARE - (2) 21 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	4	—	70	—
(4)	—	300	0	—
(3) + (4)	4	300	80	70

(9) SYNERGY

TABLE 18

(1) AMARE - (2) 21 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	12	—	75	—
(4)	—	900	20	—
	—	300	0	—
(3) + (4)	12	900	90	80
	12	300	90	75

(9) SYNERGY

TABLE 19

(1) ZEAMX - (2) 21 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	12	—	0	—
(4)	—	900	0	—
	—	300	5	—
(3) + (4)	12	900	10	0
	12	300	20	5

(9) SYNERGY

TABLE 20

(1) PHBPU - (2) 21 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	4	—	60	—
(4)	—	300	0	—
(3) + (4)	4	300	80	60

(9) SYNERGY

TABLE 21

(1) PHBPU - (2) 21 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	12	—	65	—
(4)	—	900	30	—
	—	300	0	—
(3) + (4)	12	900	90	76
	12	300	90	65

(9) SYNERGY

TABLE 22

(1) SETVI - (2) 21 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	12	—	20	—
	4	—	0	—
(4)	—	900	0	—
	—	300	0	—
(3) + (4)	12	900	30	20
	12	300	50	20
	4	900	30	0
	4	300	50	0

(9) SYNERGY

TABLE 23

(1) POLCO - (2) 21 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	12	—	70	—
(4)	—	900	0	—
	—	300	0	—
(3) + (4)	12	900	90	70
	12	300	70	70

(9) SYNERGY

TABLE 24

(1) ECHCG - (2) 21 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	4	—	85	—
(4)	—	300	0	—
(3) + (4)	4	300	98	85

(9) SYNERGY

TABLE 25

(1) ABUTH - (2) 21 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	12	—	85	—
(4)	—	900	0	—
	—	300	0	—
(3) + (4)	12	900	95	85
	12	300	95	85

(9) SYNERGY

TABLE 26

(1) TRZAS - (2) 10 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3)	12	—	0	—
(4)	—	1200	0	—
	—	400	0	—

TABLE 26-continued

(1) TRZAS - (2) 10 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3) + (4)	12	1200	10	0
	12	400	10	0

(9) SYNERGY

TABLE 27

(1) LOLMU - (2) 10 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3)	12	—	10	—
	4	—	0	—
(4)	—	1200	0	—
	—	400	0	—
(3) + (4)	12	1200	30	10
	12	400	30	10
	4	1200	30	0
	4	400	30	0

(9) SYNERGY

TABLE 28

(1) ALOMY - (2) 10 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3)	12	—	40	—
	4	—	40	—
(4)	—	400	0	—
(3) + (4)	12	400	60	40
	4	400	60	40

(9) SYNERGY

TABLE 29

(1) MATIN - (2) 10 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3)	4	—	60	—
(4)	—	1200	0	—
	—	400	0	—
(3) + (4)	4	1200	70	60
	4	400	70	60

(9) SYNERGY

TABLE 30

(1) VIOTR - (2) 10 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3)	4	—	20	—
(4)	—	400	0	—
(3) + (4)	4	400	30	20

(9) SYNERGY

TABLE 31

(1) VIOTR - (2) 10 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3)	12	—	20	—
(4)	—	1200	0	—
	—	400	0	—
(3) + (4)	12	1200	30	20
	12	400	30	20

(9) SYNERGY

TABLE 32

(1) AMARE - (2) 10 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3)	12	—	70	—
(4)	—	1200	0	—
(3) + (4)	12	1200	0	—

(9) SYNERGY

TABLE 33

(1) ZEAMX - (2) 10 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3)	12	—	0	—
	4	—	0	—
(4)	—	1200	10	—
	—	400	0	—
(3) + (4)	12	1200	40	10
	12	400	20	0
	4	1200	20	10
	4	400	20	0

(9) SYNERGY

TABLE 34

(1) PHBPU - (2) 10 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3)	12	—	60	—
	4	—	60	—
(4)	—	1200	0	—
	—	400	0	—
(3) + (4)	12	1200	70	60
	12	400	70	60
	4	1200	70	60
	4	400	70	60

(9) SYNERGY

TABLE 35

(1) POLCO - (2) 10 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3)	12	—	70	—
	4	—	70	—
(4)	—	1200	0	—
	—	400	0	—
(3) + (4)	12	1200	80	70
	12	400	80	70
	4	1200	80	70
	4	400	80	70

