US 20090247511A1

(19) **United States**

(12) **Patent Application Publication**

Suty-Heinze et al.

(10) **Pub. No.: US 2009/0247511 A1**

(43) **Pub. Date: Oct. 1, 2009**

(54) **SYNERGISTIC INSECTICIDE AND FUNGICIDE MIXTURES**

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(21) Appl. No.: **12/306,870**

(22) PCT Filed: **Jun. 20, 2007**

(86) PCT No.: **PCT/EP07/05406**

§ 371 (c)(1),
(2), (4) Date: **Feb. 27, 2009**

(30) **Foreign Application Priority Data**

Jun. 30, 2006 (DE) 10 2006 030 739.9
Jun. 20, 2007 (EP) PCT/EP2007/005406

Publication Classification

(51) **Int. Cl.**

A01N 43/88	(2006.01)
A01P 7/00	(2006.01)
A01P 3/00	(2006.01)
A01N 43/54	(2006.01)
A01N 43/56	(2006.01)

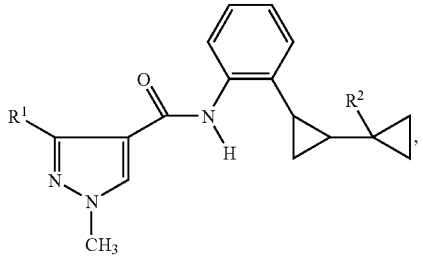
(52) **U.S. Cl.** **514/229.2**; 514/269; 514/406

(57) **ABSTRACT**

The present invention relates to novel active compound combinations comprising of at least two fungicidal components A and B and at least one insecticidal component C.

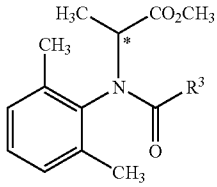
A, B and C may be selected from the following compounds:
A) the compounds of the general formula (I)

(I)



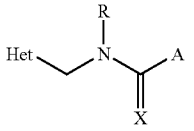
in which the radicals R^1 and R^2 have the meanings given in the description,
B) an acylalanine of the general formula (II)

(II)



in which R^3 represents benzyl, furyl or methoxymethyl and * represents a carbon in the R- or S-configuration, the S-configuration being preferred, or fludioxonil or azoxystrobin
C) a chloronicotinyl of the general formula (III)

(III)



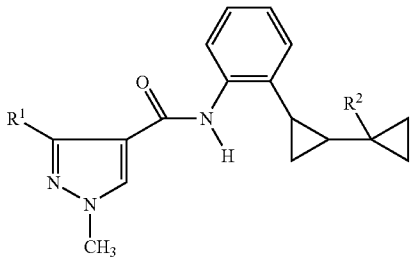
where the radicals Het, R, X and A have the meanings given in the description, or rynaxapyr, fipronil, tefluthrin.
The active compound combinations are highly suitable for controlling unwanted phytopathogenic fungi and for controlling animal pests. The active compound combinations according to the invention are particularly suitable for treating seed.

SYNERGISTIC INSECTICIDE AND FUNGICIDE MIXTURES

[0001] The present invention relates to novel active compound combinations consisting of at least two known fungicidally active compounds and at least one known insectidally active compound. These novel mixtures are highly suitable for controlling unwanted phytopathogenic fungi and animal pests.

[0002] It is already known that compounds of the general formula (I)

(I)



in which

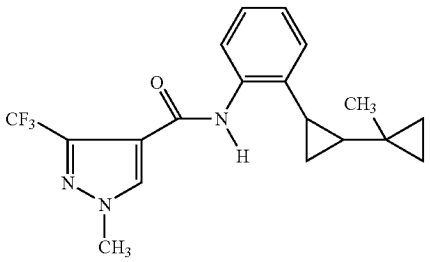
R^1 represents trifluoromethyl or difluoromethyl and

R^2 represents hydrogen or methyl have fungicidal properties.

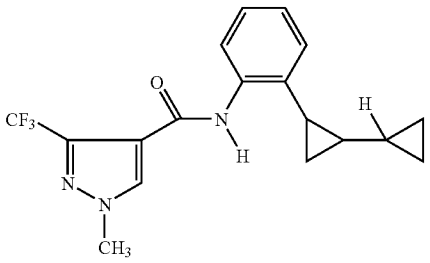
[0003] The compounds of the general formula (I) are known, for example, from WO 2006/015865 A1.

[0004] Specific mention may be made of the following compounds of the formulae (I-1)-(I-4).

(I-1)



(I-2)



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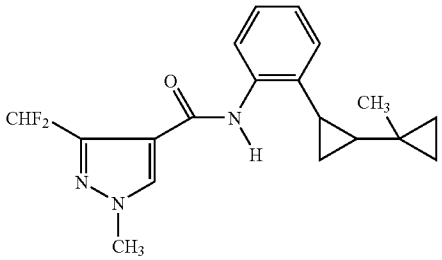
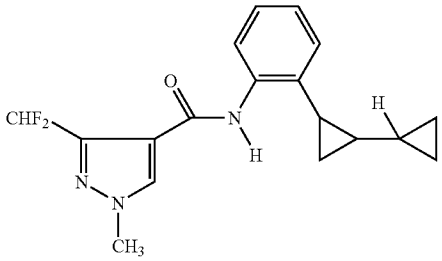
(I-3)

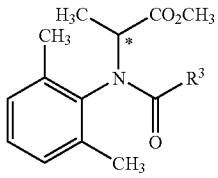


(I-4)



[0005] Moreover, it is known that acylalanines of the general formula (II)

(II)



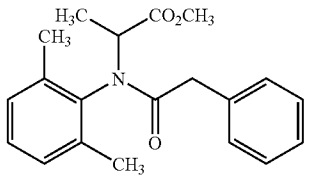
in which R^3 represents benzyl, furyl or methoxymethyl and * represents a carbon in the R- or S-configuration, the S-configuration being preferred, have fungicidal properties.

[0006] The compounds of the general formula (II) are known, for example, from DE-A 2903612 (benalaxyl).

[0007] Specific mention may be made of the following acylalanines of the formulae (II-1)-(II-5).

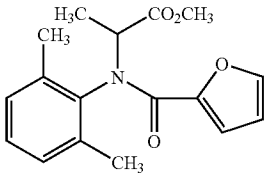
[0008] Benalaxyl (known from DE-A 29 03 612) of the formula

(II-1)



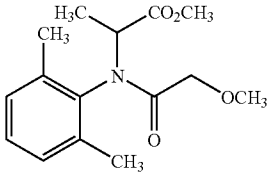
[0009] Furalaxyl (known from DE-A 25 13 732) of the formula

(II-2)



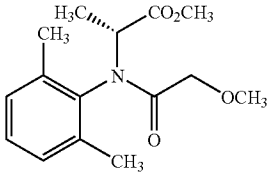
[0010] Metalaxyl (known from DE-A 25 15 091) of the formula

(II-3)



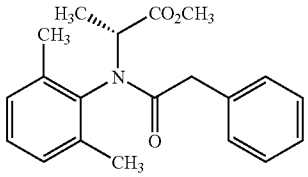
[0011] Metalaxyl-M (known from WO 96/01559) of the formula

(II-4)



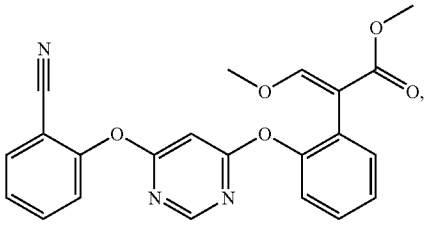
[0012] Benalaxyl-M of the formula

(II-5)



[0013] Furthermore, it is known that azoxystrobin of the formula (V)

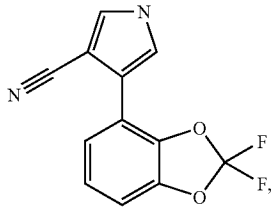
(V)



which is known from EP 00 382 375, has fungicidal properties.

[0014] Furthermore, it is known that fludioxonil of the formula (VI)

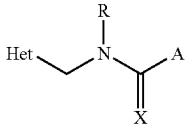
(VI)



which is known from EP 00 206 999, has fungicidal actions.

[0015] Furthermore, it is known that chloronicotinyls of the general formula (III)

(III)



in which

[0016] Het represents a heterocycle selected from the following group of heterocycles:

[0017] 2-chloropyrid-5-yl, 2-methylpyrid-5-yl, 2-chloro-1-oxidopyrid-5-yl, 2,3-dichloropyrid-5-yl, 2,3-dichloro-1-oxidopyrid-5-yl, tetrahydrofuran-3-yl, 5-methyltetrahydrofuran-3-yl, 2-chloro-1,3-thiazol-5-yl,

[0018] R represents hydrogen, C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkynyl, —C(═O)—CH_3 or benzyl or together with R^2 represents one of the groups below:

[0019] —CH_2—CH_2—, —CH_2—CH_2—CH_2—, —CH_2—O—CH_2—, —CH_2—S—CH_2—, —CH_2—NH—CH_2—, —CH_2—N(CH_3)—CH_2— and

[0020] X represents N—NO_2, N—CN or CH—NO_2,

[0021] A represents methyl, —N(R^1)(R^2) or S(R^2),

in which

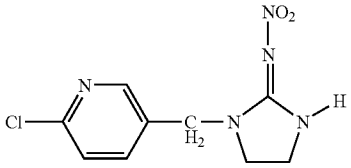
[0022] R^1 represents hydrogen, C_1-C_6-alkyl, phenyl-C_1-C_4-alkyl, C_3-C_6-cycloalkyl, C_2-C_6-alkenyl or C_2-C_6-alkynyl, and

[0023] R^2 represents C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkynyl, —C(═O)—CH_3 or benzyl,

have insecticidal properties (known, for example, from "The Pesticide Manual", 11th Edition, 1997, published by the British Crop Protection Council). Specific mention may be made of the following compounds (111-1)-(111-7) from the class of the chloronicotinyls:

[0024] Imidacloprid has the formula

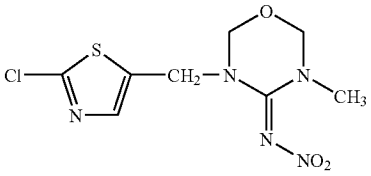
(III-1)



and is known from z.B. EP 0 192 060 A1.

[0025] Thiamethoxam has the formula

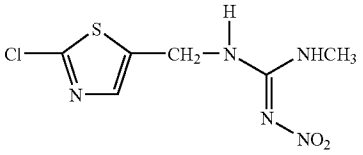
(III-2)



and is known from EP A2 0 580 553.

[0026] Clothianidin has the formula

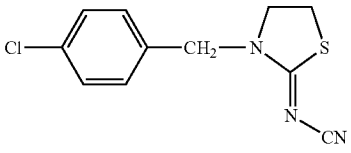
(III-3)



and is known from EP A2 0 376 279.

[0027] Thiacloprid has the formula

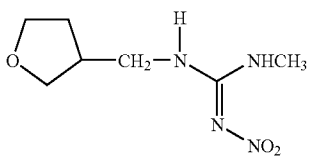
(III-4)



and is known from der EP A2 0 235 725.

[0028] Dinotefuran has the formula

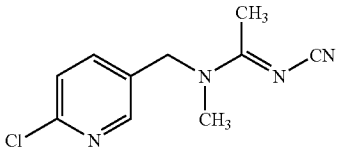
(III-5)



and is known from EP A1 0 649 845.

[0029] Acetamiprid has the formula

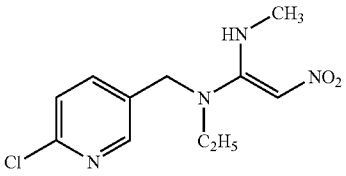
(III-6)



and is known from WO A1 91/04965.

[0030] Nitenpyram has the formula

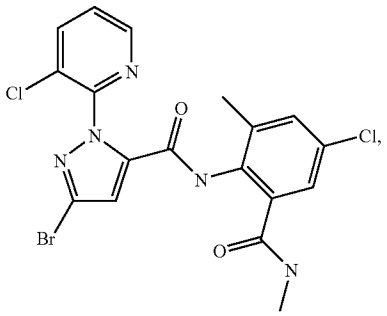
(III-7)



and is known from EP A2 0 302 389.

[0031] Moreover, it is known that anthranilamides, in particular rynaxapyr of the formula (IV)

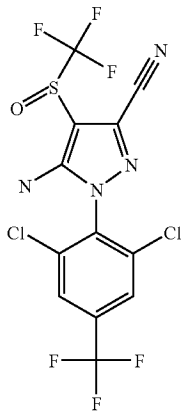
(IV)



which is known from WO 2003/015519, are insecticidally active.

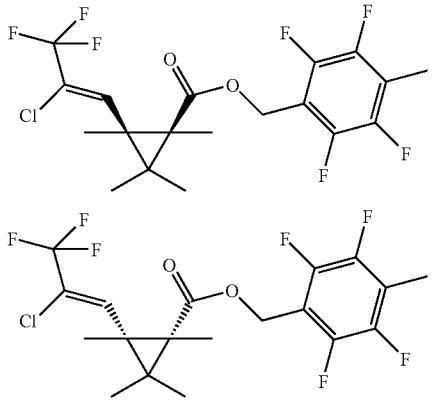
[0032] Furthermore, it is known that fipronil of the formula (VII), which is known from EP 00 295 117 has insecticidal properties.

(VII)



[0033] Moreover, it is known that tefluthrin, a racemate of the two isomers of the formula (VIII), which is known from EP 00 031 199, has insecticidal actions.

(VIII)



[0034] Surprisingly, it has now been found that mixtures consisting of at least three components, that is two fungicides (components A and B) and one insecticide (component C), have synergistic insecticidal and fungicidal properties, i.e. the activities of the mixtures are greater than the sum of the individual activities.

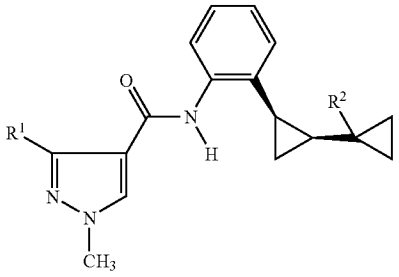
[0035] Thus, an unforeseeable synergistic effect is present, and not just an addition of activities.

[0036] The synergistic effect is particularly pronounced when the active compounds in the active compound combinations according to the invention are present in certain weight ratios. However, the weight ratios of the active compounds in the active compound combinations may be varied within a relatively wide range. In general, the combinations according to the invention comprise active compounds selected from the categories A, B and C in the preferred mixing ratios listed in the table below, the mixing ratios being based on weight ratios.

[0037] All active compound mixtures listed in Table 1 and consisting of at least three components A, B and C in accordance with Table 1 are in accordance with the invention.

[0038] The compounds of the general formula (I) are present in various stereoisomeric forms, which are described by the formulae (I_I), (I_{II}), (I_{III}) and (I_{IV}).

(I_I)



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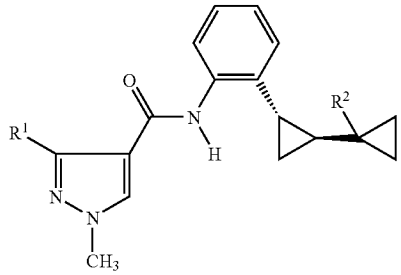
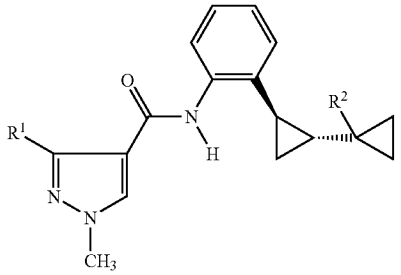
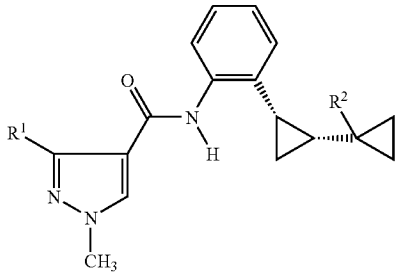
(I_{II})



(I_{III})



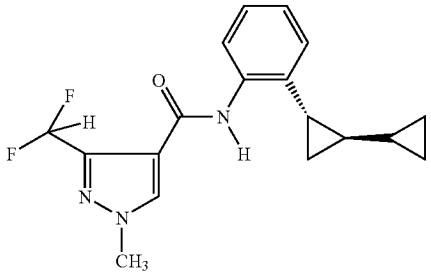
(I_{IV})



[0039] The invention—in particular the compounds (I-1), (I-2), (I-3) and (I-4) of component A—comprises all stereoisomeric forms of the general formula (I) represented by the formulae (I_I), (I_{II}), (I_{III}) and (I_{IV}) in optically pure form or in any mixing ratios with one another.

