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(54) Title: SYNERGISTIC COMPOSITIONS COMPRISING PYRACLOSTROBIN AND AN INSECTICIDAL COMPOUND

(57) Abstract: The present invention relates to synergistic mixtures comprising pyraclostrobin as compound I; and one insecticidal compound II selected from the group consisting of cycloxaprid, flometoquin, fluensulfone, flufiprole, flupyradifurone, fufenozide, pyflubumide, N2-[2-(3-chloro-2-pyridyl)-5-[(5-methyltetrazol-2-yl)methyl]pyrazol-3-yl]-5-cyano-N1,3-dimethyl-phthalamide, 3-bromo-N2-[5-bromo-2-(3-chloro-2-pyridyl)pyrazol-3-yl]-5-chloro-N1-(1-cyclopropylethyl)phthalamide, 1-[2-fluoro-4-methyl-5-(2,2,2-trifluoroethylsulfinyl)phenyl]-3-(trifluoromethyl)-1,2,4-triazole, 2-[2-fluoro-4-methyl-5-(2,2,2-trifluoroethylsulfinyl)phenyl]-5-(trifluoromethyl)-1,2,4-triazol-3-amine, 1-(4-chloro-3-fluoro-phenyl)-N-[(2-methyl-3-phenyl-phenyl)methoxy]-2-methyl-sulfanyl-ethanimine, 2-(5-amino-1,3,4-thiadiazol-2-yl)-N-[5-bromo-2-(3-chloro-2-pyridyl)pyrazol-3-yl]-4-chloro-6-methyl-benzamide, 1-[(6-chloro-3-pyridyl)methyl]-7-methyl-8-nitro-5-propoxy-3,5,6,7-tetrahydro-2H-imidazo[1,2-a]pyridine, methyl (E)-2-[2-[(2,4-dichloroanilino)-6-(trifluoromethyl)pyrimidin-4-yl]oxymethyl]phenyl]-3-methoxy-prop-2-enoate and 1-[(E)-2-(4-cyanophenyl)-1-[3-(trifluoromethyl)phenyl]ethylidene]amino]-3-(4-(difluoromethoxy)phenyl)urea; in synergistic effective amounts.



## SYNERGISTIC COMPOSITIONS COMPRISING PYRACLOSTROBIN AND AN INSECTICIDAL COMPOUND

### Description

- 5 The present invention relates to synergistic mixtures comprising
- 1) pyraclostrobin as compound I; and
  - 2) one insecticidal compound II selected from the group consisting of flupyradifurone, N2-[2-(3-chloro-2-pyridyl)-5-[(5-methyltetrazol-2-yl)methyl]pyrazol-3-yl]-5-cyano-N1,3-dimethylphthalamide, cycloxaprid, flometoquin, fluensulfone, flufiprole, , fufenozide, pyflubumide, 3-bromo-N2-[5-bromo-2-(3-chloro-2-pyridyl)pyrazol-3-yl]-5-chloro-N1-(1-cyclopropylethyl)phthalamide, 1-[2-fluoro-4-methyl-5-(2,2,2-trifluoroethylsulfinyl)phenyl]-3-(trifluoromethyl)-1,2,4-triazole, 2-[2-fluoro-4-methyl-5-(2,2,2-trifluoroethylsulfinyl)phenyl]-5-(trifluoromethyl)-1,2,4-triazol-3-amine, 1-(4-chloro-3-fluoro-phenyl)-N-[(2-methyl-3-phenyl-phenyl)methoxy]-2-methylsulfanyl-ethanimine, 2-(5-amino-1,3,4-thiadiazol-2-yl)-N-[5-bromo-2-(3-chloro-2-pyridyl)pyrazol-3-yl]-4-chloro-6-methyl-benzamide, 1-[(6-chloro-3-pyridyl)methyl]-7-methyl-8-nitro-5-propoxy-3,5,6,7-tetrahydro-2H-imidazo[1,2-a]pyridine, methyl (E)-2-[2-[[2-(2,4-dichloroanilino)-6-(trifluoromethyl)pyrimidin-4-yl]oxymethyl]phenyl]-3-methoxy-prop-2-enoate and 1-[(E)-[2-(4-cyanophenyl)-1-[3-(trifluoromethyl)phenyl]ethylidene]amino]-3-(4-(difluoromethoxy)phenyl)urea;
- 15 in synergistic effective amounts.

- The invention furthermore relates to the following mixtures comprising comprising
- 25 dinotefuran and fluxapyroxad and metalaxyl, or
  - dinotefuran and fluxapyroxad and pyraclostrobin; or
  - acetamiprid and fluxapyroxad and pyraclostrobin;
  - fluxapyroxad and pyraclostrobin and thiacloprid;
  - fluxapyroxad and pyraclostrobin and nitenpyram
  - 30 fluxapyroxad and metalaxyl and thiacloprid;
  - fluxapyroxad and metalaxyl and nitenpyram;
  - fluxapyroxad and pyraclostrobin and metalaxyl and thiacloprid;
  - fluxapyroxad and pyraclostrobin and metalaxyl and nitenpyram;
  - fluxapyroxad and pyraclostrobin and thiacloprid; or
  - 35 fluxapyroxad and pyraclostrobin and nitenpyram;
- in synergistically effective amounts.

The above-referred mixtures are herein below also referred as "inventive mixtures".

- 40 Moreover, the invention relates to a method for controlling pests, this refers to includes animal pests and harmful fungi, using the inventive mixtures and to the use of compound I and compound II (or the compounds inventive ternary and quaternary mixtures) for preparing such mixtures, and also to compositions comprising such mixtures.

Moreover, the invention relates to a method for controlling harmful fungi, using the inventive mixtures of compound I and II (or the inventive ternary and quaternary mixtures) and to the use of compound I and the compound II (or the compounds inventive ternary and quaternary mixtures) as defined above for preparing such mixtures, and also to compositions comprising such mixtures.

In one embodiment, the present invention provides methods for the control of animal pests (such as insects, acarids or nematodes) comprising contacting the animal pest (the insect, acarid or nematode) or their food supply, habitat, breeding grounds or their locus with a pesticidally effective amount of the inventive mixtures.

Moreover, in another embodiment the present invention also relates to a method of protecting plants from attack or infestation by animal pests (insects, acarids or nematodes) comprising contacting the plant, or the soil or water in which the plant is growing, with a pesticidally effective amount of the inventive mixture.