(9) SYNERGY

TABLE 36

(1) ABUTH - (2) 10 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3)	12	—	70	—
	4	—	70	—
(4)	—	1200	0	—
	—	400	0	—
(3) + (4)	12	1200	80	70
	12	400	80	70
	4	1200	80	70
	4	400	80	70

(9) SYNERGY

TABLE 37

(1) LOLMU - (2) 21 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3)	4	—	0	—
(4)	—	1200	0	—
	—	400	0	—
(3) + (4)	4	1200	10	0
	4	400	10	0

(9) SYNERGY

TABLE 38

(1) VERPE - (2) 21 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3)	12	—	40	—
	4	—	30	—
(4)	—	1200	0	—
	—	400	0	—
(3) + (4)	12	1200	50	40
	12	400	50	40
	4	1200	40	30
	4	400	40	30

(9) SYNERGY

TABLE 39

(1) ALOMY - (2) 21 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3)	12	—	50	—
	4	—	40	—

TABLE 39-continued

<u>(1) ALOMY - (2) 21 DAT - (3) A-1 - (4) B2-4</u>				
	(5)	(6)	(7)	(8)
(4)	—	1200	0	—
	—	400	0	—
(3) + (4)	12	1200	80	50
	12	400	80	50
	4	1200	70	40
	4	400	50	40

(9) SYNERGY

TABLE 40

<u>(1) MATIN - (2) 21 DAT - (3) A-1 - (4) B2-4</u>				
	(5)	(6)	(7)	(8)
(3)	12	—	60	—
	4	—	50	—
(4)	—	1200	20	—
	—	400	0	—
(3) + (4)	12	1200	80	68
	12	400	90	60
	4	1200	80	60
	4	400	80	50

(9) SYNERGY

TABLE 41

<u>(1) VIOTR - (2) 21 DAT - (3) A-1 - (4) B2-4</u>				
	(5)	(6)	(7)	(8)
(3)	4	—	0	—
(4)	—	1200	0	—
	—	400	0	—
(3) + (4)	4	1200	10	0
	4	400	10	0

(9) SYNERGY

TABLE 42

<u>(1) AVEFA - (2) 21 DAT - (3) A-1 - (4) B2-4</u>				
	(5)	(6)	(7)	(8)
(3)	4	—	10	—
(4)	—	1200	0	—
	—	400	0	—
(3) + (4)	4	1200	30	10
	4	400	30	0

(9) SYNERGY

TABLE 43

<u>(1) AVEFA - (2) 21 DAT - (3) A-1 - (4) B2-4</u>				
	(5)	(6)	(7)	(8)
(3)	12	—	30	—
(4)	—	400	0	—
(3) + (4)	12	400	40	30

(9) SYNERGY

TABLE 44

<u>(1) AMARE - (2) 21 DAT - (3) A-1 - (4) B2-4</u>				
	(5)	(6)	(7)	(8)
(3)	4	—	70	—
(4)	—	1200	0	—
(3) + (4)	4	1200	80	70

(9) SYNERGY

TABLE 45

<u>(1) AMARE - (2) 21 DAT - (3) A-1 - (4) B2-4</u>				
	(5)	(6)	(7)	(8)
(3)	12	—	75	—
(4)	—	1200	0	—
	—	400	0	—
(3) + (4)	12	1200	85	75
	12	400	85	75

(9) SYNERGY

TABLE 46

<u>(1) PHBPU - (2) 21 DAT - (3) A-1 - (4) B2-4</u>				
	(5)	(6)	(7)	(8)
(3)	4	—	60	—
(4)	—	1200	0	—
	—	400	0	—
(3) + (4)	4	1200	90	60
	4	400	90	60

(9) SYNERGY

TABLE 47

<u>(1) PHBPU - (2) 21 DAT - (3) A-1 - (4) B2-4</u>				
	(5)	(6)	(7)	(8)
(3)	12	—	65	—
(4)	—	400	0	—
(3) + (4)	12	400	88	65

(9) SYNERGY

TABLE 48

<u>(1) SETVI - (2) 21 DAT - (3) A-1 - (4) B2-4</u>				
	(5)	(6)	(7)	(8)
(3)	4	—	0	—
(4)	—	1200	40	—
(3) + (4)	4	1200	50	40