[0040] Preferred stereoisomers for racemates of the formula (I-4) are the trans compounds of the formulae (I_{II}-4) and (I_{III}-4).

(I_{II}-4)



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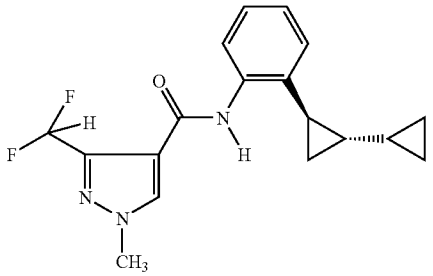
(I_{III}-4)



[0041] Preferred ratios of the four stereoisomers (I_I), (I_{II}), (I_{III}) and (I_{IV}) to one another are stated below.

[0042] Preference is given to mixtures in which in the component A the sum of the proportions by weight of the two stereoisomers (I_{II}) and (I_{III}) is between 65 and 99%.

[0043] Preference is furthermore given to mixtures in which in the component A the sum of the proportions by weight of the two stereoisomers (I_I) and (I_{IV}) is between 65 and 99%.

[0044] Particular preference is given to mixtures in which in the component A the sum of the proportions by weight of the two stereoisomers (I_{II}-4) and (I_{III}-4) is between 65 and 99%.

[0045] The components A, B and C can be selected from the active compounds listed in Table 1, all combinations selected from columns of the table being possible.

TABLE 1

Component A selected from	Component B selected from	Component C selected from
compound (I-1)	benalaxyl (II-1)	imidacloprid (III-1)
compound (I-2)	furalaxyl (II-2)	thiamethoxam (III-2)
compound (I-3)	metalaxyl (II-3)	clothianidin (III-3)
compound (I-4)	metalaxyl-M (II-4)	thiacloprid (III-4)
	benalaxyl M(II-5)	dinotefuran (III-5)
	fludioxonil (VI)	acetamiprid (III-6)
	azoxystrobin (V)	nitenpyram (III-7)
		rynaxapyr (IV)
		fipronil (VII)
		tefluthrin (VIII)

[0046] The following active compounds are preferred for the selection of the components A, B and C according to Table 2:

TABLE 2

Component A selected from	Component B selected from	Component C selected from
compound (I-4)	metalaxyl (II-3)	imidacloprid (III-1)
	metalaxyl-M (II-4)	thiamethoxam (III-2)
	fludioxonil (VI)	clothianidin (III-3)
	azoxystrobin (V)	rynaxapyr (IV)
		fipronil (VII)
		tefluthrin (VIII)

[0047] This results in the following preferred active compound combinations according to Table 3:

TABLE 3

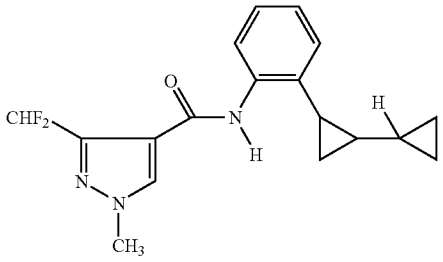
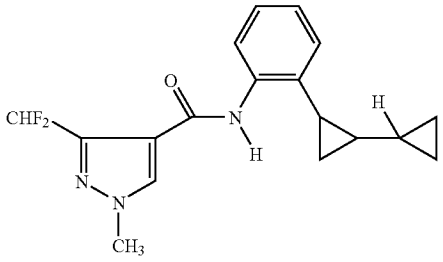
Active compound combination	Component A Compound (I-4)	Component B	Component C
1		metalaxyl (II-3)	imidacloprid (III-1)
2		metalaxyl (II-3)	thiamethoxam (III-2)

TABLE 3-continued

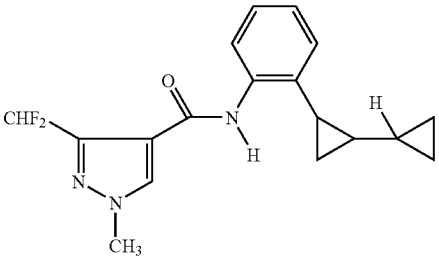
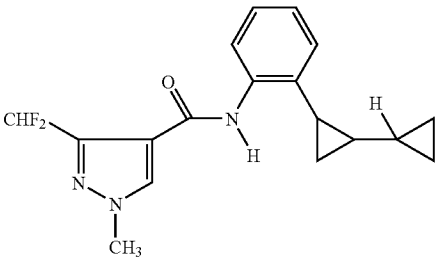
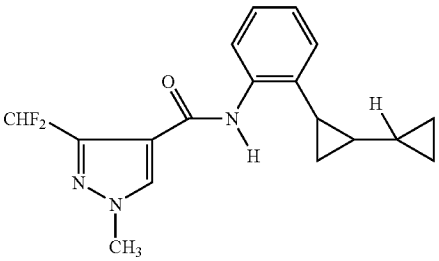
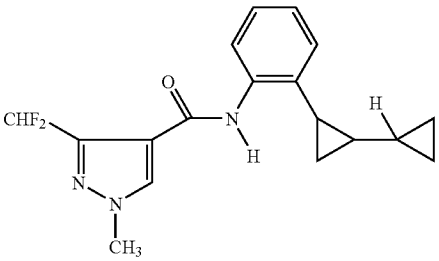
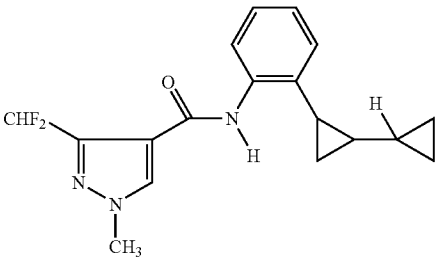
Active compound combination	Component A Compound (I-4)	Component B	Component C
3		metalaxyl (II-3)	clothianidin (III-3)
4		metalaxyl (II-3)	rynaxapyr (IV)
5		metalaxyl (II-3)	fipronil (VII)
6		metalaxyl (II-3)	tefluthrin (VIII)
7		metalaxyl-M (II-4)	imidacloprid (III-1)

TABLE 3-continued

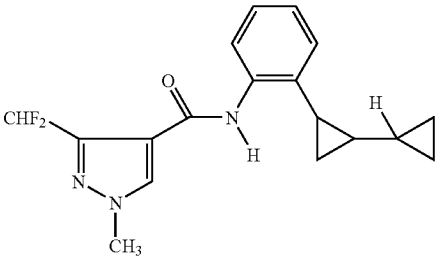
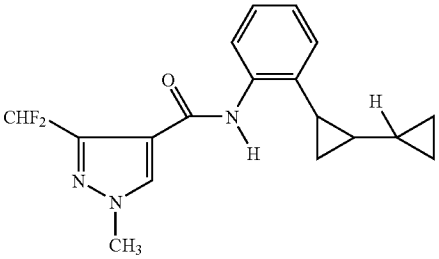
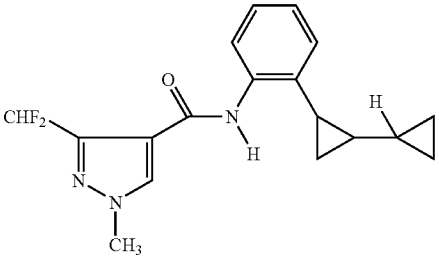
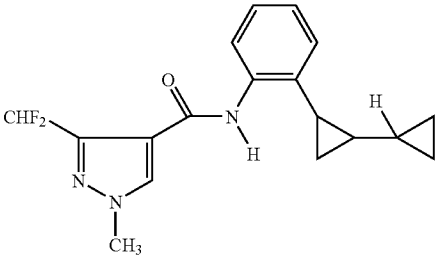
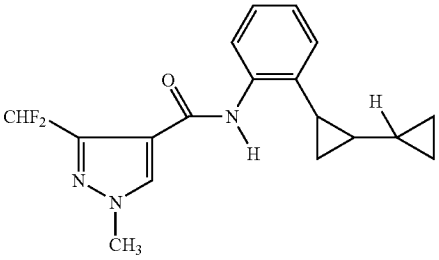
Active compound combination	Component A Compound (I-4)	Component B	Component C
8		metalaxyl-M (II-4)	thiamethoxam (III-2)
9		metalaxyl-M (II-4)	clothianidin (III-3)
10		metalaxyl-M (II-4)	rynaxapyr (IV)
11		metalaxyl-M (II-4)	fipronil (VII)
12		metalaxyl-M (II-4)	tefluthrin (VIII)

TABLE 3-continued

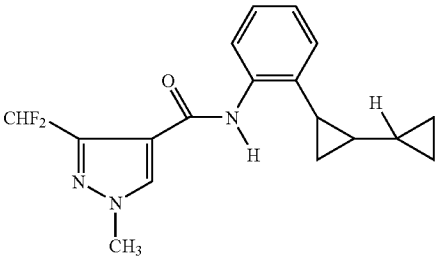
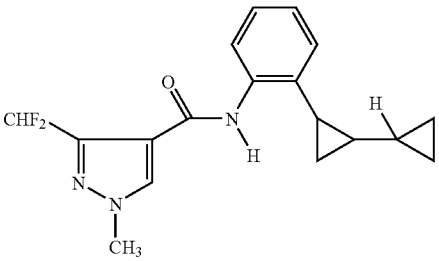
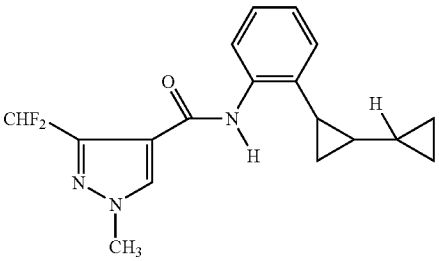
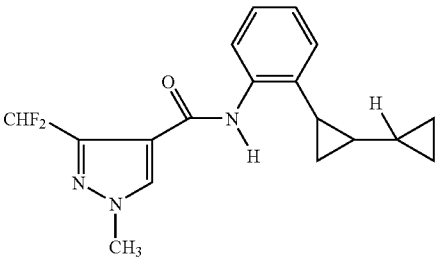
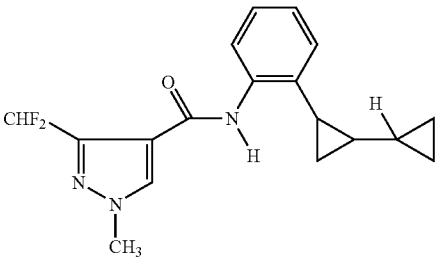
Active compound combination	Component A Compound (I-4)	Component B	Component C
13		fludioxonil (VI)	imidacloprid (III-1)
14		fludioxonil (VI)	thiamethoxam (III-2)
15		fludioxonil (VI)	clothianidin (III-3)
16		fludioxonil (VI)	rynaxapyr (IV)
17		fludioxonil (VI)	fipronil (VII)

TABLE 3-continued

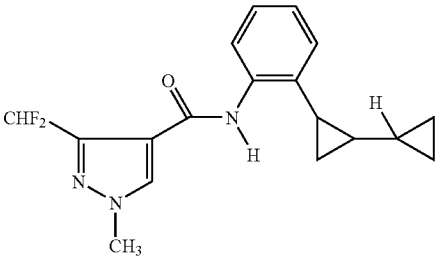
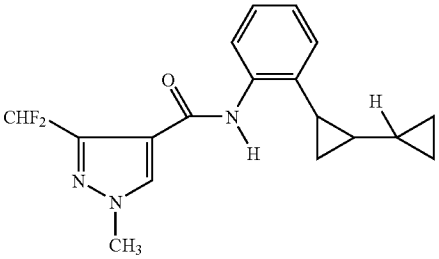
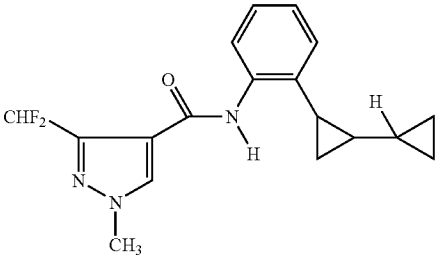
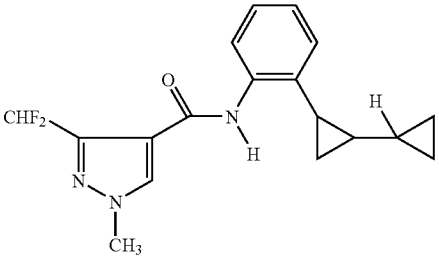
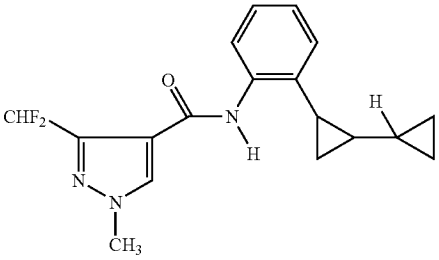
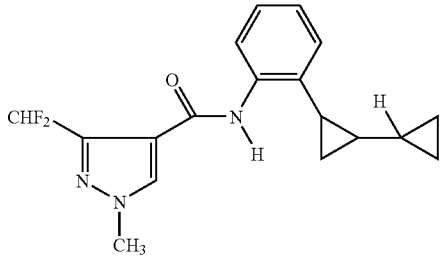
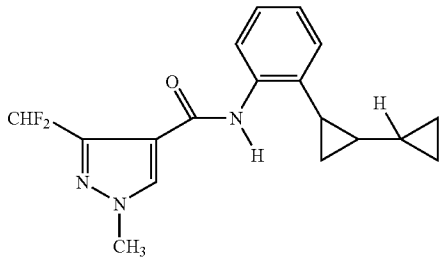
Active compound combination	Component A Compound (I-4)	Component B	Component C
18		fludioxonil (VI)	tefluthrin (VIII)
19		azoxystrobin (V)	imidacloprid (III-1)
20		azoxystrobin (V)	thiamethoxan (III-2)
21		azoxystrobin (V)	clothianidin (III-3)
22		azoxystrobin (V)	rynaxapyr (IV)

TABLE 3-continued

Active compound combination	Component A Compound (I-4)	Component B	Component C
23		azoxystrobin (V)	fipronil (VII)
24		azoxystrobin (V)	tefluthrin (VIII)

[0048] The following active compounds are particularly preferred for the selection of the components A, B and C according to Table 4:

TABLE 4

Component A selected from	Component B selected from	Component C selected from
compound (I-4)	metalaxyl (II-3) metalaxyl-M (II-4)	thiamethoxam (III-2) rynaxapyr (IV)

TABLE 4-continued

Component A selected from	Component B selected from	Component C selected from
	fludioxonil (VI) azoxystrobin (V)	fipronil (VII) tefluthrin (VIII)

[0049] This results in the following particularly preferred active compound combinations according to Table 5:

TABLE 5

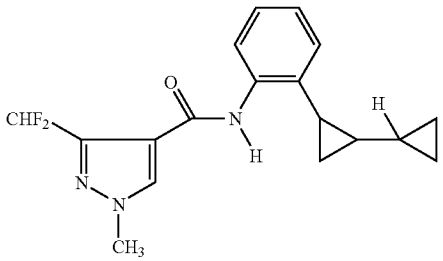
Active compound combination	Component A Compound (I-4)	Component B	Component C
2		metalaxyl (II-3)	thiamethoxam (III-2)

TABLE 5-continued

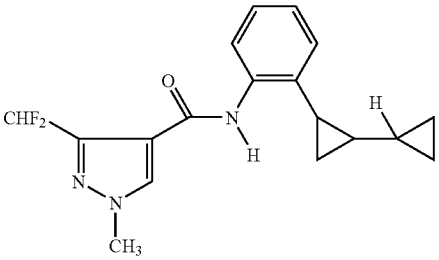
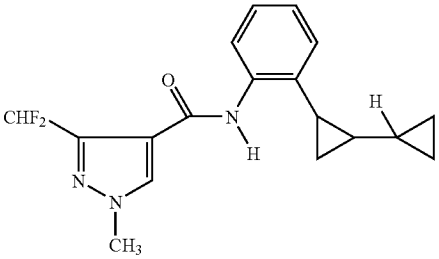
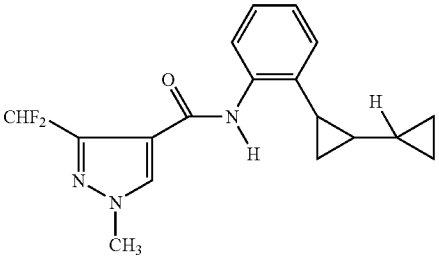
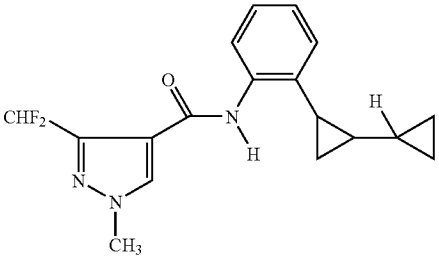
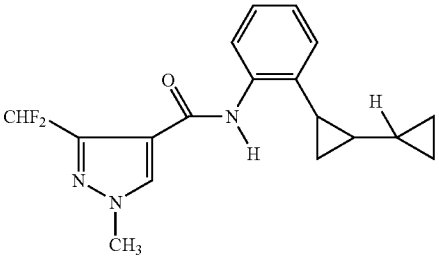
Active compound combination	Component A Compound (I-4)	Component B	Component C
4		metalaxyl (II-3)	rynaxapyr (IV)
5		metalaxyl (II-3)	fipronil (VII)
6		metalaxyl (II-3)	tefluthrin (VIII)
8		metalaxyl-M (II-4)	thiamethoxam (III-2)
10		metalaxyl-M (II-4)	rynaxapyr (IV)