Additionally, the present invention also comprises a method for protection of plant propagation material (preferably seed) from harmful pests, such as fungi or insects, arachnids or nematodes comprising contacting the plant propagation materials (preferably seeds) with an inventive mixture in pesticidally effective amounts

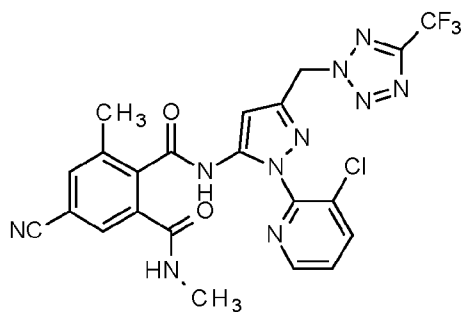
The term "plant propagation material" is to be understood to denote all the generative parts of the plant such as seeds and vegetative plant material such as cuttings and tubers (e. g. potatoes), which can be used for the multiplication of the plant. This includes seeds, roots, fruits, tubers, bulbs, rhizomes, shoots, sprouts and other parts of plants, including seedlings and young plants, which are to be transplanted after germination or after emergence from soil. These young plants may also be protected before transplantation by a total or partial treatment by immersion or pouring. In a particular preferred embodiment, the term propagation material denotes seeds.

Additionally, the present invention also comprises a method for protection of plant propagation material (preferably seed) from harmful fungi comprising contacting the plant propagation materials (preferably seeds) with the inventive mixture in pesticidally effective amounts

Moreover, the invention relates to a method for controlling harmful fungi using the inventive mixtures and to the use of the compound I and the compound II (or the compounds inventive ternary and quaternary mixtures) for preparing such mixtures, and also to compositions comprising such mixtures.

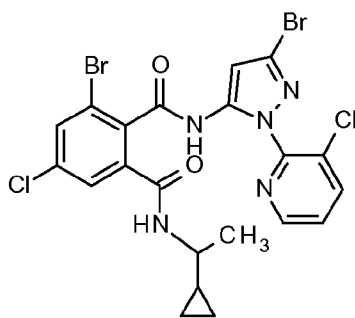
The present invention further relates to plant-protecting active ingredient mixtures having synergistically enhanced action of improving the health of plants and to a method of applying such inventive mixtures to the plants.

N2-[2-(3-chloro-2-pyridyl)-5-[(5-(trifluoromethyl)tetrazol-2-yl)methyl]pyrazol-3-yl]-5-cyano-N1,3-dimethyl-phthalamide (hereinafter also referred to as "C-1", formula set forth below) is disclosed in WO 2010069502 and WO 2011157664.



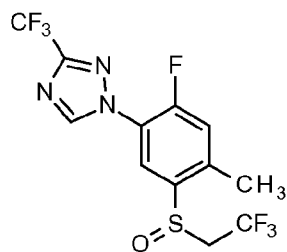
C-1

- 5 3-bromo-N2-[5-bromo-2-(3-chloro-2-pyridyl)pyrazol-3-yl]-5-chloro-N1-(1-cyclopropylethyl)phthalamide (hereinafter also referred to as "C-2", formula set forth below) is disclosed in WO 2005/077934



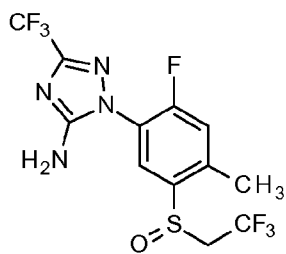
C-2

- 10 1-[2-fluoro-4-methyl-5-(2,2,2-trifluoroethylsulfinyl)phenyl]-3-(trifluoromethyl)-1,2,4-triazole (hereinafter also referred to as "C-3", formula set forth below) is disclosed in WO 06/043635 und WO 2011152320



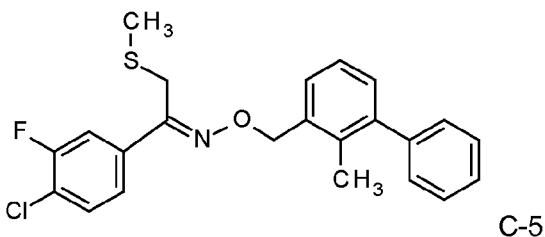
C3

- 15 2-[2-fluoro-4-methyl-5-(2,2,2-trifluoroethylsulfinyl)phenyl]-5-(trifluoromethyl)-1,2,4-triazol-3-amine (hereinafter also referred to as "C-4", formula set forth below) is disclosed in WO 06/043635 und WO 2011152320

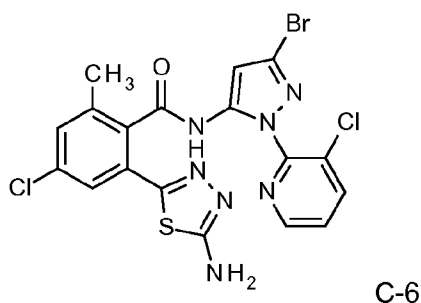


C-4

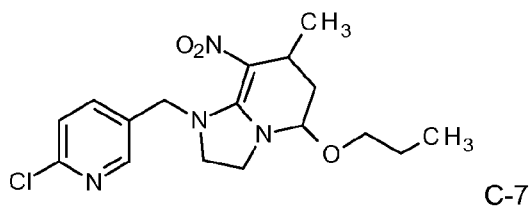
1-(4-chloro-3-fluoro-phenyl)-N-[(2-methyl-3-phenyl-phenyl)methoxy]-2-methylsulfanyl-ethanimine (hereinafter also referred to as "C-5", formula set forth below) is disclosed in CN154646A.



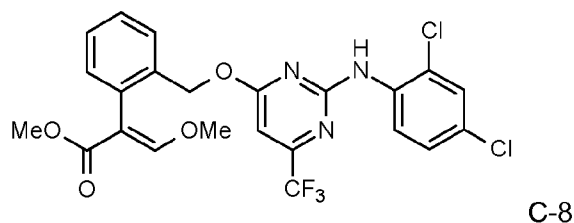
- 5 2-(5-amino-1,3,4-thiadiazol-2-yl)-N-[5-bromo-2-(3-chloro-2-pyridyl)pyrazol-3-yl]-4-chloro-6-methyl-benzamide (hereinafter also referred to as "C-6", formula set forth below) is disclosed in CN 101747325



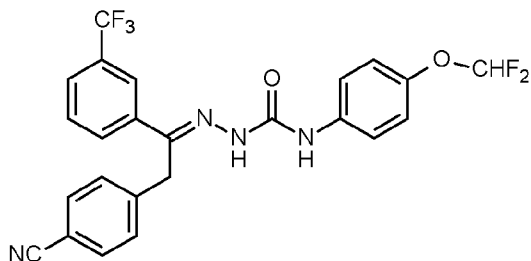
- 10 1-[(6-chloro-3-pyridyl)methyl]-7-methyl-8-nitro-5-propoxy-3,5,6,7-tetrahydro-2H-imidazo[1,2-a]pyridine (hereinafter also referred to as "C-7", formula set forth below) is disclosed in WO 2007/101369



- 15 Methyl (E)-2-[2-[[2-(2,4-dichloroanilino)-6-(trifluoromethyl)pyrimidin-4-yl]oxymethyl]phenyl]-3-methoxy-prop-2-enoate (hereinafter also referred to as "C-8", formula set forth below) is disclosed in WO 2010/139271.