(9) SYNERGY

TABLE 49

(1) POLCO - (2) 21 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3)	12	—	70	—
	4	—	75	—
(4)	—	1200	0	—
	—	400	0	—
(3) + (4)	12	1200	95	70
	12	400	95	70
	4	1200	95	75
	4	400	90	75

(9) SYNERGY

TABLE 50

(1) ABUTH - (2) 21 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3)	12	—	85	—
	4	—	85	—
(4)	—	1200	0	—
	—	400	0	—
(3) + (4)	12	1200	95	85
	12	400	98	85
	4	1200	95	85
	4	400	95	85

(9) SYNERGY

TABLE 51

(1) CYPES - (2) 21 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3)	12	—	80	—
	4	—	80	—
(4)	—	1200	0	—
	—	400	0	—
(3) + (4)	12	1200	90	80
	12	400	90	80
	4	1200	90	80
	4	400	90	80

(9) SYNERGY

TABLE 52

(1) ORYSA - (2) 21 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3)	12	—	10	—
(4)	—	1200	10	—
(3) + (4)	12	1200	0	19

(9) SAFENING

TABLE 53

(1) VERPE - (2) 10 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	4	—	60	—
(4)	—	900	0	—
(3) + (4)	4	900	70	60

(9) SYNERGY

TABLE 54

(1) AVEFA - (2) 10 DAT - (3) A-1 - (4) B1-1				
	(5)	(6)	(7)	(8)
(3)	12	—	50	—
(4)	—	300	0	—
(3) + (4)	12	300	60	50

(9) SYNERGY

TABLE 55

(1) TRZAS - (2) 10 DAT - (3) A-1 - (4) B2-4				
	(5)	(6)	(7)	(8)
(3)	4	—	0	—
(4)	—	1200	0	—
(3) + (4)	4	1200	10	0

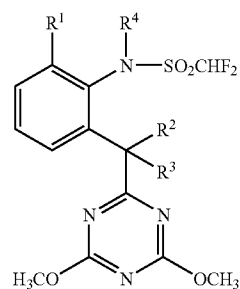
(9) SYNERGY

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1. A herbicide combination comprising components (A) and (B), where

(A) denotes one or more compounds or salts thereof from the group described by the general formula (I):

(I)



in which

R¹ is halogen, preferably fluorine or chlorine,

R² is hydrogen and R³ is hydroxyl or

R² and R³ together with the carbon atom to which they are attached are a carbonyl group C=O and

R⁴ is hydrogen or methyl; and

(B) denotes one or more herbicides from the group of the (thio)ureas consisting of:

(B1-1) cumyluron;

(B2-1) chlorbromuron;

(B2-2) chlortoluron;

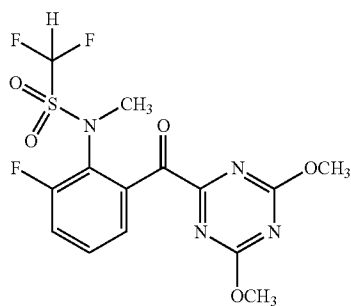
(B2-3) chloroxuron;

(B2-4) daimuron;

(B2-5) diflufenzopyr;
 (B2-6) dimefuron;
 (B2-7) diuron;
 (B2-8) fluometuron;
 (B2-9) forchlorfenuron;
 (B2-10) isoproturon;
 (B2-11) karbutilate;
 (B2-12) linuron;
 (B2-13) methyldymron;
 (B2-14) metobromuron;
 (B2-15) metoxuron;
 (B2-16) monolinuron;
 (B2-17) neburon;
 (B2-18) siduron;
 (B2-19) thidiazuron;
 (B3-1) methiuron;
 (B4-1) tebuthiuron;
 (B5-1) methabenzthiazuron.

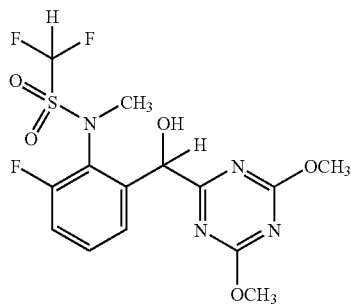
2. The herbicide combination as claimed in claim 1, comprising as component (A) one or more of the compounds from the group mentioned below consisting of:

compound (A-1)



(A1)