TABLE 5-continued

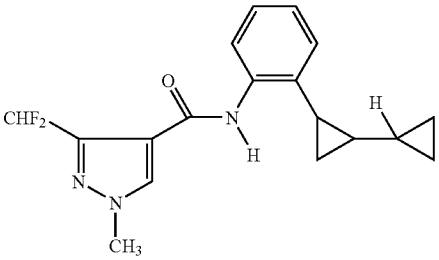
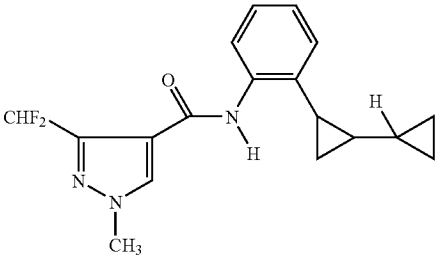
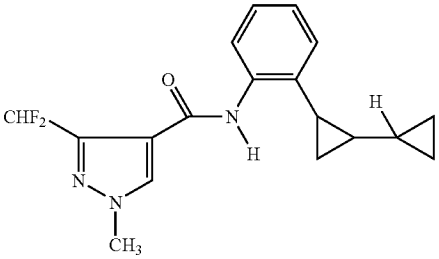
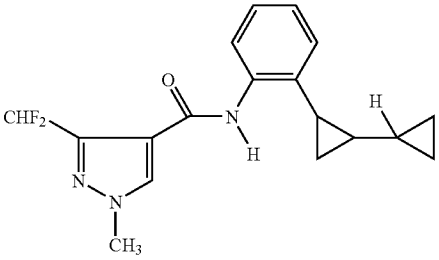
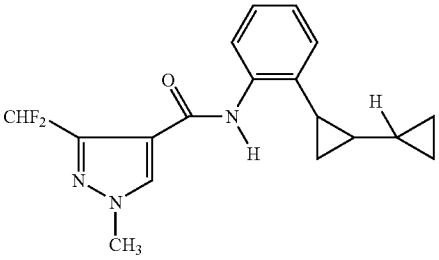
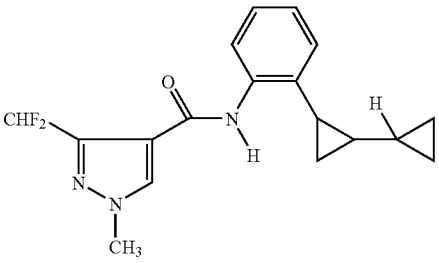
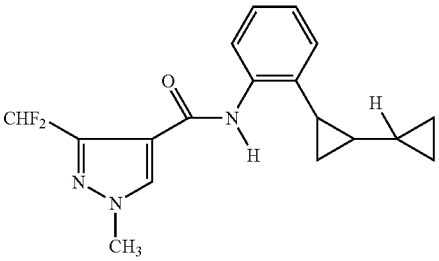
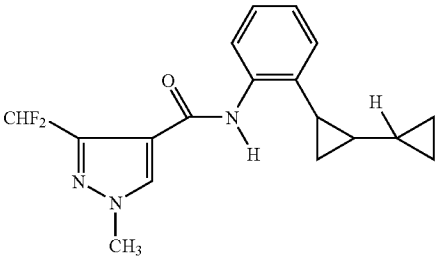
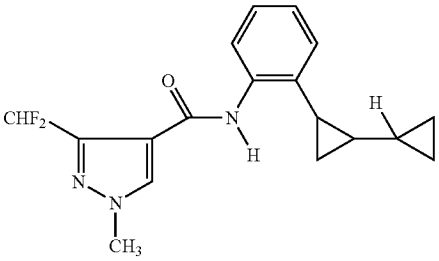
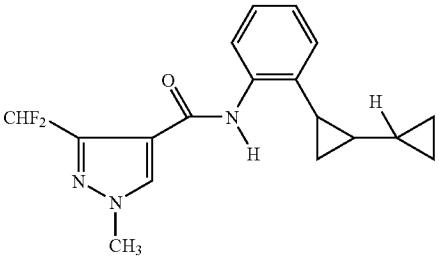
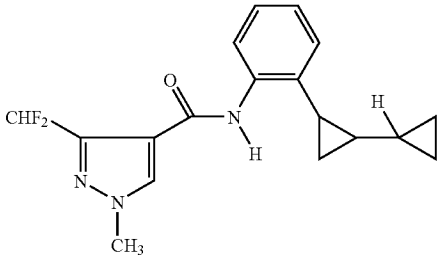
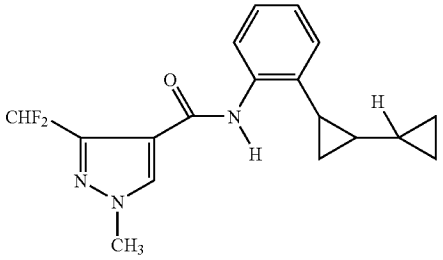
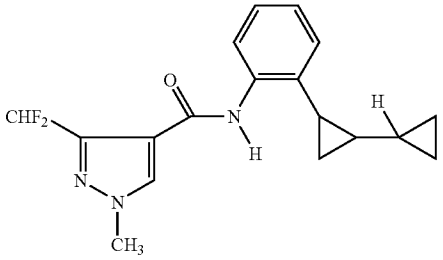
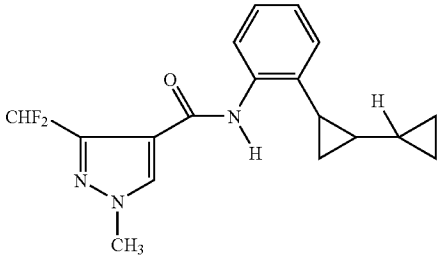
Active compound combination	Component A Compound (I-4)	Component B	Component C
11		metalaxyl-M (II-4)	fipronil (VII)
12		metalaxyl-M (II-4)	tefluthrin (VIII)
14		fludioxonil (VI)	thiamethoxam (III-2)
16		fludioxonil (VI)	rynaxapyr (IV)
17		fludioxonil (VI)	fipronil (VII)

TABLE 5-continued

Active compound combination	Component A Compound (I-4)	Component B	Component C
18		fludioxonil (VI)	tefluthrin (VIII)
20		azoxystrobin (V)	thiamethoxam (III-2)
22		azoxystrobin (V)	rynaxapyr (IV)
23		azoxystrobin (V)	fipronil (VII)
24		azoxystrobin (V)	tefluthrin (VIII)

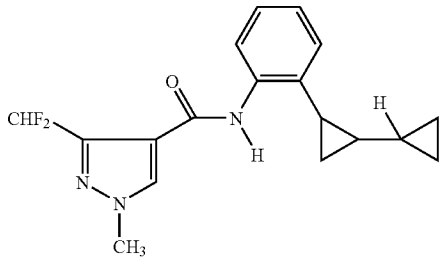
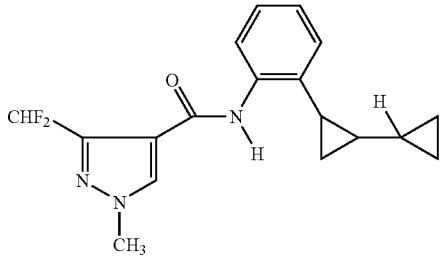
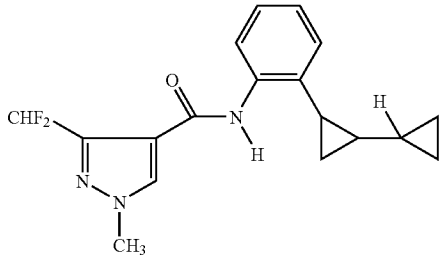
[0050] Very particular preference is given to the active compound combinations according to Table 6.

TABLE 6

Active compound combination	Component A Compound (I-4)	Component B	Component C
8		metalaxyl-M (II-4)	thiamethoxam (III-2)
10		metalaxyl-M (II-4)	rynaxapyr (IV)
11		metalaxyl-M (II-4)	fipronil (VII)
12		metalaxyl-M (II-4)	tefluthrin (VIII)

[0051] Most preferred are the active compound combinations according to Table 7:

TABLE 7

Active compound combination	Component A Compound (I-4)	Component B	Component C
8		metalaxyl-M (II-4)	thiamethoxam (III-2)
10		metalaxyl-M (II-4)	rynaxapyr (IV)
12		metalaxyl-M (II-4)	tefluthrin (VIII)

[0052] Preferred embodiments comprise the components A:B:C in the ratios from 1:625:1 to 125:1:125 or from 1:1:625 to 125:125:1.

[0053] Particularly preferred embodiments comprise the components A:B:C in the ratios from 1:125:1 to 25:1:25 or from 1:1:125 to 25:25:1.

[0054] Very particularly preferred embodiments comprise the components A:B:C in the ratios from 1:25:1 to 5:1:5 or from 1:1:25 to 5:5:1.

[0055] The active compound combinations according to the invention have a strong microbicidal action and can be used for controlling unwanted microorganisms, such as fungi and bacteria, in crop protection and in the protection of materials.

[0056] In crop protection, fungicides can be used for controlling Plasmodiophoromycetes, Oomycetes, Chytridiomycetes, Zygomycetes, Ascomycetes, Basidiomycetes and Deuteromycetes.

[0057] In crop protection, bactericides can be used for controlling Pseudomonadaceae, Rhizobiaceae, Enterobacteriaceae, Corynebacteriaceae and Streptomycetaceae.

[0058] Some pathogens causing fungal and bacterial diseases which come under the generic names listed above may be mentioned as examples, but not by way of limitation:

diseases caused by powdery mildew pathogens, such as, for example,

Blumeria species, such as, for example, *Blumeria graminis;*

Podosphaera species, such as, for example, *Podosphaera leucotricha;*

Sphaerotheca species, such as, for example, *Sphaerotheca fuliginea;*

Uncinula species, such as, for example, *Uncinula necator;*

diseases caused by rust disease pathogens, such as, for example,

Gymnosporangium species, such as, for example, *Gymnosporangium sabinae;*

Hemileia species, such as, for example, *Hemileia vastatrix;*

Phakopsora species, such as, for example, *Phakopsora pachyrhizi* and *Phakopsora meibomiae;*

Puccinia species, such as, for example, *Puccinia recondita* and *Puccinia triticina;*

Uromyces species, such as, for example, *Uromyces appendiculatus;*

diseases caused by pathogens from the group of the Oomycetes, such as, for example,

Bremia species, such as, for example, *Bremia lactucae;*

Peronospora species, such as, for example, *Peronospora pisi* or *P. brassicae;*

Phytophthora species, such as, for example *Phytophthora infestans;*
Plasmopara species, such as, for example, *Plasmopara viticola;*
Pseudoperonospora species, such as, for example, *Pseudoperonospora humuli* or *Pseudoperonospora cubensis;*
Pythium species, such as, for example, *Pythium ultimum;*
leaf blotch diseases and leaf wilt diseases caused, for example, by
Alternaria species, such as, for example, *Alternaria solani;*
Cercospora species, such as, for example, *Cercospora beticola;*
Cladiosporium species, such as, for example, *Cladiosporium cucumerinum;*
Cochliobolus species, such as, for example, *Cochliobolus sativus* (conidia form: *Drechslera*, Syn: *Helminthosporium*);
Colletotrichum species, such as, for example, *Colletotrichum lindemuthanium;*
Cycloconium species, such as, for example, *Cycloconium oleaginum;*
Diaporthe species, such as, for example, *Diaporthe citri;*
Elsinoe species, such as, for example, *Elsinoe fawcettii;*
Gloeosporium species, such as, for example, *Gloeosporium laeticolor;*
Glomerella species, such as, for example, *Glomerella cingulata;*
Guignardia species, such as, for example, *Guignardia bidwelli;*
Leptosphaeria species, such as, for example, *Leptosphaeria maculans;*
Magnaporthe species, such as, for example, *Magnaporthe grisea;*
Mycosphaerella species, such as, for example, *Mycosphaerella graminicola;*
Phaeosphaeria species, such as, for example, *Phaeosphaeria nodorum;*
Pyrenophora species, such as, for example, *Pyrenophora teres;*
Ramularia species, such as, for example, *Ramularia collocygni;*
Rhynchosporium species, such as, for example, *Rhynchosporium secalis;*
Septoria species, such as, for example, *Septoria apii;*
Typhula species, such as, for example, *Typhula incarnata;*
Venturia species, such as, for example, *Venturia inaequalis;*
root and stem diseases caused, for example, by
Corticium species, such as, for example, *Corticium graminearum;*
Fusarium species, such as, for example, *Fusarium oxysporum;*
Gaeumannomyces species, such as, for example, *Gaeumannomyces graminis;*
Rhizoctonia species, such as, for example, *Rhizoctonia solani;*
Oculimacula species, such as, for example, *Oculimacula acuformis;*
Thielaviopsis species, such as, for example, *Thielaviopsis basicola;*
ear and panicle diseases (including maize cobs) caused, for example, by
Alternaria species, such as, for example, *Alternaria* spp.;
Aspergillus species, such as, for example, *Aspergillus flavus;*
Cladosporium species, such as, for example, *Cladosporium* spp.;
Claviceps species, such as, for example, *Claviceps purpurea;*
Fusarium species, such as, for example, *Fusarium culmorum;*
Gibberella species, such as, for example, *Gibberella zeae;*
Monographellai species, such as, for example, *Monographella nivalis;*
diseases caused by smut fungi, such as, for example,
Sphacelotheca species, such as, for example, *Sphacelotheca reiliana;*
Tilletia species, such as, for example, *Tilletia caries;*
Urocystis species, such as, for example, *Urocystis occulta;*
Ustilago species, such as, for example, *Ustilago nuda;*
fruit rot caused, for example, by
Aspergillus species, such as, for example, *Aspergillus flavus;*
Botrytis species, such as, for example, *Botrytis cinerea;*
Penicillium species, such as, for example, *Penicillium expansum;*
Sclerotinia species, such as, for example, *Sclerotinia sclerotiorum;*
Verticilium species, such as, for example, *Verticilium alboatrum;*
seed- and soil-borne rot and wilt diseases, and also diseases of seedlings, caused, for example, by
Fusarium species, such as, for example, *Fusarium culmorum;*
Phytophthora species, such as, for example, *Phytophthora cactorum;*
Pythium species, such as, for example, *Pythium ultimum;*
Rhizoctonia species, such as, for example, *Rhizoctonia solani;*
Sclerotium species, such as, for example, *Sclerotium rolfsii;*
cancerous diseases, galls and witch's broom caused, for example, by
Nectria species, such as, for example, *Nectria galligena;*
wilt diseases caused, for example, by
Monilinia species, such as, for example, *Monilinia laxa;*
deformations of leaves, flowers and fruits caused, for example, by
Taphrina species, such as, for example, *Taphrina deformans;*
degenerative diseases of woody plants caused, for example, by
Esca species, such as, for example, *Phaemoniella clamydospora;*
diseases of flowers and seeds caused, for example, by
Botrytis species, such as, for example, *Botrytis cinerea;*
diseases of plant tubers caused, for example, by
Rhizoctonia species, such as, for example, *Rhizoctonia solani;*
diseases caused by bacterial pathogens, such as, for example,
Xanthomonas species, such as, for example, *Xanthomonas campestris* pv. *oryzae;*
Pseudomonas species, such as, for example, *Pseudomonas syringae* pv. *lachrymans;*
Erwinia species, such as, for example, *Erwinia amylovora.*

[0059] With preference, it is possible to control the following diseases of soya beans:
fungal diseases on leaves, stems, pods and seeds, caused, for example, by
alternaria leaf spot (*Alternaria* spec. *atrans tenuissima*), anthracnose (*Colletotrichum gloeosporoides dematium* var. *truncatum*), brown spot (*Septoria glycines*), cercospora leaf spot and blight (*Cercospora kikuchii*), choanephora leaf blight (*Choanephora infundibulifera trispora* (Syn.)), dactuliophora leaf spot (*Dactuliophora glycines*), downy mildew

(*Peronospora manshurica*), drechslera blight (*Drechslera glycini*), frogeye leaf spot (*Cercospora sojina*), leptosphaerulina leaf spot (*Leptosphaerulina trifolii*), phyllostica leaf spot (*Phyllosticta sojaecola*), powdery mildew (*Microsphaera diffusa*), pyrenochaeta leaf spot (*Pyrenochaeta glycines*), rhizoctonia aerial, foliage, and web blight (*Rhizoctonia solani*), rust (*Phakopsora pachyrhizi*), scab (*Sphaceloma glycines*), stemphylium leaf blight (*Stemphylium botryosum*), target spot (*Corynespora cassiicola*)

Fungal diseases on roots and the stem base, caused, for example, by

black root rot (*Calonectria crotalariae*), charcoal rot (*Macrophomina phaseolina*), fusarium blight or wilt, root rot, and pod and collar rot (*Fusarium oxysporum, Fusarium orthoceras, Fusarium semitectum, Fusarium equiseti*), mycoleptodiscus root rot (*Mycoleptodiscus terrestris*), neocosmospora (*Neocosmospora vasinfecta*), pod and stem blight (*Diaporthe phaseolorum*), stem canker (*Diaporthe phaseolorum* var. *caulivora*), phytophthora rot (*Phytophthora megasperma*), brown stem rot (*Phialophora gregata*), pythium rot (*Pythium aphanidermatum, Pythium irregulare, Pythium debaryanum, Pythium myriotylum, Pythium ultimum*), rhizoctonia root rot, stem decay, and damping-off (*Rhizoctonia solani*), sclerotinia stem decay (*Sclerotinia sclerotiorum*), sclerotinia southern blight (*Sclerotinia rolfsii*), thielaviopsis root rot (*Thielaviopsis basicola*).