- 20 1-[(E)-[2-(4-cyanophenyl)-1-[3-(trifluoromethyl)phenyl]ethylidene]amino]-3-(4-(difluoromethoxy)phenyl)urea (hereinafter also referred to as "C-9", formula set forth below) is disclosed in CN1071577A



C-9

Pyflubumide, which is N-[3-isobutyl-4-[2,2,2-trifluoro-1-methoxy-1-(trifluoromethyl)ethyl]phenyl]-1,3,5-trimethyl-N-(2-methylpropanoyl)pyrazole-4-carboxamide, as well as its pesticidal action is known from WO 07/020986.

5

Cycloxaprid, which is 5-((6-Chloro-pyridin-3-yl)[3H2]-methyl)-7-nitro -11-oxa-2,5-diazatricyclo[6.2.1.0<sup>2,6</sup>]undec-6-ene, as well as its pesticidal action is known from WO 2010/069266 and WO 2011/069456.

10 Fufenozide, which N'-tert-butyl-N'-(3,5-dimethylbenzoyl)-2,7-dimethyl-2,3-dihydrobenzofuran-6-carbohydrazide, as well as its pesticidal action is known from CN1313276A.

Fluxapyroxad is known from WO 2006/087343 and can be prepared in the manner described. The remaining compounds II as well as their pesticidal action and methods for producing them are generally known. For instance, they may be found in the e-Pesticide Manual V5.2 (ISBN 978 1 901396 85 0) (2008-2011) among other publications.

15

The published PCT applications WO 2005/058040, WO 2008/095913, WO 2009/098230, WO 2009/098210, WO 2006/089876, WO 2009/098225, WO 2011/039104, WO 2011/039105, WO 2011/067205, WO 2011/067209, WO 2011/069930, WO 2011/069967, WO 2011/144593, WO 2010108507 and DE 102007045920 disclose several synergistic mixtures with inter alia fluxapyroxad, further fungicides and/or insecticides. However, none of these documents explicitly discloses the mixtures referred to above.

20

25 One typical problem arising in the field of pest control lies in the need to reduce the dosage rates of the active ingredient in order to reduce or avoid unfavorable environmental or toxicological effects whilst still allowing effective pest control.

In regard to the instant invention the term pests embrace animal pests, and harmful fungi.

30

Another problem encountered concerns the need to have available pest control agents which are effective against a broad spectrum of pests, e.g. both animal pests and harmful fungi.

There also exists the need for pest control agents that combine knock-down activity with prolonged control, that is, fast action with long lasting action.

35

Another difficulty in relation to the use of pesticides is that the repeated and exclusive application of an individual pesticidal compound leads in many cases to a rapid selection of pests, that

means animal pests, and harmful fungi, which have developed natural or adapted resistance against the active compound in question. Therefore there is a need for pest control agents that help prevent or overcome resistance.

- 5 Another problem underlying the present invention is the desire for compositions that improve plants, a process which is commonly and hereinafter referred to as "plant health".

The term plant health comprises various sorts of improvements of plants that are not connected to the control of pests. For example, advantageous properties that may be mentioned are im-  
10 proved crop characteristics including: emergence, crop yields, protein content, oil content, starch content, more developed root system (improved root growth), improved stress tolerance (e.g. against drought, heat, salt, UV, water, cold), reduced ethylene (reduced production and/or inhibition of reception), tillering increase, increase in plant height, bigger leaf blade, less dead  
15 basal leaves, stronger tillers, greener leaf color, pigment content, photosynthetic activity, less input needed (such as fertilizers or water), less seeds needed, more productive tillers, earlier flowering, early grain maturity, less plant verse (lodging), increased shoot growth, enhanced plant vigor, increased plant stand and early and better germination; or any other advantages familiar to a person skilled in the art.

20 It was therefore an object of the present invention to provide pesticidal mixtures which solve the problems of reducing the dosage rate and / or enhancing the spectrum of activity and / or combining knock-down activity with prolonged control and / or to resistance management and/or promoting the health of plants.

25 We have found that this object is in part or in whole achieved by the mixtures comprising the active compounds defined in the outset.

Especially, it has been found that the mixtures as defined in the outset show markedly en-  
hanced action against pests compared to the control rates that are possible with the individual  
30 compounds and/or is suitable for improving the health of plants when applied to plants, parts of plants, seeds, or at their locus of growth.

It has been found that the action of the inventive mixtures goes far beyond the fungicidal and/or  
insecticidal and/or plant health improving action of the active compounds present in the mixture  
35 alone.

Moreover, we have found that simultaneous, that is joint or separate, application of the com-  
pound I and the compound II (or the compounds inventive ternary and quaternary mixtures) or  
successive application of the compound I and the compound II (or the compounds inventive  
40 ternary and quaternary mixtures) allows enhanced control of pests, that means animal pests, and harmful fungi, compared to the control rates that are possible with the individual com-  
pounds (synergistic mixtures).

Moreover, we have found that simultaneous, that is joint or separate, application of the compound I and the compound II (or the compounds inventive ternary and quaternary mixtures) or successive application of the compound I and the compound II (or the compounds inventive ternary and quaternary mixtures) allows enhanced control of pests, that means harmful fungi, compared to the control rates that are possible with the individual compounds (synergistic mixtures).

Moreover, we have found that simultaneous, that is joint or separate, application of the compound I and the compound II (or the compounds inventive ternary and quaternary mixtures) or successive application of the compound I and the compound II and compound(s) III (or the compounds inventive ternary and quaternary mixtures) provides enhanced plant health effects compared to the plant health effects that are possible with the individual compounds.