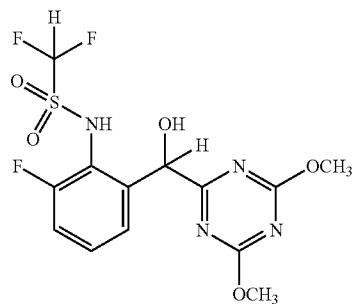
compound (A-2)



(A2)

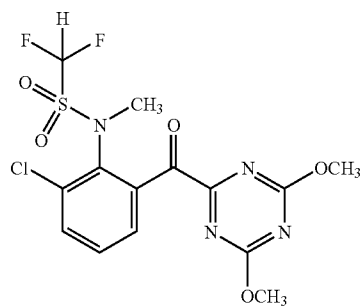
-continued

compound (A-3)



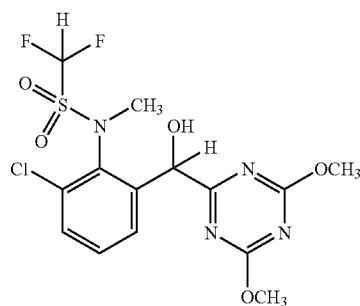
(A3)

compound (A-4)



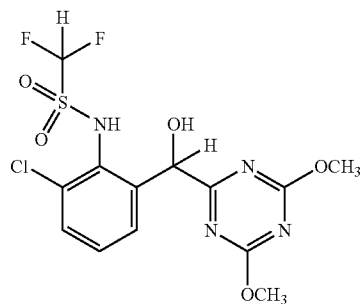
(A4)

compound (A-5)



(A5)

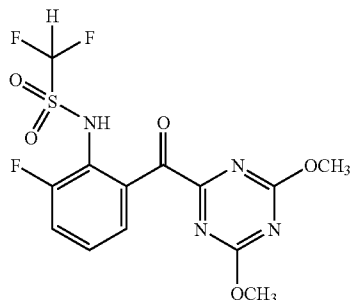
compound (A-6)



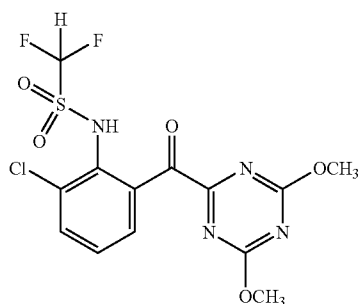
(A6)

-continued

compound (A-7)



compound (A-8)



(A7)

3. The herbicide combination as claimed in claim 1, comprising as component (B) one or more of the compounds from the group mentioned below consisting of: (B1-1) cumyluron, (B2-4) daimuron, (B2-5) diflufenzopyr, (B2-7) diuron, (B2-10) isoproturon, (B2-16) monolinuron, (B2-19) thidiazuron, (B5-1) methabenzthiazuron; particularly preferably (B1-1) cumyluron, (B2-4) daimuron.

4. The herbicide combination as claimed in claim 1, where the weight ratio (A):(B) of the components (A) and (B) is generally in the range of from 1:5000 to 500:1, preferably 1:4000 to 100:1, in particular 1:3000 to 50:1.

5. The herbicide combination as claimed in claim 1, comprising an effective amount of components (A) and (B) and/or additionally one or more further components from the group of agrochemically active compounds of a different type, for formulation auxiliaries and additives customary in crop protection.

(A8)

6. A method for controlling unwanted vegetation wherein the components (A) and (B) of the herbicide combination, defined according to claim 1, are applied jointly or separately.

7. The method as claimed in claim 6 for controlling unwanted vegetation in crop plants such as wheat (durum wheat and common wheat), corn, soybeans, sugar beet, sugar cane, cotton, rice, beans, flax, barley, oats, rye, triticale, oil-seed rape, potatoes, millet (sorghum), pasture grass, greens/lawns, in fruit plantations or on non-crop areas, in particular in rice crops.

8. The use of the herbicide combination defined in claim 1 for controlling unwanted vegetation.

* * * * *

[Pesticide Search](#)
[Companies](#)
[Glossary](#)
[Abbreviations](#)
[Background Information](#)
[My Details](#)
[Contact](#)

Searches

Multiple terms: ☒ Off ☐ On ?
Include supplementary entries: ☐ Off ☒ On ?

Search field: ?

☒ Contains ☐ Equals ?

Contains: ?