[0060] The fact that the active compound combinations are well tolerated by plants at the concentrations required for controlling plant diseases permits a treatment of entire plants (above-ground parts of plants and roots), of propagation stock and seed, and of the soil. The active compound combinations according to the invention can be used for foliar application or else as seed dressings.

[0061] The fact that the active compounds which can be used are well tolerated by plants at the concentrations required for controlling plant diseases permits a treatment of the seed. Accordingly, the active compounds according to the invention can be used as seed dressings.

[0062] A large part of the damage to crop plants which is caused by phytopathogenic fungi occurs as early as when the seed is attacked during storage and after the seed is introduced into the soil, as well as during and immediately after germination of the plants. This phase is particularly critical since the roots and shoots of the growing plant are particularly sensitive and even minor damage can lead to the death of the whole plant. Protecting the seed and the germinating plant by the use of suitable compositions is therefore of particularly great interest.

[0063] The control of phytopathogenic fungi which damage plants post-emergence is carried out primarily by treating the soil and the above-ground parts of plants with crop protection agents. Owing to the concerns regarding a possible impact of crop protection agents on the environment and the health of humans and animals, there are efforts to reduce the amount of active compounds applied.

[0064] The control of phytopathogenic fungi by treating the seeds of plants has been known for a long time and is the subject-matter of continuous improvements. However, the treatment of seed entails a series of problems which cannot always be solved in a satisfactory manner. Thus, it is desirable to develop methods for protecting the seed and the germinating plant which dispense with the additional application of crop protection agents after sowing or after the emergence of the plants or where additional application is at least significantly reduced. It is furthermore desirable to optimize the amount of active compound employed in such a way as to provide maximum protection for the seed and the germinating plant from attack by phytopathogenic fungi, but without damaging the plant itself by the active compound employed. In particular, methods for the treatment of seed should also take into consideration the intrinsic fungicidal properties of transgenic plants in order to achieve optimum protection of the seed and the germinating plant with a minimum of crop protection agents being employed.

[0065] The present invention therefore in particular also relates to a method for the protection of seed and germinating plants from attack by phytopathogenic fungi, by treating the seed with a composition according to the invention.

[0066] One of the advantages of the present invention is that, by virtue of the particular systemic properties of the compositions according to the invention, treatment of the seed with these compositions not only protects the seed itself, but also the resulting plants after emergence, from phytopathogenic fungi. In this manner, the immediate treatment of the crop at the time of sowing or shortly thereafter can be dispensed with.

[0067] Furthermore, it must be considered as advantageous that the mixtures according to the invention can also be employed in particular in transgenic seed.

[0068] The transgenic plants or plant cultivars (i.e. those obtained by genetic engineering) which are preferably to be treated according to the invention include all plants which, in the genetic modification, received genetic material which imparted particularly advantageous useful properties ("traits") to these plants. Examples of such properties are better plant growth, increased tolerance to high or low temperatures, increased tolerance to drought or to water or soil salt content, increased flowering performance, easier harvesting, accelerated maturation, higher harvest yields, better quality and/or a higher nutritional value of the harvested products, better storage stability and/or processability of the harvested products. Further and particularly emphasized examples of such properties are a better defense of the plants against animal and microbial pests, such as against insects, mites, phytopathogenic fungi, bacteria and/or viruses, and also increased tolerance of the plants to certain herbicidally active compounds. Examples of transgenic plants which may be mentioned are the important crop plants, such as cereals (wheat, rice), maize, soya beans, potatoes, cotton, oilseed rape and also fruit plants (with the fruits apples, pears, citrus fruits and grapes), and particular emphasis is given to maize, soya beans, potatoes, cotton and oilseed rape. Traits that are emphasized are in particular increased defense of the plants against insects, by toxins formed in the plants, in particular those formed in the plants by the genetic material from *Bacillus thuringiensis* (for example by the genes CryIA(a), CryIA(b), CryIA(c), CryIIA, CryIIIA, CryIIIB2, Cry9c, Cry2Ab, Cry3Bb and CryIF and also combinations thereof) (hereinbelow referred to as "Bt plants"). Traits that are furthermore particularly emphasized are the increased tolerance of the plants to certain herbicidally active compounds, for example imidazolinones, sulphonylureas, glyphosate, glutosinate-ammonium or phosphinotricin (for example the "PAT" gene). The genes which impart the desired traits in question can also be present in combination with one another in the transgenic plants. Examples of "Bt plants" which may be mentioned are maize varieties, cotton varieties, soya bean varieties and potato varieties which are sold under the trade names YIELD

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

[0069] The compositions according to the invention are suitable for protecting seed of any plant variety which is employed in agriculture, in the greenhouse, in forests or in horticulture. In particular, this takes the form of seed of cereals (such as wheat, barley, rye, millet and oats), maize, cotton, soya beans, rice, potatoes, sunflowers, beans, coffee, beet (for example sugar beet and fodder beet), peanuts, oilseed rape, canola and vegetables (such as tomatoes, cucumbers, onions and lettuce), lawn and ornamental plants. The treatment of seed of cereals (such as wheat, barley, rye and oats), potatoes, soya beans and rice is of particular importance.

[0070] In the context of the present invention, the composition according to the invention is applied to the seed either alone or in a suitable formulation. Preferably, the seed is treated in a state which is stable enough to avoid damage during treatment. In general, the seed may be treated at any point in time between harvest and sowing. The seed usually used has been separated from the plant and freed from cobs, shells, stalks, coats, hairs or the flesh of the fruits. Thus, for example, it is possible to use seed which has been harvested, cleaned and dried to a moisture content of below 15% by weight. Alternatively, it is also possible to use seed which, after drying, has, for example, been treated with water and then dried again.

[0071] When treating the seed, care must generally be taken that the amount of the composition according to the invention applied to the seed and/or the amount of further additives is/are chosen in such a way that the germination of the seed is not adversely affected, or that the resulting plant is not damaged. This must be borne in mind in particular in the case of active compounds which may have phytotoxic effects at certain application rates.

[0072] The compositions according to the invention can be applied directly, that is to say without comprising further components and without having been diluted. In general, it is preferable to apply the compositions to the seed in the form of a suitable formulation. Suitable formulations and methods for the treatment of seed are known to the skilled worker and are described, for example, in the following documents: U.S. Pat. No. 4,272,417 A, U.S. Pat. No. 4,245,432 A, U.S. Pat. No. 4,808,430 A, U.S. Pat. No. 5,876,739 A, US 2003/0176428 A1, WO 2002/080675 A1, WO 2002/028186 A2.

[0073] The active compound combinations according to the invention are also suitable for increasing the yield of crops. In addition, they show reduced toxicity and are well tolerated by plants.

[0074] The active compound combinations according to the invention also have a potent strengthening effect in plants. They are therefore suitable for mobilizing the plants' defenses against attack by undesired microorganisms.

[0075] Plant-strengthening (resistance-inducing) compounds are understood as meaning, in the present context, those substances which are capable of stimulating the defense system of plants in such a way that, when subsequently inoculated with undesired microorganisms, the treated plants display a substantial degree of resistance to these microorganisms.

[0076] In the present case, undesired microorganisms are understood as meaning phytopathogenic fungi, bacteria and viruses. Thus, the compounds according to the invention can be employed for protecting plants against attack by the above-mentioned pathogens within a certain period of time after the treatment. The period of time within which their protection is effected generally extends from 1 to 200 days, preferably from 1 to 100 days after the plants have been treated with the active compounds or after sowing.

[0077] The fact that the active compound combinations, at the concentrations required for the controlling of plant diseases, are well tolerated by plants permits a treatment of above-ground plant parts, of propagation stock and seed, and of the soil.

[0078] Here, the active compound combinations according to the invention can be used with particularly good results for controlling cereal diseases, such as, for example, against *Tilletia caries, Ustilago nuda* and diseases of dicotyledonous plants, such as, for example, against *Rhizoctonia, Helminthosporium* or *Fusarium* species.

[0079] The active compound combinations according to the invention are also suitable for increasing the harvest yield. In addition, they show reduced toxicity and are well tolerated by plants.

[0080] If appropriate, the active compound combinations according to the invention can also be used in certain concentrations and application rates as herbicides, for influencing plant growth and for controlling animal pests.

[0081] According to the invention, it is possible to treat all plants and parts of plants. Plants are to be understood here as meaning all plants and plant populations, such as desired and undesired wild plants or crop plants (including naturally occurring crop plants). Crop plants can be plants which can be obtained by conventional breeding and optimization methods or by biotechnological and genetic engineering methods or combinations of these methods, including the transgenic plants and including plant cultivars which can or cannot be protected by plant breeders' certificates. Parts of plants are to be understood as meaning all above-ground and below-ground parts and organs of plants, such as shoot, leaf, flower and root, examples which may be mentioned being leaves, needles, stems, trunks, flowers, fruit-bodies, fruits and seeds and also roots, tubers and rhizomes. Parts of plants also include harvested material and vegetative and generative propagation material, for example seedlings, tubers, rhizomes, cuttings and seeds.

[0082] The treatment of the plants and parts of plants according to the invention with the active compound combinations is carried out directly or by action on their environment, habitat or storage area according to customary treatment methods, for example by dipping, spraying, evaporating, atomizing, broadcasting, brushing-on and, in the case of propagation material, in particular in the case of seeds,

furthermore by one- or multilayer coating. Here, the active compound combinations can be prepared prior to the treatment by mixing the individual active compounds. Or the treatment is carried out in succession by applying first an active compound of group (1) followed by treatment with an active compound of groups (2) to (24). However, it is also possible to treat the plants or parts of plants firstly with an active compound of groups (2) to (24), followed by the treatment with a phthalamide of group (1).

[0083] In addition, the active compound combinations according to the invention also have very good antimycotic activity. They have a very broad antimycotic spectrum of action, in particular against dermatophytes and budding fungi, molds and diphasic fungi (for example against *Candida* species such as *Candida albicans, Candida glabrata*) and *Epidermophyton floccosum, Aspergillus* species such as *Aspergillus niger* and *Aspergillus fumigatus, Trichophyton* species such as *Trichophyton mentagrophytes, Microsporon* species such as *Microsporon canis* and *audouinii*. The enumeration of these fungi is no restriction whatsoever of the mycotic spectrum which can be controlled and is provided as illustration only.

[0084] The active compound combinations can be employed as such, in the form of their formulations or the use forms prepared therefrom, such as ready-to-use solutions, suspensions, wettable powders, pastes, soluble powders, dusts and granules. They are applied in the customary manner, for example by pouring, spraying, atomizing, broadcasting, dusting, foaming, painting on and the like. It is furthermore possible to apply the active compounds by the ultra-low-volume method, or to inject the active compound preparation or the active compound itself into the soil. The seed of the plants can also be treated.

[0085] When employing the active compound combinations according to the invention as fungicides, the application rates can be varied within a substantial range, depending on the type of application. In the treatment of plant parts, the application rates of active compound are generally between 0.1 and 10 000 g/ha, preferably between 10 and 1000 g/ha. For the treatment of seed, the application rates of active compound are generally between 0.001 and 50 g per kilogram of seed, preferably between 0.01 and 10 g per kilogram of seed. For treating the soil, the application rates of active compound are generally between 0.1 and 10 000 g/ha, preferably between 1 and 5000 g/ha.

[0086] According to the invention, the plants listed can be treated particularly advantageously with the active compound mixtures according to the invention. The preferred ranges indicated above for the active compounds and mixtures also apply to the treatment of these plants. Particular emphasis is given to the treatment of plants with compounds or mixtures specifically indicated in the present text.

[0087] The active compound combinations can be converted into the customary formulations such as solutions, emulsions, wettable powders, suspensions, powders, dusts, pastes, soluble powders, granules, suspension-emulsion concentrates, natural and synthetic materials impregnated with active compound, and microencapsulations in polymeric materials.

[0088] These formulations are produced in a known manner, for example by mixing the active compounds with extenders, that is, liquid solvents and/or solid carriers, optionally with the use of surfactants, that is, emulsifiers and/or dispersants, and/or anti-foaming agents.

[0089] If the extender used is water, it is also possible, for example, to use organic solvents as cosolvents. The following are essentially suitable as liquid solvents: aromatics such as xylene, toluene or alkylnaphthalenes, chlorinated aromatics or 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, or else water.

[0090] 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 materials such as finely divided silica, alumina and silicates; suitable solid carriers for granules are: for example crushed and fractionated natural rocks such as calcite, marble, pumice, sepiolite and dolomite, or else 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, alkylsulfonates, alkyl sulfates, arylsulfonates, or else protein hydrolysates; suitable dispersants are: for example lignosulfite waste liquors and methylcellulose.

[0091] Tackifiers such as carboxymethylcellulose and natural and synthetic polymers in the form of powders, granules or lattices, such as gum arabic, polyvinyl alcohol and polyvinyl acetate, or else natural phospholipids such as cephalins and lecithins and synthetic phospholipids can be used in the formulations. Other possible additives are mineral and vegetable oils.

[0092] It is possible to use colorants such as inorganic pigments, for example iron oxide, titanium oxide, 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.

[0093] The formulations generally comprise between 0.1 and 95% by weight of active compound, preferably between 0.5 and 90%.

[0094] The active compound combinations according to the invention can be present in commercially available formulations and in the use forms, prepared from these formulations, as a mixture with other active compounds, such as insecticides, attractants, sterilants, bactericides, acaricides, nematicides, fungicides, growth-regulating substances or herbicides. The insecticides include, for example, phosphates, carbamates, carboxylates, chlorinated hydrocarbons, phenylureas and substances produced by microorganisms, inter alia. Mixtures with fertilizers are also possible.

[0095] The treatment according to the invention of the plants and parts of plants with the active compounds is carried out directly or by action on their environment, habitat or storage area according to customary treatment methods, for example by dipping, spraying, evaporating, atomizing, broadcasting, brushing-on and, in the case of propagation material, in particular in the case of seeds, further by single- or multi-layer coating.

[0096] As already mentioned above, it is possible to treat all plants and their parts according to the invention. In a preferred embodiment, wild plant species and plant cultivars, or those obtained by conventional biological breeding methods, such as crossing or protoplast fusion, and parts thereof, are treated. In a further preferred embodiment, transgenic plants and plant cultivars obtained by genetic engineering methods, if appropriate in combination with conventional methods (genetically modified organisms), and parts thereof, are treated. The term "parts" or "parts of plants" or "plant parts" has been explained above.

[0097] Particularly preferably, plants of the plant cultivars which are in each case commercially available or in use are treated according to the invention.

[0098] Depending on the plant species or plant cultivars, their location and growth conditions (soils, climate, vegetation period, diet), the treatment according to the invention may also result in superadditive ("synergistic") effects. Thus, for example, reduced application rates and/or a widening of the activity spectrum and/or an increase in the activity of substances and compositions which can be used according to the invention, better plant growth, increased tolerance to high or low temperatures, increased tolerance to drought or to water or soil salt content, increased flowering performance, easier harvesting, accelerated maturation, higher harvest yields, better quality and/or a higher nutritional value of the harvested products, better storage stability and/or processability of the harvested products are possible which exceed the effects which were actually to be expected.