The ratio by weight of compound I and II is from 20000:1 to 1:20000, from 500:1 to 1:500, preferably from 100:1 to 1:100 (for example ratios from 99:1, 98:2, 97:3, 96:4, 95:5, 94:6, 93:7, 92:8, 91:9, 90:10, 89:11, 88:12, 87:13, 86:14, 85:15, 84:16, 83:17, 82:18, 81:19, 80:20, 79:21, 78:22, 77:23, 76:24, 75:25, 74:26, 73:27, 72:28, 71:29, 70:30, 69:31, 68:32, 67:33, 66:34, 65:45, 64:46, 63:47, 62:48, 61:49, 60:40, 59:41, 58:42, 57:43, 56:44, 55:45, 54:46, 53:47, 52:48, 51:49, 50:50, 49:51, 48:52, 47:53, 46:54, 45:55, 44:56, 43:57, 42:58, 41:59, 40:60, 39:61, 38:62, 37:63, 36:64, 35:65, 34:66, 33:67, 32:68, 31:69, 30:70, 29:71, 28:72, 27:73, 26:74, 25:75, 24:76, 23:77, 22:78, 21:79, 20:80, 19:81, 18:82, 17:83, 16:84, 15:85, 14:86, 13:87, 12:88, 11:89, 10:90, 9:91, 8:92, 7:93, 6:94, 5:95, 4:96, 3:97, 2:98, to 1:99) more preferably from 50:1 to 1:50, most preferably from 20:1 to 1:20, including also ratios from 10:1 to 1:10, 1:5 to 5:1, or 1:1.

Thus, preferably the present invention relates to mixtures comprising

1) pyraclostrobin as compound I; and

2) one insecticidal compound II selected from the group consisting of cyclo-x-aprid, flometoquin, fluensulfone, flufiprole, flupyradifurone, fufenozide, pyflubumide, N2-[2-(3-chloro-2-pyridyl)-5-[(5-methyltetrazol-2-yl)methyl]pyrazol-3-yl]-5-cyano-N1,3-dimethyl-phthalamide, 3-bromo-N2-[5-bromo-2-(3-chloro-2-pyridyl)pyrazol-3-yl]-5-chloro-N1-(1-cyclopropylethyl)phthalamide, 1-[2-fluoro-4-methyl-5-(2,2,2-trifluoroethylsulfinyl)phenyl]-3-(trifluoromethyl)-1,2,4-triazole, 2-[2-fluoro-4-methyl-5-(2,2,2-trifluoroethylsulfinyl)phenyl]-5-(trifluoromethyl)-1,2,4-triazol-3-amine, 1-(4-chloro-3-fluoro-phenyl)-N-[(2-methyl-3-phenyl-phenyl)methoxy]-2-methylsulfanyl-ethanimine, 2-(5-amino-1,3,4-thiadiazol-2-yl)-N-[5-bromo-2-(3-chloro-2-pyridyl)pyrazol-3-yl]-4-chloro-6-methyl-benzamide, 1-[(6-chloro-3-pyridyl)methyl]-7-methyl-8-nitro-5-propoxy-3,5,6,7-tetrahydro-2H-imidazo[1,2-a]pyridine, methyl (E)-2-[2-[[2-(2,4-dichloroanilino)-6-(trifluoromethyl)pyrimidin-4-yl]oxymethyl]phenyl]-3-methoxy-prop-2-enoate and 1-[(E)-[2-(4-cyanophenyl)-1-[3-(trifluoromethyl)phenyl]ethylidene]amino]-3-(4-(difluoromethoxy)phenyl)urea

in synergistic effective amounts, wherein the ratio by weight of compound I and II is from 500:1 to 1:500, preferably from 100:1 to 1:100 more preferably from 50:1 to 1:50, most preferably from 20:1 to 1:20, and utmost preferred from 10:1 to 1:10.

In a more preferred embodiment the present invention relates to mixtures comprising pyraclostrobin as compound I and wherein compound II is selected from the group consisting of cyclozaprid, flometoquin, flufiprole, flupyradifurone, fufenozide, pyflubumide, N2-[2-(3-chloro-2-pyridyl)-5-[(5-methyltetrazol-2-yl)methyl]pyrazol-3-yl]-5-cyano-N1,3-dimethyl-phthalamide, 3-bromo-N2-[5-bromo-2-(3-chloro-2-pyridyl)pyrazol-3-yl]-5-chloro-N1-(1-cyclopropylethyl)phthalamide, 1-[2-fluoro-4-methyl-5-(2,2,2-trifluoroethylsulfinyl)phenyl]-3-(trifluoromethyl)-1,2,4-triazole, 2-[2-fluoro-4-methyl-5-(2,2,2-trifluoroethylsulfinyl)phenyl]-5-(trifluoromethyl)-1,2,4-triazol-3-amine, 2-(5-amino-1,3,4-thiadiazol-2-yl)-N-[5-bromo-2-(3-chloro-2-pyridyl)pyrazol-3-yl]-4-chloro-6-methyl-benzamide and 1-[(6-chloro-3-pyridyl)methyl]-7-methyl-8-nitro-5-propoxy-3,5,6,7-tetrahydro-2H-imidazo[1,2-a]pyridine;

in synergistic effective amounts, wherein the ratio by weight of compound I and II is from 500:1 to 1:500, preferably from 100:1 to 1:100 more preferably from 50:1 to 1:50, most preferably from 20:1 to 1:20, and utmost preferred from 10:1 to 1:10

The following mixtures are most preferred:

Pyraclostrobin and cyclozaprid in synergistically effective amounts, preferably in a ratio by weight from 20000:1 to 1:20000, from 500:1 to 1:500, preferably from 100:1 to 1:100 more preferably from 50:1 to 1:50, most preferably from 20:1 to 1:20, and utmost preferred from 10:1 to 1:10.

Pyraclostrobin and flufiprole in synergistically effective amounts, preferably in a ratio by weight from 20000:1 to 1:20000, from 500:1 to 1:500, preferably from 100:1 to 1:100 more preferably from 50:1 to 1:50, most preferably from 20:1 to 1:20, and utmost preferred from 10:1 to 1:10.

Pyraclostrobin and flupyradifurone in synergistically effective amounts, preferably in a ratio by weight from 20000:1 to 1:20000, from 500:1 to 1:500, preferably from 100:1 to 1:100 more preferably from 50:1 to 1:50, most preferably from 20:1 to 1:20, and utmost preferred from 10:1 to 1:10.

Pyraclostrobin and C-1 in synergistically effective amounts, preferably in a ratio by weight from 20000:1 to 1:20000, from 500:1 to 1:500, preferably from 100:1 to 1:100 more preferably from 50:1 to 1:50, most preferably from 20:1 to 1:20, and utmost preferred from 10:1 to 1:10.

Pyraclostrobin and C-2 in synergistically effective amounts, preferably in a ratio by weight from 20000:1 to 1:20000, from 500:1 to 1:500, preferably from 100:1 to 1:100 more preferably from 50:1 to 1:50, most preferably from 20:1 to 1:20, and utmost preferred from 10:1 to 1:10.

Pyraclostrobin and C-3 in synergistically effective amounts, preferably in a ratio by weight from 20000:1 to 1:20000, from 500:1 to 1:500, preferably from 100:1 to 1:100 more preferably from 50:1 to 1:50, most preferably from 20:1 to 1:20, and utmost preferred from 10:1 to 1:10.