Search Criteria

'benzofluor' was found in the following pesticide names:
benzofluor

Search Results – 1 pesticides found – Supplementary entries included

'Pesticide name' Contains
'benzofluor'

benzofluor

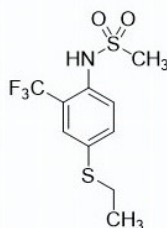
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benzofluor

Herbicide ^Top

Supplementary entry



Nomenclature

^Top

benzofluor

Common name benzofluor (BSI, ANSI, WSSA, E-ISO, (*m*) F-ISO)

IUPAC name 4'-(ethylthio)-2'-(trifluoromethyl)methanesulfonanilide

CAS RN [68672-17-3]

Chemical Abstracts name *N*-[4-(ethylthio)-2-(trifluoromethyl)phenyl]methanesulfonamide

Development codes MBR-18337 (3M)

SMILES code CS(NC1=CC=C(SCC)C=C1C(F)(F)F)=O=O

InChI key IDFXUDGCYIGBDC-UHFFFAOYSA-N

InChI InChI=1S/C10H12F3NO2S2/c1-3-17-7-4-5-9(14-18(2,15)16)8(6-7)10(11,12)13/h4-6,14H,3H2,1-2H3

Physical chemistry

^Top

benzofluor

Mol. wt. 299.3

M.f. C₁₀H₁₂F₃NO₂S₂

Commercialisation

^Top

benzofluor

History Patented in 1978 by 3M Company. Evaluated as a herbicide and plant growth by 3M but apparently never marketed.

Patents DE 2815340; DE 3002895.

Applications

^Top

benzofluor

Uses Growth retardant in turf grass.

Classes

ethoxysulfuron
 flazasulfuron
 flupyr-sulfuron-methyl-
 sodium
 foramsulfuron
 halosulfuron-methyl
 imazosulfuron
 iodosulfuron-methyl-sodium
 mesosulfuron-methyl
 metsulfuron-methyl
 nicosulfuron
 orthosulfamuron
 oxasulfuron
 primisulfuron-methyl
 prosulfuron
 pyrazosulfuron-ethyl
 rimsulfuron
 sulfometuron-methyl
 sulfosulfuron
 thifensulfuron-methyl
 triasulfuron
 tribenuron-methyl
 trifloxysulfuron-sodium
 triflusulfuron-methyl
 tritosulfuron

synthetic auxin

See auxin, synthetic

synthetic pheromone

See pheromone, synthetic

tetracycline antibiotic

See antibiotic, tetracycline

tetramic acid

spirotetramat

tetrazine

diflovidazin

tetrazolinone

fentrazamide

tetronic acid

spirodiclofen

spiromesifen

thiadiazole

fluthiacet-methyl

thiadiazole carboxamide

tiadinil

thiazole carboxamide

ethaboxam

Classes**thiocarbamate**

butylate
 cycloate
 dimepiperate
 EPTC
 esprocarb
 molinate
 orbencarb
 pebulate
 prosulfocarb
 thiobencarb
 tri-allate

thiophanate

See MBC: thiophanate

thiophenecarboxamide

silthiofam

triazine, 1,3,5-

ametryn
 atrazine
 cyanazine
 dimethametryn
 prometon
 prometryn
 propazine
 simazine
 simetryn
 terbumeton
 terbuthylazine
 terbutryn
 trietazine

triazinone

hexazinone
 metamidron
 metribuzin

triazole

amitrole

triazole (PGR)

See DMI: triazole

triazole fungicide

See SBI Class I, DMI:
 triazole

triazolinone

amicarbazone
 carfentrazone-ethyl
 sulfentrazone

Classes**triazolopyrimidine**

cloransulam-methyl
 diclosulam
 florasulam
 flumetsulam
 metosulam
 penoxsulam
 pyroxsulam

triketone

mesotrione
 sulcotrione

uracil

bromacil
 lenacil
 terbacil

urea

chlorotoluron
 dimefuron
 diuron
 fluometuron
 isoproturon
 isouron
 karbutilate
 linuron
 methabenzthiazuron
 metobromuron
 metoxuron
 monolinuron
 neburon
 siduron
 tebuthiuron

valinamide carbamate

benthiavalicarb-isopropyl
 iprovalicarb
 valifenalate

wasp (Hymenoptera)

Anagrus atomus
Aphelinus abdominalis
Aphidius colemani
Dacnusa sibirica
Diglyphus isaea
Encarsia formosa
Eretmocerus eremicus
Leptomastix dactylopii
Metaphycus helvolus
Trichogramma spp.