[0099] The plants listed can be treated according to the invention in a particularly advantageous manner with the active compound mixtures according to the invention. The preferred ranges stated above for the mixtures also apply to the treatment of these plants. Particular emphasis is given to the treatment of plants with the mixtures specifically mentioned in the present text.

[0100] If appropriate, the compounds of the formula (I) may be present in various polymorphic forms or as mixtures of different polymorphic forms. The invention provides both the pure polymorphs and the polymorph mixtures, and both can be used according to the invention.

[0101] The active compound combinations according to the invention, in combination with good plant tolerance and favourable toxicity to warm-blooded animals and being tolerated well by the environment, are suitable for protecting plants and plant organs, for increasing the harvest yields, for improving the quality of the harvested material and for controlling animal pests, in particular insects, arachnids, helminths, nematodes and molluscs, which are encountered in agriculture, in horticulture, in animal husbandry, in forests, in gardens and leisure facilities, in the protection of stored products and of materials, and in the hygiene sector. They may be preferably employed as crop protection agents. They are active against normally sensitive and resistant species and against all or some stages of development. The abovementioned pests include:

[0102] From the order of the Anoplura (Phthiraptera), for example, *Damalinia* spp., *Haematopinus* spp., *Linognathus* spp., *Pediculus* spp., *Trichodectes* spp.

[0103] From the class of the Arachnida, for example, *Acarus siro, Aceria sheldoni, Aculops* spp., *Aculus* spp., *Amblyomma* spp., *Argas* spp., *Boophilus* spp., *Brevipalpus* spp., *Bryobia praetiosa, Chorioptes* spp., *Dermanyssus gallinae, Eotetranychus* spp., *Epitrimerus pyri, Eutetranychus* spp., *Eriophyes* spp., *Hemitarsonemus* spp., *Hyalomma* spp., *Ixodes* spp., *Latrodectus mactans, Metatetranychus* spp., *Oligonychus* spp., *Ornithodoros* spp., *Panonychus* spp., *Phyllocoptruta oleivora, Polyphagotarsonemus latus, Psoroptes* spp., *Rhipicephalus* spp., *Rhizoglyphus* spp., *Sarcoptes* spp., *Scorpio maurus, Stenotarsonemus* spp., *Tarsonemus* spp., *Tetranychus* spp., *Vasates lycopersici.*

[0104] From the class of the Bivalva, for example, *Dreissena* spp.

[0105] From the order of the Chilopoda, for example, *Geophilus* spp., *Scutigera* spp.

[0106] From the order of the Coleoptera, for example, *Acanthoscelides obtectus, Adoretus* spp., *Agelastica alni, Agriotes* spp., *Amphimallon solstitialis, Anobium punctatum, Anoplophora* spp., *Anthonomus* spp., *Anthrenus* spp., *Apogonia* spp., *Atomaria* spp., *Attagenus* spp., *Bruchidius obtectus, Bruchus* spp., *Ceuthorhynchus* spp., *Cleonus mendicus, Conoderus* spp., *Cosmopolites* spp., *Costelytra zealandica, Curculio* spp., *Cryptorhynchus lapathi, Dermestes* spp., *Diabrotica* spp., *Epilachna* spp., *Faustinus cubae, Gibbium psylloides, Heteronychus arator, Hylamorpha elegans, Hylotrupes bajulus, Hypera postica, Hypothenemus* spp., *Lachnosterna consanguinea, Leptinotarsa decemlineata, Lissorhoptrus oryzophilus, Lixus* spp., *Lyctus* spp., *Meligethes aeneus, Melolontha melolontha, Migdolus* spp., *Monochamus* spp., *Naupactus xanthographus, Niptus hololeucus, Oryctes rhinoceros, Oryzaephilus surinamensis, Otiorrhynchus sulcatus, Oxycetonia jucunda, Phaedon cochleariae, Phyllophaga* spp., *Popillia japonica, Premnotrypes* spp., *Psylliodes chrysocephala, Ptinus* spp., *Rhizobius ventralis, Rhizopertha dominica, Sitophilus* spp., *Sphenophorus* spp., *Stemechus* spp., *Symphyletes* spp., *Tenebrio molitor, Tribolium* spp., *Trogoderma* spp., *Tychius* spp., *Xylotrechus* spp., *Zabrus* spp.

[0107] From the order of the Collembola, for example, *Onychiurus armatus.*

[0108] From the order of the Dermaptera, for example, *Forficula auricularia.*

[0109] From the order of the Diplopoda, for example, *Blaniulus guttulatus.*

[0110] From the order of the Diptera, for example, *Aedes* spp., *Anopheles* spp., *Bibio hortulanus, Calliphora* erythrocephala, *Ceratitis capitata, Chrysomyia* spp., *Cochliomyia* spp., *Cordylobia anthropophaga, Culex* spp., *Cuterebra* spp., *Dacus oleae, Dermatobia hominis, Drosophila* spp., *Fannia* spp., *Gastrophilus* spp., *Hylemyia* spp., *Hyppobosca* spp., *Hypoderma* spp., *Liriomyza* spp., *Lucilia* spp., *Musca* spp., *Nezara* spp., *Oestrus* spp., *Oscinella frit, Pegomyia hyoscyami, Phorbia* spp., *Stomoxys* spp., *Tabanus* spp., *Tannia* spp., *Tipula paludosa, Wohlfahrtia* spp.

[0111] From the class of the Gastropoda, for example, *Arion* spp., *Biomphalaria* spp., *Bulinus* spp., *Deroceras* spp., *Galba* spp., *Lymnaea* spp., *Oncomelania* spp., *Succinea* spp.

[0112] From the class of the helminths, for example, *Ancylostoma duodenale, Ancylostoma ceylanicum, Acylostoma braziliensis, Ancylostoma* spp., *Ascaris lubricoides, Ascaris* spp., *Brugia malayi, Brugia timori, Bunostomum* spp., *Chabertia* spp., *Clonorchis* spp., *Cooperia* spp., *Dicrocoelium* spp, *Dictyocaulus filaria, Diphyllobothrium latum, Dracunculus medinensis, Echinococcus granulosus, Echinococcus multilocularis, Enterobius vermicularis, Faciola* spp., *Haemonchus* spp., *Heterakis* spp., *Hymenolepis nana, Hyostrongulus* spp., *Loa Loa, Nematodirus* spp., *Oesophagostomum* spp., *Opisthorchis* spp., *Onchocerca volvulus, Ostertagia* spp.,

Paragonimus spp., *Schistosomen* spp., *Strongyloides fuelleborni, Strongyloides stercoralis, Stronyloides* spp., *Taenia saginata, Taenia solium, Trichinella spiralis, Trichinella nativa, Trichinella britovi, Trichinella nelsoni, Trichinella pseudopsiralis, Trichostrongulus* spp., *Trichuris trichuria, Wuchereria bancrofti.*

[0113] It is furthermore possible to control protozoa, such as Eimeria.

[0114] From the order of the Heteroptera, for example, *Anasa tristis, Antestiopsis* spp., *Blissus* spp., *Calocoris* spp., *Campylomma livida, Cavelerius* spp., *Cimex* spp., *Creontiades dilutus, Dasynus piperis, Dichelops furcatus, Diconocoris hewetti, Dysdercus* spp., *Euschistus* spp., *Eurygaster* spp., *Heliopeltis* spp., *Horcias nobilellus, Leptocorisa* spp., *Leptoglossus phyllopus, Lygus* spp., *Macropes excavatus, Miridae, Nezara* spp., *Oebalus* spp., *Pentomidae, Piesma quadrata, Piezodorus* spp., *Psallus seriatus, Pseudacysta persea, Rhodnius* spp., *Sahlbergella singularis, Scotinophora* spp., *Stephanitis nashi, Tibraca* spp., *Triatoma* spp.

[0115] From the order of the Homoptera, for example, *Acyrthosipon* spp., *Aeneolamia* spp., *Agonoscena* spp., *Aleurodes* spp., *Aleurolobus barodensis, Aleurothrixus* spp., *Amrasca* spp., *Anuraphis cardui, Aonidiella* spp., *Aphanostigma piri, Aphis* spp., *Arboridia apicalis, Aspidiella* spp., *Aspidiotus* spp., *Atanus* spp., *Aulacorthum solani, Bemisia* spp., *Brachycaudus helichrysii, Brachycolus* spp., *Brevicoryne brassicae, Calligypona marginata, Carneocephala fulgidai, Ceratovacuna lanigera, Cercopidae, Ceroplastes* spp., *Chaetosiphon fragaefolii, Chionaspis tegalensis, Chlorita onukii, Chromaphis juglandicola, Chrysomphalus ficus, Cicadulina mbila, Coccomytilus halli, Coccus* spp., *Cryptomyzus ribis, Dalbulus* spp., *Dialeurodes* spp., *Diaphorina* spp., *Diaspis* spp., *Doralis* spp., *Drosicha* spp., *Dysaphis* spp., *Dysmicoccus* spp., *Empoasca* spp., *Eriosoma* spp., *Erythroneura* spp., *Euscelis bilobatus, Geococcus coffeae, Homalodisca coagulata, Hyalopterus arundinis, Icerya* spp., *Idiocerus* spp., *Idioscopus* spp., *Laodelphax striatellus, Lecanium* spp., *Lepidosaphes* spp., *Lipaphis erysimi, Macrosiphum* spp., *Mahanarva fimbriolata, Melanaphis sacchari, Metcalfiella* spp., *Metopolophium dirhodum, Monellia costalis, Monelliopsis pecanis, Myzus* spp., *Nasonovia ribisnigri, Nephotettix* spp., *Nilaparvata lugens, Oncometopia* spp., *Orthezia praelonga, Parabemisia myricae, Paratrioza* spp., *Parlatoria* spp., *Pemphigus* spp., *Peregrinus maidis, Phenacoccus* spp., *Phloeomyzus passerinii, Phorodon humuli, Phylloxera* spp., *Pinnaspis aspidistrae, Planococcus* spp., *Protopulvinaria pyriformis, Pseudaulacaspis pentagona, Pseudococcus* spp., *Psylla* spp., *Pteromalus* spp., *Pyrilla* spp., *Quadraspidiotus* spp., *Quesada gigas, Rastrococcus* spp., *Rhopalosiphum* spp., *Saissetia* spp., *Scaphoides titanus, Schizaphis graminum, Selenaspidus articulatus, Sogata* spp., *Sogatella furcifera, Sogatodes* spp., *Stictocephala festina, Tenalaphara malayensis, Tinocallis caryaefoliae, Tomaspis* spp., *Toxoptera* spp., *Trialeurodes vaporariorum, Trioza* spp., *Typhlocyba* spp., *Unaspis* spp., *Viteus vitifolii.*

[0116] From the order of the Hymenoptera, for example, *Diprion* spp., *Hoplocampa* spp., *Lasius* spp., *Mono-morium pharaonis, Vespa* spp.

[0117] From the order of the Isopoda, for example, *Armadillidium vulgare, Oniscus asellus, Porcellio scaber.*

[0118] From the order of the Isoptera, for example, *Reticulitermes* spp., *Odontotermes* spp.

[0119] From the order of the Lepidoptera, for example, *Acronicta major, Aedia leucomelas, Agrotis* spp., *Alabama argillacea, Anticarsia* spp., *Barathra brassicae, Bucculatrixi thurberiella, Bupalus piniarius, Cacoecia podana, Capua reticulana, Carpocapsa pomonella, Chematobia brumata, Chilo* spp., *Choristoneura fumiferana, Clysia ambiguella, Cnaphalocerus* spp., *Earias insulana, Ephestia kuehniella, Euproctis chrysofrhoea, Euxoa* spp., *Feltia* spp., *Galleria mellonella, Helicoverpa* spp., *Heliothis* spp., *Hofmannophila pseudospretella, Homona magnanima, Hyponomeuta padella, Laphygma* spp., *Lithocolletis blancardella, Lithophane antennata, Loxagrotis albicosta, Lymantria* spp., *Malacosoma neustria, Mamestra brassicae, Mocis repanda, Mythimna separata, Oria* spp., *Oulema oryzae, Panolis flammea, Pectinophora gossypiella, Phyllocnistis citrella, Pieris* spp., *Plutella xylostella, Prodenia* spp., *Pseudaletia* spp., *Pseudoplusia includens, Pyrausta nubilalis, Spodoptera* spp., *Thermesia gemmatalis, Tinea pellionella, Tineola bisselliella, Tortrix viridana, Trichoplusia* spp.

[0120] From the order of the Orthoptera, for example, *Acheta domesticus, Blatta orientalis, Blattella germanica, Gryllotalpa* spp., *Leucophaea maderae, Locusta* spp., *Melanoplus* spp., *Periplaneta americana, Schistocerca gregaria.*

[0121] From the order of the Siphonaptera, for example, *Ceratophyllus* spp., *Xenopsylla cheopis.*

[0122] From the order of the Symphyla, for example, *Scutigerella immaculata.*

[0123] From the order of the Thysanoptera, for example, *Baliothrips biformis, Enneothrips flavens, Frankliniella* spp., *Heliothrips* spp., *Hercinothrips femoralis, Kakothrips* spp., *Rhipiphorothrips cruentatus, Scirtothrips* spp., *Taeniothrips cardamoni, Thrips* spp.

[0124] From the order of the Thysanura, for example, *Lepisma saccharina.*

[0125] The phytoparasitic nematodes include, for example, *Anguina* spp., *Aphelenchoides* spp., *Belonoaimus* spp., *Bursaphelenchus* spp., *Ditylenchus dipsaci, Globodera* spp., *Heliocotylenchus* spp., *Heterodera* spp., *Longidorus* spp., *Meloidogyne* spp., *Pratylenchus* spp., *Radopholus similis, Rotylenchus* spp., *Trichodorus* spp., *Tylenchorhynchus* spp., *Tylenchulus* spp., *Tylenchulus semipenetrans, Xiphinema* spp.

[0126] If appropriate, the compounds according to the invention can, at certain concentrations or application rates, also be used as herbicides, safeners, growth regulators or agents to improve plant properties, or as microbicides, for example as fungicides, antimycotics, bactericides, viricides (including agents against viroids) or as agents against MLO (Mycoplasma-like organisms) and RLO (Rickettsia-like organisms). If appropriate, they can also be employed as intermediates or precursors for the synthesis of other active compounds.

[0127] The active compounds can be converted to the customary formulations, such as solutions, emulsions, wettable powders, water- and oil-based suspensions, powders, dusts, pastes, soluble powders, soluble granules, granules for broadcasting, suspension-emulsion concentrates, natural materials impregnated with active compound, synthetic materials impregnated with active compound, fertilizers and microencapsulations in polymeric substances.

[0128] These formulations are produced in a known manner, for example by mixing the active compounds with extenders, that is liquid solvents and/or solid carriers, optionally with the use of surfactants, that is emulsifiers and/or

dispersants and/or foam-formers. The formulations are prepared either in suitable plants or else before or during the application.

[0129] Suitable for use as auxiliaries are substances which are suitable for imparting to the composition itself and/or to preparations derived therefrom (for example spray liquors, seed dressings) particular properties such as certain technical properties and/or also particular biological properties. Typical suitable auxiliaries are: extenders, solvents and carriers.

[0130] Suitable extenders are, for example, water, polar and nonpolar organic chemical liquids, for example from the classes of the aromatic and non-aromatic hydrocarbons (such as paraffins, alkylbenzenes, alkylnaphthalenes, chlorobenzenes), the alcohols and polyols (which, if appropriate, may also be substituted, etherified and/or esterified), the ketones (such as acetone, cyclohexanone), esters (including fats and oils) and (poly)ethers, the unsubstituted and substituted amines, amides, lactams (such as N-alkylpyrrolidones) and lactones, the sulphones and sulphoxides (such as dimethyl sulphoxide).

[0131] 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 petroleum fractions, mineral and vegetable oils, alcohols such as butanol or glycol and also their ethers and esters, ketones such as acetone, methyl ethyl ketone, methyl isobutyl ketone or cyclohexanone, strongly polar solvents such as dimethyl sulphoxide, and also water.