Pyraclostrobin and C-4 in synergistically effective amounts, preferably in a ratio by weight from 20000:1 to 1:20000, from 500:1 to 1:500, preferably from 100:1 to 1:100 more preferably from 50:1 to 1:50, most preferably from 20:1 to 1:20, and utmost preferred from 10:1 to 1:10.

Pyraclostrobin and C-6 in synergistically effective amounts, preferably in a ratio by weight from 20000:1 to 1:20000, from 500:1 to 1:500, preferably from 100:1 to 1:100 more preferably from 50:1 to 1:50, most preferably from 20:1 to 1:20, and utmost preferred from 10:1 to 1:10.

Pyraclostrobin and C-7 in synergistically effective amounts, preferably in a ratio by weight

from 20000:1 to 1:20000, from 500:1 to 1:500, preferably from 100:1 to 1:100 more preferably from 50:1 to 1:50, most preferably from 20:1 to 1:20, and utmost preferred from 10:1 to 1:10.

5 Pyraclostrobin and N2-[2-(3-chloro-2-pyridyl)-5-[(5-methyltetrazol-2-yl)methyl]pyrazol-3-yl]-5-cyano-N1,3-dimethyl-phthalamide in synergistically effective amounts, preferably in a ratio by weight from 20000:1 to 1:20000, from 500:1 to 1:500, preferably from 100:1 to 1:100 more preferably from 50:1 to 1:50, most preferably from 20:1 to 1:20, and utmost preferred from 10:1 to 1:10.

10 Pyraclostrobin and flupyradifurone in synergistically effective amounts, preferably in a ratio by weight from 20000:1 to 1:20000, from 500:1 to 1:500, preferably from 100:1 to 1:100 more preferably from 50:1 to 1:50, most preferably from 20:1 to 1:20, and utmost preferred from 10:1 to 1:10.

Utmost preference is given to the following mixtures:

15 Pyraclostrobin and N2-[2-(3-chloro-2-pyridyl)-5-[(5-methyltetrazol-2-yl)methyl]pyrazol-3-yl]-5-cyano-N1,3-dimethyl-phthalamide in synergistically effective amounts, preferably in a ratio by weight from 20000:1 to 1:20000, from 500:1 to 1:500, preferably from 100:1 to 1:100 more preferably from 50:1 to 1:50, most preferably from 20:1 to 1:20, and utmost preferred from 10:1 to 1:10.

20 Pyraclostrobin and flupyradifurone in synergistically effective amounts, preferably in a ratio by weight from 500:1 to 1:500, preferably from 100:1 to 1:100 more preferably from 50:1 to 1:50, most preferably from 20:1 to 1:20, and utmost preferred from 10:1 to 1:10.

The ratios by weight for the respective ternary mixtures comprising  
dinotefuran and fluxapyroxad and metalaxyl, or  
25 dinotefuran and fluxapyroxad and pyraclostrobin; or

acetamiprid and fluxapyroxad and pyraclostrobin;  
fluxapyroxad and pyraclostrobin and thiacloprid;  
fluxapyroxad and pyraclostrobin and nitenpyram  
30 fluxapyroxad and metalaxyl and thiacloprid;  
fluxapyroxad and metalaxyl and nitenpyram;  
fluxapyroxad and pyraclostrobin and thiacloprid; or  
fluxapyroxad and pyraclostrobin and nitenpyram, or  
are from 1:100:100 to 100:1:1, preferably from 50:1:1 to 1:50:50, more preferably from 1:20:20  
35 to 20:1:1.

The ratios by weight for the respective quaternary mixture comprising  
dinotefuran and fluxapyroxad and metalaxyl and pyraclostrobin; or  
fluxapyroxad and pyraclostrobin and metalaxyl and thiacloprid; or  
40 fluxapyroxad and pyraclostrobin and metalaxyl and nitenpyram; or  
is from 1:100:100:100 to 100:1:1:1, preferably from 50:1:1:1 to 1:50:50:50, more preferably  
from 1:20:20:20 to 20:1:1:1.

All above-referred mixtures are herein below referred to as "inventive mixtures".

The inventive mixtures can further contain one or more insecticides, fungicides, herbicides.

5 The inventive mixtures can be converted into customary types of agrochemical compositions, e. g. solutions, emulsions, suspensions, dusts, powders, pastes, granules, pressings, capsules, and mixtures thereof. Examples for composition types are suspensions (e.g. SC, OD, FS), emulsifiable concentrates (e.g. EC), emulsions (e.g. EW, EO, ES, ME), capsules (e.g. CS, ZC), pastes, pastilles, wettable powders or dusts (e.g. WP, SP, WS, DP, DS), pressings (e.g. 10 BR, TB, DT), granules (e.g. WG, SG, GR, FG, GG, MG), insecticidal articles (e.g. LN), as well as gel formulations for the treatment of plant propagation materials such as seeds (e.g. GF). These and further compositions types are defined in the "Catalogue of pesticide formulation types and international coding system", Technical Monograph No. 2, 6<sup>th</sup> Ed. May 2008, CropLife International.

15 The compositions are prepared in a known manner, such as described by Mollet and Grubemann, Formulation technology, Wiley VCH, Weinheim, 2001; or Knowles, New developments in crop protection product formulation, Agrow Reports DS243, T&F Informa, London, 2005.

20 Suitable auxiliaries are solvents, liquid carriers, solid carriers or fillers, surfactants, dispersants, emulsifiers, wetters, adjuvants, solubilizers, penetration enhancers, protective colloids, adhesion agents, thickeners, humectants, repellents, attractants, feeding stimulants, compatibilizers, bactericides, anti-freezing agents, anti-foaming agents, colorants, tackifiers and binders.

25 Suitable solvents and liquid carriers are water and organic solvents, such as mineral oil fractions of medium to high boiling point, e.g. kerosene, diesel oil; oils of vegetable or animal origin; aliphatic, cyclic and aromatic hydrocarbons, e. g. toluene, paraffin, tetrahydronaphthalene, alkylated naphthalenes; alcohols, e.g. ethanol, propanol, butanol, benzylalcohol, cyclohexanol; glycols; DMSO; ketones, e.g. cyclohexanone; esters, e.g. lactates, carbonates, fatty acid esters, gamma-butyrolactone; fatty acids; phosphonates; amines; amides, e.g. N-methylpyrrolidone, fatty acid dimethylamides; and mixtures thereof.