A World Compendium

The Pesticide Manual

Fifteenth Edition

Editor: C D S Tomlin



Promoting the Science and Practice of Sustainable Crop Production

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ametryn

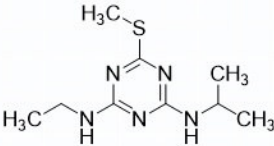
Herbicide ^Top

Target site PS-II inhibition (photosystem II)

Class 1,3,5-triazine

HRAC C1

WSSA 5



atrazine

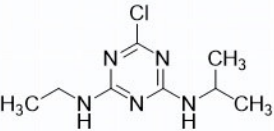
Herbicide ^Top

Target site PS-II inhibition (photosystem II)

Class 1,3,5-triazine

HRAC C1

WSSA 5



cyanazine

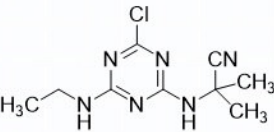
Herbicide ^Top

Target site PS-II inhibition (photosystem II)

Class 1,3,5-triazine

HRAC C1

WSSA 5



prometon

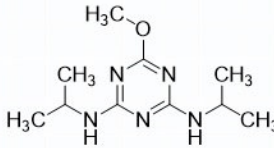
Herbicide ^Top

Target site PS-II inhibition (photosystem II)

Class 1,3,5-triazine

HRAC C1

WSSA 5



prometryn

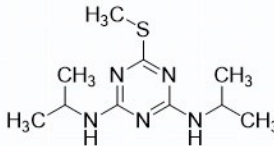
Herbicide ^Top

Target site PS-II inhibition (photosystem II)

Class 1,3,5-triazine

HRAC C1

WSSA 5



propazine

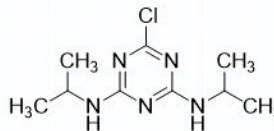
Herbicide ^Top

Target site PS-II inhibition (photosystem II)

Class 1,3,5-triazine

HRAC C1

WSSA 5



simazine

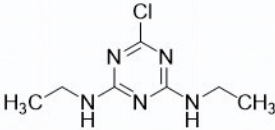
Herbicide ^Top

Target site PS-II inhibition (photosystem II)

Class 1,3,5-triazine

HRAC C1

WSSA 5



simetryn

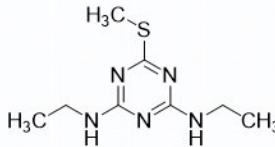
Herbicide ^Top

Target site PS-II inhibition (photosystem II)

Class 1,3,5-triazine

HRAC C1

WSSA 5



terbumeton

Herbicide ^Top

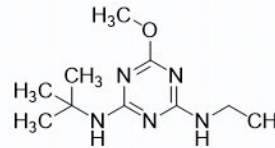
Supplementary entry

Target site PS-II inhibition (photosystem II)

Class 1,3,5-triazine

HRAC C1

WSSA 5



terbutylazine

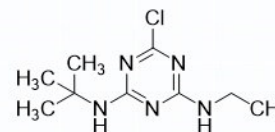
Herbicide ^Top

Target site PS-II inhibition (photosystem II)

Class 1,3,5-triazine

HRAC C1

WSSA 5



terbutryn

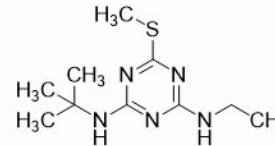
Herbicide ^Top

Target site PS-II inhibition (photosystem II)

Class 1,3,5-triazine

HRAC C1

WSSA 5



trietazine

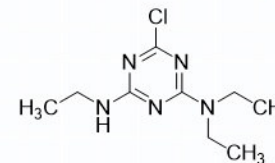
Herbicide ^Top

Target site PS-II inhibition (photosystem II)

Class 1,3,5-triazine

HRAC C1

WSSA 5



dimethametryn

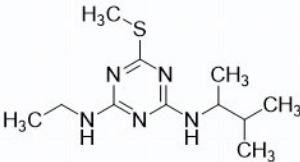
Herbicide ^Top

Target site PS-II inhibition (photosystem II)

Class 1,3,5-triazine

HRAC C1

WSSA 5





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CC: 66.783.790
Pago PSE No: 434063
CUS: 718328213

Patente PCT
COMBINACIÓN HERBICIDA QUE CONTIENE TRIAFAMONA E INDAZIFLAM

Detalle del pago

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