[0132] 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 finely divided silica, alumina and silicates; suitable solid carriers for granules are: for example, crushed and fractionated natural rocks such as calcite, marble, pumice, sepiolite and dolomite, and also synthetic granules of inorganic and organic meals, and granules of organic material such as paper, sawdust, coconut shells, maize cobs and tobacco stalks; suitable emulsifiers and/or foam-formers are: for example, nonionic and anionic emulsifiers, such as polyoxyethylene fatty acid esters, polyoxyethylene fatty alcohol ethers, for example alkylaryl polyglycol ethers, alkylsulphonates, alkyl sulphates, arylsulphonates and also protein hydrolysates; suitable dispersants are nonionic and/or ionic substances, for example from the classes of the alcohol-POE and/or -POP ethers, acid and/or POP-POE esters, alkylaryl and/or POP-POE ethers, fat- and/or POP-POE adducts, POE- and/or POP-polyol derivatives, POE- and/or POP-sorbitan or -sugar adducts, alkyl or aryl sulphates, alkyl- or arylsulphonates and alkyl or aryl phosphates or the corresponding PO-ether adducts. Furthermore, suitable oligo- or polymers, for example those derived from vinylic monomers, from acrylic acid, from EO and/or PO alone or in combination with, for example, (poly)alcohols or (poly)amines. It is also possible to employ lignin and its sulphonic acid derivatives, unmodified and modified celluloses, aromatic and/or aliphatic sulphonic acids and their adducts with formaldehyde.

[0133] Tackifiers such as carboxymethylcellulose and natural and synthetic polymers in the form of powders, granules or latices, such as gum arabic, polyvinyl alcohol and polyvinyl acetate, as well as natural phospholipids such as cephalins and lecithins, and synthetic phospholipids, can be used in the formulations.

[0134] It is possible to use colorants such as inorganic pigments, for example iron oxide, titanium oxide and Prussian Blue, and organic dyestuffs, such as alizarin dyestuffs, azo dyestuffs and metal phthalocyanine dyestuffs, and trace nutrients such as salts of iron, manganese, boron, copper, cobalt, molybdenum and zinc.

[0135] Other possible additives are perfumes, mineral or vegetable, optionally modified oils, waxes and nutrients (including trace nutrients), such as salts of iron, manganese, boron, copper, cobalt, molybdenum and zinc.

[0136] Stabilizers, such as low-temperature stabilizers, preservatives, antioxidants, light stabilizers or other agents which improve chemical and/or physical stability may also be present.

[0137] The formulations generally comprise between 0.01 and 98% by weight of active compound, preferably between 0.5 and 90%.

[0138] The active compound according to the invention can be used in its commercially available formulations and in the use forms, prepared from these formulations, as a mixture with other active compounds, such as insecticides, attractants, sterilizing agents, bactericides, acaricides, nematicides, fungicides, growth-regulating substances, herbicides, safeners, fertilizers or semiochemicals.

[0139] Particularly favourable mixing components are, for example, the following compounds:

Fungicides:

Inhibitors of Nucleic Acid Synthesis

[0140] benalaxyl, benalaxyl-M, bupirimate, chiralaxyl, clozylacon, dimethirimol, ethirimol, furalaxyl, hymexazole, metalaxyl, metalaxyl-M, ofurace, oxadixyl, oxolinic acid

Inhibitors of Mitosis and Cell Division

[0141] benomyl, carbendazim, diethofencarb, fuberidazole, pencycuron, thiabendazole, thiophanate-methyl, zoxamide

Inhibitors of Respiratory Chain Complex I

[0142] diflumetorim

Inhibitors of Respiratory Chain Complex II

[0143] boscalid, carboxin, fenfuram, flutolanil, furametpyr, mepronil, oxycarboxin, penthiopyrad, thifluzamide

Inhibitors of Respiratory Chain Complex III

[0144] azoxystrobin, cyazofamid, dimoxystrobin, enestrobin, famoxadone, fenamidone, fluoxastrobin, kresoxim-methyl, metominostrobin, orysastrobin, pyraclostrobin, picoxystrobin, trifloxystrobin

Decouplers

[0145] dinocap, fluazinam

Inhibitors of ATP Production

[0146] fentin acetate, fentin chloride, fentin hydroxide, silthiofam

Inhibitors of Amino Acid Biosynthesis and Protein Biosynthesis

[0147] andoprim, blasticidin-S, cyprodinil, kasugamycin, kasugamycin hydrochloride hydrate, mepanipyrim, pyrimethanil

Inhibitors of Signal Transduction

[0148] fenpiclonil, fludioxonil, quinoxyfen

Inhibitors of Lipid and Membrane Synthesis

[0149] chlozolinate, iprodione, procymidone, vinclozolin

[0150] ampropylfos, potassium-ampropylfos, edifenphos, iprobenfos (IBP), isoprothiolane, pyrazophos tolclofos-methyl, biphenyl

[0151] iodocarb, propamocarb, propamocarb hydrochloride

Inhibitors of Ergosterol Biosynthesis

[0152] fenhexamid,

[0153] azaconazole, bitertanol, bromuconazole, cyproconazole, diclobutrazole, difenoconazole, diniconazole, diniconazole-M, epoxiconazole, etaconazole, fenbuconazole, fluquinconazole, flusilazole, flutriafol, furconazole, furconazole-cis, hexaconazole, imibenconazole, ipconazole, metconazole, myclobutanil, paclobutrazole, penconazole, propiconazole, prothioconazole, simeconazole, tebuconazole, tetraconazole, triadimefon, triadimenol, triticonazole, uniconazole, voriconazole, imazalil, imazalil sulphate, oxpoconazole, fenarimol, flurprimidole, nuarimol, pyrifenox, triforine, pefurazoate, prochloraz, triflumizole, viniconazole, aldimorph, dodemorph, dodemorph acetate, fenpropimorph, tridemorph, fenpropidin, spiroxamine, naftifine, pyributicarb, terbinafine

Inhibitors of Cell Wall Synthesis

[0154] benthiavalicarb, bialaphos, dimethomorph, flumorph, iprovalicarb, polyoxins, polyoxorim, validamycin A

Inhibitors of Melanin Biosynthesis

[0155] capropamid, diclocymet, fenoxanil, phthalid, pyroquilon, tricyclazole

Resistance Inductors

[0156] acibenzolar-S-methyl, probenazole, tiadinil

Multisite

[0157] captafol, captan, chlorothalonil, copper salts such as: copper hydroxide, copper naphthenate, copper oxychloride, copper sulphate, copper oxide, oxine-copper and Bordeaux mixture, dichlofluanid, dithianon, dodine, dodine free base, ferbam, folpet, fluorofolpet, guazatine, guazatine acetate, iminoctadine, iminoctadine albesilate, iminoctadine triacetate, mancopper, mancozeb, maneb, metiram, metiram zinc, propineb, sulphur and sulphur preparations containing calcium polysulphide, thiram, tolylfluanid, zineb, ziram

Unknown Mechanism

[0158] amibromdol, benthiazole, bethoxazin, capsimycin, carvone, chinomethionat, chloropicrin, cufraneb, cyflufenamid, cymoxanil, dazomet, debacarb, diclomezine, dichlorophen, dicloran, difenzoquat, difenzoquat methyl sulphate, diphenylamine, ethaboxam, ferimzone, flumetover, flusulphamide, fluopicolide, fluoroimide, hexachlorobenzene, 8-hydroxyquinoline sulphate, irumamycin, methasulphocarb, metrafenone, methyl isothiocyanate, mildiomycin, natamycin, nickel dimethyl dithiocarbamate, nitrothal-isopropyl, octhilinone, oxamocarb, oxyfenthiin, pentachlorophenol and salts, 2-phenylphenol and salts, piperalin, propanosine-sodium, proquinazid, pyrrolnitrin, quintozene, tecloftalam, tecnazene, triazoxide, trichlamide, zarilamid and 2,3,5,6-tetrachloro-4-(methylsulphonyl)pyridine, N-(4-chloro-2-nitrophenyl)-N-ethyl-4-methylbenzene-sulphonamide, 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-[5-(4-chlorophenyl)-2,3-dimethylisoxazolidin-3-yl] pyridine, cis-1-(4-chlorophenyl)-2-(1H-1,2,4-triazol-1-yl)cycloheptanol, 2,4-dihydro-5-methoxy-2-methyl-4-[[[[1-[3-(trifluoromethyl)phenyl]ethylidene]amino] oxy]methyl]phenyl]-3H-1,2,3-triazol-3-one (185336-79-2), methyl 1-(2,3-dihydro-2,2-dimethyl-1H-inden-1-yl)-1H-imidazole-5-carboxylate, 3,4,5-trichloro-2,6-pyridinedicarbonitrile, methyl 2-[[[cyclopropyl[(4-methoxy-phenyl)imino]methyl]thio]methyl]-.alpha.-(methoxymethylene)benzacetate, 4-chloro-alpha-propynyloxy-N-[2-[3-methoxy-4-(2-propynyloxy) phenyl]ethyl]benzacetamide, (2S)—N-[2-[4-[[3-(4-chlorophenyl)-2-propynyl]oxy]-3-methoxyphenyl] ethyl]-3-methyl-2-[(methylsulphon-yl)amino] butanamide, 5-chloro-7-(4-methylpiperidin-1-yl)-6-(2,4,6-trifluorophenyl)[1,2,4]-triazolo[1,5-a]pyrimidine, 5-chloro-6-(2,4,6-trifluorophenyl)-N-[(1R)-1,2,2-trimethylpropyl]-[1,2,4]triazolo[1,5-a]pyrimidin-7-amine, 5-chloro-N-[(1R)-1,2-dimethylpropyl]-6-(2,4,6-trifluorophenyl) [1,2,4]triazolo[1,5-a]pyrimidin-7-amine, N-[1-(5-bromo-3-chloropyridin-2-yl)ethyl]-2,4-dichloronicotinamide, N-(5-bromo-3-chloropyridin-2-yl)methyl-2,4-dichloronicotinamide, 2-butoxy-6-iodo-3-propylbenzopyranon-4-one, N-{(Z)-[(cyclopropylmethoxy)imino][6-(difluoromethoxy)-2,3-difluorophenyl]methyl}-2-benzacetamide, N-(3-ethyl-3,5,5-trimethylcyclohexyl)-3-formylamino-2-hydroxybenzamide, 2-[[[[1 [3(1-fluoro-2-phenyl-ethyl) oxy]phenyl]ethylidene]amino]oxy]methyl]-alpha-(methoxyimino)-N-methyl-alphaE-benzacetamide, N-{2-[3-chloro-5-(trifluoromethyl)pyridin-2-yl]ethyl}-2-(trifluoro-methyl)benzamide, N-(3',4'-dichloro-5-fluorobiphenyl-2-yl)-3-(difluoromethyl)-1-methyl-1H-pyrazole-4-carboxamide, N-(6-methoxy-3-pyridinyl) cyclopropanecarboxamide, 1-[(4-methoxyphenoxy) methyl]-2,2-dimethylpropyl-1H-imidazole-1-carboxylic acid, O-[1-[(4-methoxyphenoxy)methyl]-2,2-dimethylpropyl]-1H-imidazole-1-carbothioic acid,

2-(2-{[6-(3-chloro-2-methylphenoxy)-5-fluoropyrimidin-4-yl]oxy}phenyl)-2-(methoxyimino)-N-methylacetamide

Bactericides:

[0159] bronopol, dichlorophen, nitrapyrin, nickel dimethyldithiocarbamate, kasugamycin, octhilinone, furancarboxylic acid, oxytetracycline, probenazole, streptomycin, tecloftalam, copper sulphate and other copper preparations.

Insecticides/Acaricides/Nematicides:

[0160] Acetylcholine esterase (AChE) inhibitors

[0161] carbamates,

[0162] for example alanycarb, aldicarb, aldoxycarb, allyxycarb, aminocarb, bendiocarb, benfuracarb, bufencarb, butacarb, butocarboxim, butoxycarboxim, carbaryl, carbofuran, carbosulphan, cloethocarb, dimetilan, ethiofencarb, fenobucarb, fenothiocarb, formetanate, furathiocarb, isoprocarb, metam-sodium, methiocarb, methomyl, metolcarb, oxamyl, pirimicarb, promecarb, propoxur, thiodicarb, thiofanox, trimethacarb, XMC, xylylcarb, triazamate

[0163] organophosphates,

[0164] for example acephate, azamethiphos, azinphos (-methyl, -ethyl), bromophos-ethyl, bromfenvinfos (-methyl), butathiofos, cadusafos, carbophenothion, chlorethoxyfos, chlorfenvinphos, chlormephos, chlorpyrifos (-methyl/-ethyl), coumaphos, cyanofenphos, cyanophos, chlorfenvinphos, demeton-S-methyl, demeton-5-methylsulphone, dialifos, diazinon, dichlofenthion, dichlorvos/DDVP, dicrotophos, dimethoate, dimethylvinphos, dioxabenzofos, disulphoton, EPN, ethion, ethoprophos, etrimfos, famphur, fenamiphos, fenitrothion, fensulphothion, fenthion, flupyrazofos, fonofos, formothion, fosmethilan, fosthiazate, 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, sulphotep, sulprofos, tebupirimfos, temephos, terbufos, tetrachlorvinphos, thiometon, triazophos, triclorfon, vamidothion

Sodium Channel Modulators/Voltage-Dependent Sodium Channel Blockers

[0165] pyrethroids,

[0166] for example acrinathrin, allethrin (d-cis-trans, d-trans), beta-cyfluthrin, bifenthrin, bioallethrin, bioallethrin-5-cyclopentyl isomer, bioethanomethrin, biopermethrin, bioresmethrin, chlovaporthrin, cis-cypermethrin, cis-resmethrin, cis-permethrin, clocythrin, cycloprothrin, cyfluthrin, cyhalothrin, cypermethrin (alpha-, beta-, theta-, zeta-), cyphenothrin, deltamethrin, empenthrin (1R isomer), esfenvalerate, etofenprox, fenfluthrin, fenpropathrin, fenpyrithrin, fenvalerate, flubrocythrinate, flucythrinate, flufenprox, flumethrin, fluvalinate, fubfenprox, gamma-cyhalothrin, imiprothrin, kadethrin, lambda-cyhalothrin, metofluthrin, permethrin (cis-, trans-), phenothrin (1R-trans isomer), prallethrin, profluthrin, protrifenbute, pyresmethrin, resmethrin, RU 15525, silafluofen, tau-fluvalinate, tefluthrin, terallethrin, tetramethrin (1R isomer), tralomethrin, transfluthrin, ZXI 8901, pyrethrins (pyrethrum)

[0167] DDT

[0168] oxadiazines,

[0169] for example indoxacarb

[0170] semicarbazones,

[0171] for example metaflumizone (BAS3201)

Acetylcholine Receptor Agonists/Antagonists

[0172] chloronicotinyls,

[0173] for example acetamiprid, clothianidin, dinotefuran, imidacloprid, nitenpyram, nithiazine, thiacloprid, thiamethoxam

[0174] nicotine, bensultap, cartap

Acetylcholine Receptor Modulators

[0175] spinosyns,

[0176] for example spinosad

GABA-Controlled Chloride Channel Antagonists

[0177] organochlorines,

[0178] for example camphechlor, chlordane, endosulphan, gamma-HCH, HCH, heptachlor, lindane, methoxychlor

[0179] fiprols,

[0180] for example acetoprole, ethiprole, fipronil, pyrafluprole, pyriprole, vaniliprole

Chloride Channel Activators

[0181] mectins,

[0182] for example abamectin, emamectin, emamectin-benzoate, ivermectin, lepimectin, milbemycin

Juvenile Hormone Mimetics,

[0183] for example diofenolan, epofenonane, fenoxycarb, hydroprene, kinoprene, methoprene, pyriproxifen, triprene

Ecdysone Agonists/Disruptors

[0184] diacylhydrazines,

[0185] for example chromafenozide, halofenozide, methoxyfenozide, tebufenozide

Chitin Biosynthesis Inhibitors

[0186] benzoylureas,

for example bistrifluoron, chlofluazuron, diflubenzuron, fluazuron, flucycloxuron, flufenoxuron, hexaflumuron, lufenuron, novaluron, noviflumuron, penfluoron, teflubenzuron, triflumuron

[0187] buprofezin

[0188] cyromazine

Oxidative Phosphorylation Inhibitors, ATP Disruptors

[0189] diafenthiuron

[0190] organotin compounds,

[0191] for example azocyclotin, cyhexatin, fenbutatin-oxide

Oxidative Phosphorylation Decouplers Acting by Interrupting the H-Proton Gradient

[0192] pyrroles,

[0193] for example chlorfenapyr

[0194] dinitrophenols,

[0195] for example binapacyrl, dinobuton, dinocap, DNOC

Site-I Electron Transport Inhibitors

[0196] METI's,

[0197] for example fenazaquin, fenpyroximate, pyrimidifen, pyridaben, tebufenpyrad, tolfenpyrad hydramethylnon

[0198] dicofol

Site-II Electron Transport Inhibitors

[0199] rotenone

Site-III Electron Transport Inhibitors

[0200] acequinocyl, fluacrypyrim

Microbial Disruptors of the Insect Gut Membrane

[0201] *Bacillus thuringiensis* strains

Lipid Synthesis Inhibitors

[0202] tetronic acids,

[0203] for example spirodiclofen, spiromesifen

[0204] tetramic acids,

[0205] for example spirotetramate, cis-3-(2,5-dimethylphenyl)-4-hydroxy-8-methoxy-1-azaspiro[4.5]dec-3-en-2-one

[0206] Carboxamides,

[0207] for example flonicamid

[0208] Octopaminergic agonists,

[0209] for example amitraz

Inhibitors of Magnesium-Stimulated ATPase,

[0210] propargite

[0211] nereistoxin analogues,

[0212] for example thiocyclam hydrogen oxalate, thiosultap-sodium

Ryanodine Receptor Agonists,

[0213] benzodicarboxamides,

[0214] for example flubendiamide

[0215] anthranilamides,

[0216] for example rynaxypyr (3-bromo-N-{4-chloro-2-methyl-6-[(methylamino)carbonyl]phenyl}-1-(3-chloropyridin-2-yl)-1H-pyrazole-5-carboxamide)

Biologicals, Hormones or Pheromones

[0217] azadirachtin, *Bacillus* spec., *Beauveria* spec., codlemone, *Metarrhizium* spec., *Paecilomyces* spec., thuringiensin, *Verticillium* spec.