30 Suitable solid carriers or fillers are mineral earths, e.g. silicates, silica gels, talc, kaolins, limestone, lime, chalk, clays, dolomite, diatomaceous earth, bentonite, calcium sulfate, magnesium sulfate, magnesium oxide; polysaccharides, e.g. cellulose, starch; fertilizers, e.g. ammonium sulfate, ammonium phosphate, ammonium nitrate, ureas; products of vegetable origin, e.g. cereal meal, tree bark meal, wood meal, nutshell meal, and mixtures thereof.

35 Suitable surfactants are surface-active compounds, such as anionic, cationic, nonionic and amphoteric surfactants, block polymers, polyelectrolytes, and mixtures thereof. Such surfactants can be used as emulsifier, dispersant, solubilizer, wetter, penetration enhancer, protective colloid, or adjuvant. Examples of surfactants are listed in McCutcheon's, Vol.1: Emulsifiers & Detergents, McCutcheon's Directories, Glen Rock, USA, 2008 (International Ed. or North American 40 Ed.).

Suitable anionic surfactants are alkali, alkaline earth or ammonium salts of sulfonates, sulfates, phosphates, carboxylates, and mixtures thereof. Examples of sulfonates are alkylaryl-sulfonates, diphenylsulfonates, alpha-olefin sulfonates, lignine sulfonates, sulfonates of fatty acids and oils, sulfonates of ethoxylated alkylphenols, sulfonates of alkoxyated arylphenols,

sulfonates of condensed naphthalenes, sulfonates of dodecyl- and tridecylbenzenes, sulfonates of naphthalenes and alkylnaphthalenes, sulfosuccinates or sulfosuccinamates. Examples of sulfates are sulfates of fatty acids and oils, of ethoxylated alkylphenols, of alcohols, of ethoxylated alcohols, or of fatty acid esters. Examples of phosphates are phosphate esters. Examples of carboxylates are alkyl carboxylates, and carboxylated alcohol or alkylphenol ethoxylates.

Suitable nonionic surfactants are alkoxyates, N-substituted fatty acid amides, amine oxides, esters, sugar-based surfactants, polymeric surfactants, and mixtures thereof. Examples of alkoxyates are compounds such as alcohols, alkylphenols, amines, amides, arylphenols, fatty acids or fatty acid esters which have been alkoxyated with 1 to 50 equivalents. Ethylene oxide and/or propylene oxide may be employed for the alkoxylation, preferably ethylene oxide. Examples of N-substituted fatty acid amides are fatty acid glucamides or fatty acid alkanolamides. Examples of esters are fatty acid esters, glycerol esters or monoglycerides. Examples of sugar-based surfactants are sorbitans, ethoxylated sorbitans, sucrose and glucose esters or alkylpolyglucosides. Examples of polymeric surfactants are homo- or copolymers of vinylpyrrolidone, vinylalcohols, or vinylacetate.

Suitable cationic surfactants are quaternary surfactants, for example quaternary ammonium compounds with one or two hydrophobic groups, or salts of long-chain primary amines. Suitable amphoteric surfactants are alkylbetains and imidazolines. Suitable block polymers are block polymers of the A-B or A-B-A type comprising blocks of polyethylene oxide and polypropylene oxide, or of the A-B-C type comprising alkanol, polyethylene oxide and polypropylene oxide. Suitable polyelectrolytes are polyacids or polybases. Examples of polyacids are alkali salts of polyacrylic acid or polyacid comb polymers. Examples of polybases are polyvinylamines or polyethyleneamines.

Suitable adjuvants are compounds, which have a neglectable or even no pesticidal activity themselves, and which improve the biological performance of the inventive mixtures on the target. Examples are surfactants, mineral or vegetable oils, and other auxiliaries. Further examples are listed by Knowles, Adjuvants and additives, Agrow Reports DS256, T&F Informa UK, 2006, chapter 5.

Suitable thickeners are polysaccharides (e.g. xanthan gum, carboxymethylcellulose), anorganic clays (organically modified or unmodified), polycarboxylates, and silicates.

Suitable bactericides are bronopol and isothiazolinone derivatives such as alkylisothiazolinones and benzisothiazolinones.

Suitable anti-freezing agents are ethylene glycol, propylene glycol, urea and glycerin.

Suitable anti-foaming agents are silicones, long chain alcohols, and salts of fatty acids.

Suitable colorants (e.g. in red, blue, or green) are pigments of low water solubility and water-soluble dyes. Examples are inorganic colorants (e.g. iron oxide, titan oxide, iron hexacyanoferrate) and organic colorants (e.g. alizarin-, azo- and phthalocyanine colorants).

Suitable tackifiers or binders are polyvinylpyrrolidons, polyvinylacetates, polyvinyl alcohols, polyacrylates, biological or synthetic waxes, and cellulose ethers.

Examples for composition types and their preparation are:

i) Water-soluble concentrates (SL, LS)

10-60 wt% of an inventive mixture and 5-15 wt% wetting agent (e.g. alcohol alkoxyates) are dissolved in water and/or in a water-soluble solvent (e.g. alcohols) ad 100 wt%. The active sub-

stance dissolves upon dilution with water.

ii) Dispersible concentrates (DC)

5-25 wt% of an inventive mixture and 1-10 wt% dispersant (e. g. polyvinylpyrrolidone) are dissolved in organic solvent (e.g. cyclohexanone) ad 100 wt%. Dilution with water gives a dispersion.

iii) Emulsifiable concentrates (EC)

15-70 wt% of an inventive mixture and 5-10 wt% emulsifiers (e.g. calcium dodecylbenzenesulfonate and castor oil ethoxylate) are dissolved in water-insoluble organic solvent (e.g. aromatic hydrocarbon) ad 100 wt%. Dilution with water gives an emulsion.

iv) Emulsions (EW, EO, ES)

5-40 wt% of an inventive mixture and 1-10 wt% emulsifiers (e.g. calcium dodecylbenzenesulfonate and castor oil ethoxylate) are dissolved in 20-40 wt% water-insoluble organic solvent (e.g. aromatic hydrocarbon). This mixture is introduced into water ad 100 wt% by means of an emulsifying machine and made into a homogeneous emulsion. Dilution with water gives an emulsion.

v) Suspensions (SC, OD, FS)

In an agitated ball mill, 20-60 wt% of an inventive mixture are comminuted with addition of 2-10 wt% dispersants and wetting agents (e.g. sodium lignosulfonate and alcohol ethoxylate), 0.1-2 wt% thickener (e.g. xanthan gum) and water ad 100 wt% to give a fine active substance suspension. Dilution with water gives a stable suspension of the active substance. For FS type composition up to 40 wt% binder (e.g. polyvinylalcohol) is added.

vi) Water-dispersible granules and water-soluble granules (WG, SG)

50-80 wt% of an inventive mixture are ground finely with addition of dispersants and wetting agents (e.g. sodium lignosulfonate and alcohol ethoxylate) ad 100 wt% and prepared as water-dispersible or water-soluble granules by means of technical appliances (e. g. extrusion, spray tower, fluidized bed). Dilution with water gives a stable dispersion or solution of the active substance.

vii) Water-dispersible powders and water-soluble powders (WP, SP, WS)

50-80 wt% of an inventive mixture are ground in a rotor-stator mill with addition of 1-5 wt% dispersants (e.g. sodium lignosulfonate), 1-3 wt% wetting agents (e.g. alcohol ethoxylate) and solid carrier (e.g. silica gel) ad 100 wt%. Dilution with water gives a stable dispersion or solution of the active substance.

viii) Gel (GW, GF)

In an agitated ball mill, 5-25 wt% of an inventive mixture are comminuted with addition of 3-10 wt% dispersants (e.g. sodium lignosulfonate), 1-5 wt% thickener (e.g. carboxymethylcellulose) and water ad 100 wt% to give a fine suspension of the active substance. Dilution with water gives a stable suspension of the active substance.

iv) Microemulsion (ME)

5-20 wt% of an inventive mixture are added to 5-30 wt% organic solvent blend (e.g. fatty acid dimethylamide and cyclohexanone), 10-25 wt% surfactant blend (e.g. alcohol ethoxylate and arylphenol ethoxylate), and water ad 100 %. This mixture is stirred for 1 h to produce spontaneously a thermodynamically stable microemulsion.

iv) Microcapsules (CS)

An oil phase comprising 5-50 wt% of an inventive mixture, 0-40 wt% water insoluble organic solvent (e.g. aromatic hydrocarbon), 2-15 wt% acrylic monomers (e.g. methylmethacrylate, methacrylic acid and a di- or triacrylate) are dispersed into an aqueous solution of a protective colloid (e.g. polyvinyl alcohol). Radical polymerization initiated by a radical initiator results in the formation of poly(meth)acrylate microcapsules. Alternatively, an oil phase comprising 5-50 wt% of an inventive mixture according to the invention, 0-40 wt% water insoluble organic solvent (e.g. aromatic hydrocarbon), and an isocyanate monomer (e.g. diphenylmethene-4,4'-diisocyanatae) are dispersed into an aqueous solution of a protective colloid (e.g. polyvinyl alcohol). The addition of a polyamine (e.g. hexamethylenediamine) results in the formation of polyurea microcapsules. The monomers amount to 1-10 wt%. The wt% relate to the total CS composition.

ix) Dustable powders (DP, DS)

1-10 wt% of an inventive mixture are ground finely and mixed intimately with solid carrier (e.g. finely divided kaolin) ad 100 wt%.

x) Granules (GR, FG)

0.5-30 wt% of an inventive mixture is ground finely and associated with solid carrier (e.g. silicate) ad 100 wt%. Granulation is achieved by extrusion, spray-drying or fluidized bed.

xi) Ultra-low volume liquids (UL)

1-50 wt% of an inventive mixture are dissolved in organic solvent (e.g. aromatic hydrocarbon) ad 100 wt%.

The compositions types i) to xi) may optionally comprise further auxiliaries, such as 0.1-1 wt% bactericides, 5-15 wt% anti-freezing agents, 0.1-1 wt% anti-foaming agents, and 0.1-1 wt% colorants.

The resulting agrochemical compositions generally comprise between 0.01 and 95%, preferably between 0.1 and 90%, and in particular between 0.5 and 75%, by weight of active substance. The active substances are employed in a purity of from 90% to 100%, preferably from 95% to 100% (according to NMR spectrum).

Solutions for seed treatment (LS), Suspoemulsions (SE), flowable concentrates (FS), powders for dry treatment (DS), water-dispersible powders for slurry treatment (WS), water-soluble powders (SS), emulsions (ES), emulsifiable concentrates (EC) and gels (GF) are usually employed for the purposes of treatment of plant propagation materials, particularly seeds. The compositions in question give, after two-to-tenfold dilution, active substance concentrations of from 0.01 to 60% by weight, preferably from 0.1 to 40%, in the ready-to-use preparations. Application can be carried out before or during sowing. Methods for applying the inventive mixtures and compositions thereof, respectively, on to plant propagation material, especially seeds include dressing, coating, pelleting, dusting, soaking and in-furrow application methods of the propagation material. Preferably, the inventive mixtures or the compositions thereof, respectively, are applied on to the plant propagation material by a method such that germination is not induced, e. g. by seed dressing, pelleting, coating and dusting.

When employed in plant protection, the amounts of active substances applied are, depending on the kind of effect desired, from 0.001 to 2 kg per ha, preferably from 0.005 to 2 kg per ha, more preferably from 0.01 to 1.0 kg per ha, and in particular from 0.05 to 0.75 kg per ha.

In treatment of plant propagation materials such as seeds, e. g. by dusting, coating or

drenching seed, amounts of active substance of from 0.01-10kg, preferably from 0.1-1000 g, more preferably from 1-100 g per 100 kilogram of plant propagation material (preferably seeds) are generally required.

When used in the protection of materials or stored products, the amount of active substance applied depends on the kind of application area and on the desired effect. Amounts customarily applied in the protection of materials are 0.001 g to 2 kg, preferably 0.005 g to 1 kg, of active substance per cubic meter of treated material.

Various types of oils, wetters, adjuvants, fertilizer, or micronutrients, and further pesticides (e.g. herbicides, insecticides, fungicides, growth regulators, safeners) may be added to the active substances or the compositions comprising them as premix or, if appropriate not until immediately prior to use (tank mix). These agents can be admixed with the compositions according to the invention in a weight ratio of 1:100 to 100:1, preferably 1:10 to 10:1.

The user applies the composition according to the invention usually from a predosage device, a knapsack sprayer, a spray tank, a spray plane, or an irrigation system. Usually, the agrochemical composition is made up with water, buffer, and/or further auxiliaries to the desired application concentration and the ready-to-use spray liquor or the agrochemical composition according to the invention is thus obtained. Usually, 20 to 2000 liters, preferably 50 to 400 liters, of the ready-to-use spray liquor are applied per hectare of agricultural useful area.

According to one embodiment, individual components of the composition according to the invention such as parts of a kit or parts of an inventive mixture may be mixed by the user himself in a spray tank and further auxiliaries may be added, if appropriate.

In a further embodiment, either individual compounds of the inventive mixtures formulated as composition or partially premixed components, e. g. components set forth in the inventive mixtures may be mixed by the user in a spray tank and further auxiliaries and additives may be added, if appropriate (tank mix).