Active Compounds with Unknown or Unspecific Mechanisms of Action

[0218] fumigants,

[0219] for example aluminium phosphide, methyl bromide, sulphuryl fluoride

[0220] antifeedants,

[0221] for example cryolite, flonicamid, pymetrozine

[0222] mite growth inhibitors,

[0223] for example clofentezine, etoxazole, hexythiazox

[0224] amidoflumet, benclothiaz, benzoximate, bifenazate, bromopropylate, buprofezin, chinomethionat, chlordimeform, chlorobenzilate, chloropicrin, clothiazoben, cycloprene, cyenopyrafen, cyflumetofen, dicyclanil, fenoxacrim, fentrifanil, flubenzimine, flufenerim, flutenzin, gossyplure, hydramethylnone, japonilure, metoxadiazone, petroleum, piperonyl butoxide, potassium oleate, pyridalyl, sulfluramid, tetradifon, tetrasul, triarathene, verbutin

[0225] A mixture with other known active compounds, such as herbicides, fertilizers, growth regulators, safeners, semiochemicals, or else with agents for improving the plant properties, is also possible.

[0226] When used as insecticides, the active compounds according to the invention can furthermore be present in their commercially available formulations and in the use forms, prepared from these formulations, as a mixture with synergistic agents. Synergistic agents are compounds which increase the action of the active compounds, without it being necessary for the synergistic agent added to be active itself.

[0227] When used as insecticides, the active compounds according to the invention can furthermore be present in their commercially available formulations and in the use forms, prepared from these formulations, as a mixture with inhibitors which reduce degradation of the active compound after use in the environment of the plant, on the surface of parts of plants or in plant tissues.

[0228] The active compound content of the use forms prepared from the commercially available formulations can vary within wide limits. The active compound concentration of the use forms can be from 0.00000001 to 95% by weight of active compound, preferably between 0.00001 and 1% by weight.

[0229] The compounds are employed in a customary manner appropriate for the use forms.

[0230] All plants and plant parts can be treated in accordance with the invention. Plants are to be understood as meaning in the present context all plants and plant populations such as desired and undesired wild plants or crop plants (including naturally occurring crop plants). Crop plants can be plants which can be obtained by conventional plant breeding and optimization methods or by biotechnological and genetic engineering methods or by combinations of these methods, including the transgenic plants and including the plant cultivars protectable or not protectable by plant breeders' rights. Plant parts are to be understood as meaning all parts and organs of plants above and below the ground, such as shoot, leaf, flower and root, examples which may be mentioned being leaves, needles, stalks, stems, flowers, fruit bodies, fruits, seeds, roots, tubers and rhizomes. The plant parts also include harvested material, and vegetative and generative propagation material, for example cuttings, tubers, rhizomes, offshoots and seeds.

[0231] Treatment according to the invention of the plants and plant parts with the active compounds is carried out directly or by allowing the compounds to act on the surround-

ings, habitat or storage space by the customary treatment methods, for example by immersion, spraying, evaporation, fogging, scattering, painting on, injection and, in the case of propagation material, in particular in the case of seeds, also by applying one or more coats.

[0232] As already mentioned above, it is possible to treat all plants and their parts according to the invention. In a preferred embodiment, wild plant species and plant cultivars, or those obtained by conventional biological breeding methods, such as crossing or protoplast fusion, and parts thereof, are treated. In a further preferred embodiment, transgenic plants and plant cultivars obtained by genetic engineering methods, if appropriate in combination with conventional methods (Genetically Modified Organisms), and parts thereof are treated. The terms "parts", "parts of plants" and "plant parts" have been explained above.

[0233] Particularly preferably, plants of the plant cultivars which are in each case commercially available or in use are treated according to the invention. Plant cultivars are to be understood as meaning plants having novel properties ("traits") which have been obtained by conventional breeding, by mutagenesis or by recombinant DNA techniques. These can be cultivars, bio- or genotypes.

[0234] Depending on the plant species or plant cultivars, their location and growth conditions (soils, climate, vegetation period, diet), the treatment according to the invention may also result in superadditive ("synergistic") effects. Thus, for example, reduced application rates and/or a widening of the activity spectrum and/or an increase in the activity of the substances and compositions which can be used according to the invention, better plant growth, increased tolerance to high or low temperatures, increased tolerance to drought or to water or soil salt content, increased flowering performance, easier harvesting, accelerated maturation, higher harvest yields, higher quality and/or a higher nutritional value of the harvested products, better storage stability and/or processability of the harvested products are possible, which exceed the effects which were actually to be expected.

[0235] The preferred transgenic plants or plant cultivars (obtained by genetic engineering) which are to be treated according to the invention include all plants which, by virtue of the genetic modification, received genetic material which imparts particular advantageous, useful traits to these plants. Examples of such traits are better plant growth, increased tolerance to high or low temperatures, increased tolerance to drought or to water or soil salt content, increased flowering performance, easier harvesting, accelerated maturation, higher harvest yields, higher quality and/or a higher nutritional value of the harvested products, better storage stability and/or processability of the harvested products. Further and particularly emphasized examples of such traits are a better defense of the plants against animal and microbial pests, such as against insects, mites, phytopathogenic fungi, bacteria and/or viruses, and also increased tolerance of the plants to certain herbicidally active compounds. Examples of transgenic plants which may be mentioned are the important crop plants, such as cereals (wheat, rice), maize, soya beans, potatoes, sugar beet, tomatoes, peas and other vegetable varieties, cotton, tobacco, oilseed rape and also fruit plants (with the fruits apples, pears, citrus fruits and grapes), and particular emphasis is given to maize, soya beans, potatoes, cotton, tobacco and oilseed rape. Traits that are emphasized are in particular increased defence of the plants against insects, arachnids, nematodes and slugs and snails by virtue of toxins formed in the plants, in particular those formed in the plants by the genetic material from *Bacillus thuringiensis* (for example by the genes CryIA(a), CryIA(b), CryIA(c), CryIIA, CryIIIA, CryIIIB2, Cry9c, Cry2Ab, Cry3Bb and CryIF and also combinations thereof) (referred to hereinbelow as "Bt plants"). Traits that are also particularly emphasized are the increased defence of plants against fungi, bacteria and viruses by systemic acquired resistance (SAR), systemin, phytoalexins, elicitors and resistance genes and correspondingly expressed proteins and toxins. Traits that are furthermore particularly emphasized are the increased tolerance of plants to certain herbicidally active compounds, for example imidazolinones, sulphonylureas, glyphosate or phosphinotricin (for example the "PAT" gene). The genes which impart the desired traits in question can also be present in combination with one another in the transgenic plants. Examples of "Bt plants" which may be mentioned are maize varieties, cotton varieties, soya bean varieties and potato varieties which are sold under the trade names YIELD GARD® (for example maize, cotton, soya beans), KnockOut® (for example maize), StarLink® (for example maize), Bollgard® (cotton), Nucotn® (cotton) and NewLeaf® (potato). Examples of herbicide-tolerant plants which may be mentioned are maize varieties, cotton varieties and soya bean varieties which are sold under the trade names Roundup Ready® (tolerance to glyphosate, for example maize, cotton, soya bean), Liberty Link® (tolerance to phosphinotricin, for example oilseed rape), IMI® (tolerance to imidazolinones) and STS® (tolerance to sulphonylureas, for example maize). Herbicide-resistant plants (plants bred in a conventional manner for herbicide tolerance) which may be mentioned include the varieties sold under the name Clearfield® (for example maize). Of course, these statements also apply to plant cultivars having these genetic traits or genetic traits still to be developed, which plant cultivars will be developed and/or marketed in the future.

[0236] The plants listed can be treated according to the invention in a particularly advantageous manner with the compounds of the general formula I and/or the active compound mixtures according to the invention. The preferred ranges stated above for the active compounds or mixtures also apply to the treatment of these plants. Particular emphasis is given to the treatment of plants with the compounds or mixtures specifically mentioned in the present text.

[0237] The active compounds according to the invention act not only against plant, hygiene and stored product pests, but also in the veterinary medicine sector against animal parasites (ecto- and endoparasites), such as hard ticks, soft ticks, mange mites, leaf mites, flies (biting and licking), parasitic fly larvae, lice, hair lice, feather lice and fleas. These parasites include:

[0238] From the order of the Anoplurida, for example, *Haematopinus* spp., *Linognathus* spp., *Pediculus* spp., *Phtirus* spp., *Solenopotes* spp.

[0239] From the order of the Mallophagida and the suborders Amblycerina and Ischnocerina, for example, *Trimenopon* spp., *Menopon* spp., *Trinoton* spp., *Bovicola* spp., *Werneckiella* spp., *Lepikentron* spp., *Damalina* spp., *Trichodectes* spp., *Felicola* spp.

[0240] From the order of the Diptera and the suborders Nematocerina and Brachycerina, for example, *Aedes* spp., *Anopheles* spp., *Culex* spp., *Simulium* spp., *Eusimulium* spp., *Phlebotomus* spp., *Lutzomyia* spp., *Culicoides* spp., *Chrysops* spp., *Hybomitra* spp., *Atylotus* spp., *Tabanus* spp.,

Haematopota spp., *Philipomyia* spp., *Braula* spp., *Musca* spp., *Hydrotaea* spp., *Stomoxys* spp., *Haematobia* spp., *Morellia* spp., *Fannia* spp., *Glossina* spp., *Calliphora* spp., *Lucilia* spp., *Chrysomyia* spp., *Wohlfahrtia* spp., *Sarcophaga* spp., *Oestrus* spp., *Hypoderma* spp., *Gasterophilus* spp., *Hippobosca* spp., *Lipoptena* spp., *Melophagus* spp.

[0241] From the order of the Siphonapterida, for example, *Pulex* spp., *Ctenocephalides* spp., *Xenopsylla* spp., *Ceratophyllus* spp.

[0242] From the order of the Heteropterida, for example, *Cimex* spp., *Triatoma* spp., *Rhodnius* spp., *Panstrongylus* spp.

[0243] From the order of the Blattarida, for example, *Blatta orientalis, Periplaneta americana, Blattela germanica, Supella* spp.

[0244] From the subclass of the Acari (Acarina) and the orders of the Meta- and Mesostigmata, for example, *Argas* spp., *Ornithodorus* spp., *Otobius* spp., *Ixodes* spp., *Amblyomma* spp., *Boophilus* spp., *Dermacentor* spp., *Haemophysalis* spp., *Hyalomma* spp., *Rhipicephalus* spp., *Dermanyssus* spp., *Raillietia* spp., *Pneumonyssus* spp., *Stemostoma* spp., *Varroa* spp.

[0245] From the order of the Actinedida (Prostigmata) and Acaridida (Astigmata), for example, *Acarapis* spp., *Cheyletiella* spp., *Ornithocheyletia* spp., *Myobia* spp., *Psorergates* spp., *Demodex* spp., *Trombicula* spp., *Listrophorus* spp., *Acarus* spp., *Tyrophagus* spp., *Caloglyphus* spp., *Hypodectes* spp., *Pterolichus* spp., *Psoroptes* spp., *Chorioptes* spp., *Otodectes* spp., *Sarcoptes* spp., *Notoedres* spp., *Knemidocoptes* spp., *Cytodites* spp., *Laminosioptes* spp.

[0246] The active compounds of the formula (I) according to the invention are also suitable for controlling arthropods which infest agricultural productive livestock, such as, for example, cattle, sheep, goats, horses, pigs, donkeys, camels, buffalo, rabbits, chickens, turkeys, ducks, geese and bees, other pets, such as, for example, dogs, cats, caged birds and aquarium fish, and also so-called test animals, such as, for example, hamsters, guinea pigs, rats and mice. By controlling these arthropods, cases of death and reductions in productivity (for meat, milk, wool, hides, eggs, honey etc.) should be diminished, so that more economic and easier animal husbandry is possible by use of the active compounds according to the invention.

[0247] The active compounds according to the invention are used in the veterinary sector and in animal husbandry in a known manner by enteral administration in the form of, for example, tablets, capsules, potions, drenches, granules, pastes, boluses, the feed-through process and suppositories, by parenteral administration, such as, for example, by injection (intramuscular, subcutaneous, intravenous, intraperitoneal and the like), implants, by nasal administration, by dermal use in the form, for example, of dipping or bathing, spraying, pouring on and spotting on, washing and powdering, and also with the aid of moulded articles containing the active compound, such as collars, ear marks, tail marks, limb bands, halters, marking devices and the like.

[0248] When used for cattle, poultry, pets and the like, the active compounds of the formula (I) can be used as formulations (for example powders, emulsions, free-flowing compositions), which comprise the active compounds in an amount of 1 to 80% by weight, directly or after 100- to 10 000-fold dilution, or they can be used as a chemical bath.

[0249] It has furthermore been found that the compounds according to the invention also have a strong insecticidal action against insects which destroy industrial materials.

[0250] The following insects may be mentioned as examples and as preferred—but without any limitation:

[0251] Beetles, such as *Hylotrupes bajulus, Chlorophorus pilosis, Anobium punctatum, Xestobium rufovillosum, Ptilinus pecticornis, Dendrobium pertinex, Ernobius mollis, Priobium carpini, Lyctus brunneus, Lyctus* africanus, *Lyctus planicollis, Lyctus linearis, Lyctus pubescens, Trogoxylon aequale, Minthes rugicollis, Xyleborus* spec. *Tryptodendron* spec. *Apate monachus, Bostrychus capucins, Heterobostrychus brunneus, Sinoxylon* spec. *Dinoderus minutus;*

[0252] Hymenopterons, such as *Sirex juvencus, Urocerus gigas, Urocerus gigas taignus, Urocerus augur;*

[0253] Termites, such as *Kalotermes flavicollis, Cryptotermes brevis, Heterotermes indicola, Reticulitermes flavipes, Reticulitermes santonensis, Reticulitermes lucifugus, Mastotermes darwiniensis, Zootermopsis nevadensis, Coptotermes formosanus;*

[0254] Bristletails, such as *Lepisma saccharina.*

[0255] Industrial materials in the present connection are to be understood as meaning non-living materials, such as, preferably, plastics, adhesives, sizes, papers and cardboards, leather, wood and processed wood products and coating compositions.

[0256] The ready-to-use compositions may, if appropriate, comprise further insecticides and, if appropriate, one or more fungicides.

[0257] With respect to possible additional additives, reference may be made to the insecticides and fungicides mentioned above.

[0258] The compounds according to the invention can likewise be employed for protecting objects which come into contact with saltwater or brackish water, in particular hulls, screens, nets, buildings, moorings and signalling systems, against fouling.

[0259] Furthermore, the compounds according to the invention, alone or in combinations with other active compounds, may be employed as antifouling agents.

[0260] In domestic, hygiene and stored-product protection, the active compounds are also suitable for controlling animal pests, in particular insects, arachnids and mites, which are found in enclosed spaces such as, for example, dwellings, factory halls, offices, vehicle cabins and the like. They can be employed alone or in combination with other active compounds and auxiliaries in domestic insecticide products for controlling these pests. They are active against sensitive and resistant species and against all developmental stages.

[0261] These pests include:

[0262] From the order of the Scorpionidea, for example, *Buthus occitanus.*

[0263] From the order of the Acarina, for example, *Argas persicus, Argas reflexus, Bryobia* ssp., *Dermanyssus gallinae, Glyciphagus domesticus, Ornithodorus moubat, Rhipicephalus sanguineus, Trombicula alfreddugesi, Neutrombicula autumnalis, Dermatophagoides pteronissimus, Dermatophagoides forinae.*

[0264] From the order of the Araneae, for example, *Aviculariidae, Araneidae.*

[0265] From the order of the Opiliones, for example, *Pseudoscorpiones chelifer, Pseudoscorpiones cheiridium, Opiliones phalangium.*

[0266] From the order of the Isopoda, for example, *Oniscus asellus, Porcellio scaber.*

[0267] From the order of the Diplopoda, for example, *Blaniulus guttulatus, Polydesmus* spp.

[0268] From the order of the Chilopoda, for example, *Geophilus* spp.

[0269] From the order of the Zygentoma, for example, *Ctenolepisma* spp., *Lepisma saccharina, Lepismodes inquilinus.*

[0270] From the order of the Blattaria, for example, *Blatta orientalies, Blattella germanica, Blattella asahinai, Leucophaea maderae, Panchlora* spp., *Parcoblatta* spp., *Periplaneta australasiae, Periplaneta americana, Periplaneta brunnea, Periplaneta fuliginosa, Supella longipalpa.*

[0271] From the order of the Saltatoria, for example, *Acheta domesticus.*

[0272] From the order of the Dermaptera, for example, *Forficula auricularia.*

[0273] From the order of the Isoptera, for example, *Kalotermes* spp., *Reticulitermes* spp.

[0274] From the order of the Psocoptera, for example, *Lepinatus* spp., *Liposcelis* spp.

[0275] From the order of the Coleoptera, for example, *Anthrenus* spp., *Attagenus* spp., *Dermestes* spp., *Latheticus oryzae, Necrobia* spp., *Ptinus* spp., *Rhizopertha dominica, Sitophilus granarius, Sitophilus oryzae, Sitophilus zeamais, Stegobium paniceum.*

[0276] From the order of the Diptera, for example, *Aedes aegypti, Aedes albopictus, Aedes taeniorhynchus, Anopheles* spp., *Calliphora erythrocephala, Chrysozona pluvialis, Culex quinquefasciatus, Culex pipiens, Culex tarsalis, Drosophila* spp., *Fannia canicularis, Musca domestica, Phlebotomus* spp., *Sarcophaga carnaria, Simulium* spp., *Stomoxys calcitrans, Tipula paludosa.*

[0277] From the order of the Lepidoptera, for example, *Achroia grisella, Galleria mellonella, Plodia interpunctella, Tinea cloacella, Tinea pellionella, Tineola bisselliella.*

[0278] From the order of the Siphonaptera, for example, *Ctenocephalides canis, Ctenocephalides felis, Pulex irritans, Tunga penetrans, Xenopsylla cheopis.*

[0279] From the order of the Hymenoptera, for example, *Camponotus herculeanus, Lasius fuliginosus, Lasius niger, Lasius umbratus, Monomorium pharaonis, Paravespula* spp., *Tetramorium caespitum.*

[0280] From the order of the Anoplura, for example, *Pediculus humanus capitis, Pediculus humanus corporis, Pemphigus* spp., *Phylloera vastatrix, Phthirus pubis.*

[0281] From the order of the Heteroptera, for example, *Cimex hemipterus, Cimex lectularius, Rhodinus prolixus, Triatoma infestans.*

[0282] In the field of household insecticides, they are used alone or in combination with other suitable active compounds, such as phosphoric esters, carbamates, pyrethroids, neonicotinoids, growth regulators or active compounds from other known classes of insecticides.

[0283] They are used in aerosols, pressure-free spray products, for example pump and atomizer sprays, automatic fogging systems, foggers, foams, gels, evaporator products with evaporator tablets made of cellulose or polymer, liquid evaporators, gel and membrane evaporators, propeller-driven evaporators, energy-free, or passive, evaporation systems, moth papers, moth bags and moth gels, as granules or dusts, in baits for spreading or in bait stations.

[0284] The expected activity for a given combination of three active compounds can be calculated in accordance with S. R. Colby, Weeds 15 (1967), 20-22 as follows (Colby formula):

[0285] If

[0286] X denotes the kill rate, expressed in % of the untreated control, when using the active compound A at an application rate of m g/ha or in a concentration of m ppm,

[0287] Y denotes the kill rate, expressed in % of the untreated control, when using the active compound B at an application rate of n g/ha or in a concentration of n ppm and

[0288] Z denotes the kill rate, expressed in % of the untreated control, when using the active compound C at an application rate of o g/ha or in a concentration of o ppm and

[0289] E denotes the efficacy, expressed in % of the untreated control, when using the active compounds A, B and C at application rates of m, n and o g/ha or in a concentration of m, n and o ppm,

[0290] then

$$E = X + Y + Z - \frac{XY + YZ + XZ}{100} - \frac{XYZ}{10000}$$

[0291] If the actual kill rate is greater than the calculated kill rate, the activity of the combination is superadditive, i.e. a synergistic effect is present. In this case, the kill rate actually observed must be greater than the value calculated using the above-indicated formula for the expected kill rate (E).

EXAMPLE A

Myzus persicae Test

[0292]

Solvent: 7	parts by weight of dimethylformamide
Emulsifier: 2	parts by weight of alkylaryl polyglycol ether

[0293] To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amounts of solvent and emulsifier, and the concentrate is diluted with emulsifier-containing water to the desired concentration.

[0294] Cabbage leaves (*Brassica oleracea*) which are heavily infested by the green peach aphid (*Myzus persicae*) are treated by being dipped into the active compound preparation of the desired concentration.

[0295] After the desired period of time, the kill in % is determined. 100% means that all aphids have been killed; 0% means that none of the aphids have been killed. The determined kill rates are entered into Colby's formula (see sheet 1).

[0296] In this test, for example, the following active compound combinations in accordance with the present application show a synergistically enhanced activity compared to the active compounds applied individually:

TABLE A1

	Plant-damaging insects *Myzus persicae* test	
Active compound	Concentration in ppm	Kill in % after 1[d]
Compound (I-4)	200	0
Compound (I-4) + fludioxonil	200	0
Compound (I-4) + tefluthrin	20	0

TABLE A1-continued

Active compound	Concentration in ppm	Kill in % after 1 d	
		found*	calc.**
Compound (I-4) + fludioxonil + tefluthrin (1:1:0.1) according to the invention	200 + 200 + 20	35	0

Plant-damaging insects
Myzus persicae test

*found = activity found
**calc. = activity calculated using Colby's formula

TABLE A2

Active compound	Concentration in ppm	Kill in % after 1 d	
Compound (I-4)	200	0	
Compound (I-4) + azoxystrobin	200	0	
Compound (I-4) + fludioxonil	200	0	
Compound (I-4) + thiamethoxam	0.16	15	
		found*	calc.**
Compound (I-4) + azoxystrobin + thiamethoxam (1:1:0.0008) according to the invention	200 + 200 + 0.16	55	15
Compound (I-4) + fludioxonil + thiamethoxam (1:1:0.0008) according to the invention	200 + 200 + 0.16	40	15

Plant-damaging insects
Myzus persicae test

*found = activity found
**calc. = activity calculated using Colby's formula

EXAMPLE B

Phaedon cochleariae Larvae Test

[0297]

Solvent: 7	parts by weight of dimethylformamide
Emulsifier: 2	parts by weight of alkylaryl polyglycol ether

[0298] To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amounts of solvent and emulsifier, and the concentrate is diluted with emulsifier-containing water to the desired concentration.

[0299] Cabbage leaves (*Brassica oleracea*) are treated by being dipped into the active compound preparation of the desired concentration and are populated with larvae of the mustard beetle (*Phaedon cochleariae*) while the leaves are still moist.

[0300] After the desired period of time, the kill in % is determined. 100% means that all beetle larvae have been killed; 0% means that none of the beetle larvae have been killed. The determined kill rates are entered into Colby's formula (see sheet 1).

[0301] In this test, for example, the following active compound combinations in accordance with the present application show the synergistically enhanced activity compared to the active compounds applied individually:

TABLE B1

Active compound	Concentration in ppm	Kill in % after 4 d	
Compound (I-4)	200	0	
Compound (I-4) + azoxystrobin	200	0	
Compound (I-4) + metalaxyl	200	5	
Compound (I-4) + thiamethoxam	4	5	
		found*	calc.**
Compound (I-4) + azoxystrobin + thiamethoxam (1:1:0.02) according to the invention	200 + 200 + 4	45	5
Compound (I-4) + metalaxyl + thiamethoxam (1:1:0.02) according to the invention	200 + 200 + 4	60	9.75

Plant-damaging insects
Phaedon cochleariae larvae test

*found = activity found
**calc. = activity calculated using Colby's formula

TABLE B2

Active compound	Concentration in ppm	Kill in % after 6 d	
Compound (I-4)	200	0	
Compound (I-4) + fludioxonil	200	40	
Compound (I-4) + thiamethoxam	4	40	
		found*	calc.**
Compound (I-4) + fludioxonil + thiamethoxam (1:1:0.02) according to the invention	200 + 200 + 4	80	64

Plant-damaging insects
Phaedon cochleariae larvae test

*found = activity found
**calc. = activity calculated using Colby's formula

TABLE B3

Active compound	Concentration in ppm	Kill in % after 4 d
Compound (I-4)	400	0
	200	0
Compound (I-4) + Azoxystrobin	200	0
Compound (I-4) + Metalaxyl	400	0
Compound (I-4) + Tefluthrin	4	35

Plant-damaging insects
Phaedon cochleariae larvae test

TABLE B3-continued

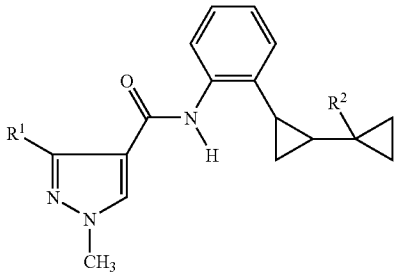
Active compound	Concentration in ppm	Kill in % after 4 d	
		found*	calc.**
Compound (I-4) + Azoxystrobin + Tefluthrin (1:1:0.02) according to the invention	200 + 200 + 4	80	35
Compound (I-4) + Metalaxyl + Tefluthrin (1:1:0.01) according to the invention	400 + 400 + 4	85	35

Plant-damaging insects
Phaedon cochleariae larvae test

*found = activity found
**calc. = activity calculated using Colby's formula

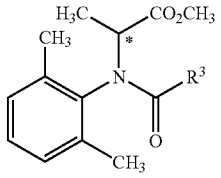
1. An active compound combination comprising
A) at least one compound of formula (I)

(I)



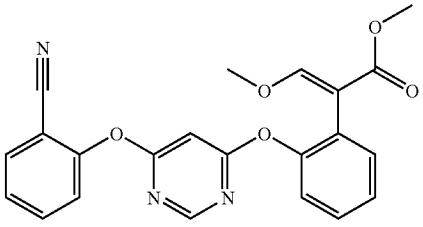
in which
R^1 represents trifluoromethyl or difluoromethyl and
R^2 represents hydrogen or methyl and
B) at least one compound of formula (II)

(II)



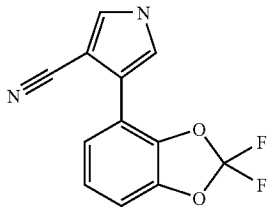
in which R^3 represents benzyl, furyl or methoxymethyl and * represents a carbon in the R- or S-configuration, azoxystrobin of formula (V)

(V)



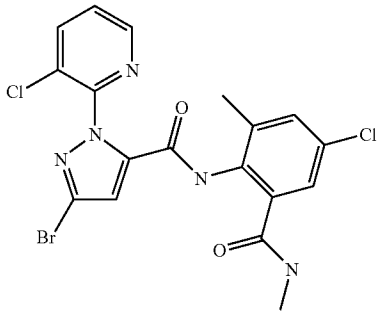
or
fludioxonil of formula (VI)

(VI)



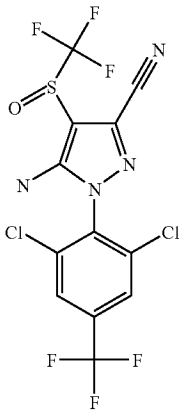
and
C) at least one compound selected from the group consisting of:
imidacloprid, thiamethoxam, clothianidin, thiacloprid, dinotefuran, acetamiprid, nitenpyram, rynaxapyr of formula (IV)

(IV)



fipronil of formula (VII)

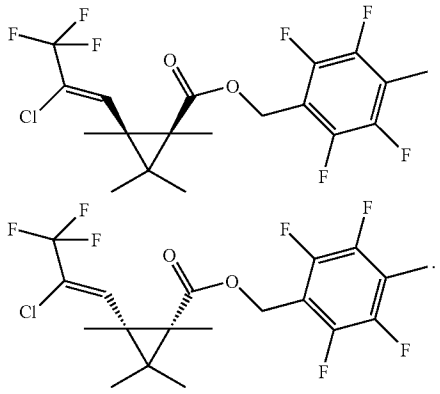
(VII)



and

tefluthrin, which is a racemate of two isomers of formula (VIII)

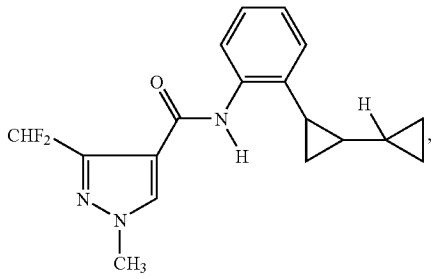
(VIII)



2. An active compound combination according to claim **1** in which the component

A is the compound (I-4)

(I-4)



the component

B is selected from the group consisting of benalaxyl, benalaxyl-M, furalaxyl, metalaxyl, metalaxyl-M, fludioxonil and azoxystrobin,

and the component

C is selected from the group consisting of: imidacloprid, thiamethoxam, clothianidin, thiacloprid, dinotefuran, acetamiprid, nitenpyram, rynaxapyr, fipronil and tefluthrin.

3. An active compound combination according to claim **2** in which the component

B is selected from the group consisting of: metalaxyl, metalaxyl-M, fludioxonil and azoxystrobin

and the component

C is selected from the group consisting of thiamethoxam, rynaxapyr, fipronil and tefluthrin.

4. An active compound combination according to claim **3** in which the component

B is selected from the group consisting of metalaxyl, metalaxyl-M, fludioxonil and azoxystrobin

and the component

C is selected from the group consisting of thiamethoxam, rynaxapyr, fipronil and tefluthrin.

5. An active compound combination according to claim **4** in which the component

B is metalaxyl-M

and the component

C is selected from the group consisting of thiamethoxam, rynaxapyr, fipronil and tefluthrin.

6. An active compound combination according to claim **5** in which the component

B is metalaxyl-M

and the component

C is selected from the group consisting of thiamethoxam, rynaxapyr and tefluthrin.

7. A synergistic active compound combination comprising an active compound combination according to claim **1**.

8. An active compound combination according to claim **1** which is being used for controlling unwanted phytopathogenic fungi and/or insects.

9. A method for controlling unwanted phytopathogenic fungi and insects, wherein an active compound combination according to claim **1** is applied to the unwanted phytopathogenic fungi and/or insects and/or their habitat and/or seed.

10. A process for preparing an active compound combination, wherein the composition according to claim **1** is mixed with a surfactant and/or extender.

11. An active compound combination according to claim **1** which is being used for treating seeds.

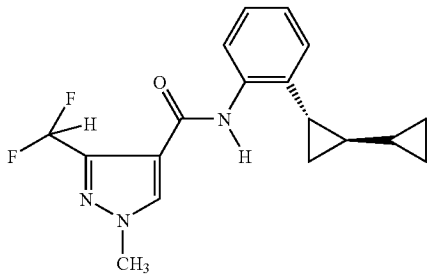
12. An active compound combination according to claim **1** which is being used for treating transgenic plants.

13. An active compound combination according to claim **1** which is being used for treating seed of transgenic plants.

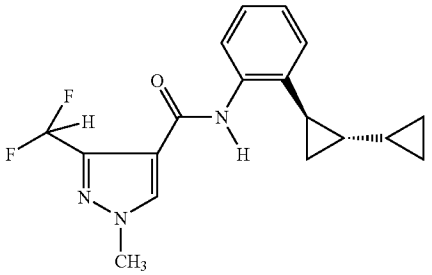
14. A seed treated with an active compound combination according to claim **1**.

15. An active compound combination according to claim **2** wherein in the component A, the proportion of the two stereoisomers (I_{II}-4) and (I_{III}-4)

(I_{II}-4)



(I_{III}-4)



is from 65 to 99% by weight of the active compound.

16. A combination of claim **1**, wherein * represents a carbon in the S-configuration.

17. A combination of claim **2**, wherein * represents a carbon in the S-configuration.

18. A combination of claim **3**, wherein * represents a carbon in the S-configuration.

19. A combination of claim **4**, wherein * represents a carbon in the S-configuration.

20. Seed of claim **14**, wherein * represents a carbon in the S-configuration.

* * * * *