In a further embodiment, either individual components of the composition according to the invention or partially premixed components, e. g. components comprising the compound I and II (or the compounds inventive ternary and quarternary mixtures), can be applied jointly (e. .g. after tankmix) or consecutively.

As said above, the present invention comprises a method for controlling pests, that means animal pests and/or harmful fungi, wherein the pest, their habitat, breeding grounds, their locus or the plants to be protected against pest attack, the soil or plant propagation material (preferably seed) are treated with an pesticidally effective amount of a mixture.

Advantageously, the inventive mixtures are suitable for controlling the following fungal plant diseases:

*Albugo* spp. (white rust) on ornamentals, vegetables (e. g. *A. candida*) and sunflowers (e. g. *A. tragopogonis*); *Alternaria* spp. (Alternaria leaf spot) on vegetables, rape (*A. brassicola* or *brassicae*), sugar beets (*A. tenuis*), fruits, rice, soybeans, potatoes (e. g. *A. solani* or *A. alternata*), tomatoes (e. g. *A. solani* or *A. alternata*) and wheat; *Aphanomyces* spp. on sugar beets and

vegetables; *Ascochyta* spp. on cereals and vegetables, e. g. *A. tritici* (anthracnose) on wheat and *A. hordei* on barley; *Bipolaris* and *Drechslera* spp. (teleomorph: *Cochliobolus* spp.), e. g. Southern leaf blight (*D. maydis*) or Northern leaf blight (*B. zeicola*) on corn, e. g. spot blotch (*B. sorokiniana*) on cereals and e.g. *B. oryzae* on rice and turfs; *Blumeria* (formerly *Erysiphe*) *graminis* (powdery mildew) on cereals (e. g. on wheat or barley); *Botrytis cinerea* (teleomorph: *Botryotinia fuckeliana*: grey mold) on fruits and berries (e. g. strawberries), vegetables (e. g. lettuce, carrots, celery and cabbages), rape, flowers, vines, forestry plants and wheat; *Bremia lactucae* (downy mildew) on lettuce; *Ceratocystis* (syn. *Ophiostoma*) spp. (rot or wilt) on broad-leaved trees and evergreens, e. g. *C. ulmi* (Dutch elm disease) on elms; *Cercospora* spp. (*Cercospora* leaf spots) on corn (e.g. Gray leaf spot: *C. zea-maydis*), rice, sugar beets (e. g. *C. beticola*), sugar cane, vegetables, coffee, soybeans (e. g. *C. sojina* or *C. kikuchii*) and rice; *Cladosporium* spp. on tomatoes (e. g. *C. fulvum*: leaf mold) and cereals, e. g. *C. herbarum* (black ear) on wheat; *Claviceps purpurea* (ergot) on cereals; *Cochliobolus* (anamorph: *Helminthosporium* of *Bipolaris*) spp. (leaf spots) on corn (*C. carbonum*), cereals (e. g. *C. sativus*, anamorph: *B. sorokiniana*) and rice (e. g. *C. miyabeanus*, anamorph: *H. oryzae*); *Colletotrichum* (teleomorph: *Glomerella*) spp. (anthracnose) on cotton (e. g. *C. gossypii*), corn (e. g. *C. graminicola*: Anthracnose stalk rot), soft fruits, potatoes (e. g. *C. coccodes*: black dot), beans (e. g. *C. lindemuthianum*) and soybeans (e. g. *C. truncatum* or *C. gloeosporioides*); *Corticium* spp., e. g. *C. sasakii* (sheath blight) on rice; *Corynespora cassiicola* (leaf spots) on soybeans and ornamentals; *Cycloconium* spp., e. g. *C. oleaginum* on olive trees; *Cylindrocarpon* spp. (e. g. fruit tree canker or young vine decline, teleomorph: *Nectria* or *Neonectria* spp.) on fruit trees, vines (e. g. *C. liriodendri*, teleomorph: *Neonectria liriodendri*: Black Foot Disease) and ornamentals; *Dematophora* (teleomorph: *Rosellinia*) necatrix (root and stem rot) on soybeans; *Diaporthe* spp., e. g. *D. phaseolorum* (damping off) on soybeans; *Drechslera* (syn. *Helminthosporium*, teleomorph: *Pyrenophora*) spp. on corn, cereals, such as barley (e. g. *D. teres*, net blotch) and wheat (e. g. *D. tritici-repentis*: tan spot), rice and turf; Esca (dieback, apoplexy) on vines, caused by *Formitiporia* (syn. *Phellinus*) *punctata*, *F. mediterranea*, *Phaeomoniella chlamydospora* (earlier *Phaeoacremonium chlamydosporum*), *Phaeoacremonium aleophilum* and/or *Botryosphaeria obtusa*; *Elsinoe* spp. on pome fruits (*E. pyri*), soft fruits (*E. veneta*: anthracnose) and vines (*E. ampelina*: anthracnose); *Entyloma oryzae* (leaf smut) on rice; *Epicoccum* spp. (black mold) on wheat; *Erysiphe* spp. (powdery mildew) on sugar beets (*E. betae*), vegetables (e. g. *E. pisi*), such as cucurbits (e. g. *E. cichoracearum*), cabbages, rape (e. g. *E. cruciferarum*); *Eutypa lata* (*Eutypa* canker or dieback, anamorph: *Cytosporina lata*, syn. *Libertella blepharis*) on fruit trees, vines and ornamental woods; *Exserohilum* (syn. *Helminthosporium*) spp. on corn (e. g. *E. turcicum*); *Fusarium* (teleomorph: *Gibberella*) spp. (wilt, root or stem rot) on various plants, such as *F. graminearum* or *F. culmorum* (root rot, scab or head blight) on cereals (e. g. wheat or barley), *F. oxysporum* on tomatoes, *F. solani* on soybeans and *F. verticillioides* on corn; *Gaeumannomyces graminis* (take-all) on cereals (e. g. wheat or barley) and corn; *Gibberella* spp. on cereals (e. g. *G. zea*) and rice (e. g. *G. fujikuroi*: Bakanae disease); *Glomerella cingulata* on vines, pome fruits and other plants and *G. gossypii* on cotton; Grainstaining complex on rice; *Guignardia bidwellii* (black rot) on vines; *Gymnosporangium* spp. on rosaceous plants and junipers, e. g. *G. sabiniae* (rust) on pears; *Helminthosporium* spp. (syn. *Drechslera*, teleomorph: *Cochliobolus*) on corn, cereals and rice; *Hemileia* spp., e. g. *H. vastatrix* (coffee leaf rust) on coffee; *Isariopsis clavispora* (syn. *Cladosporium vitis*) on vines; *Macrophomina phaseolina* (syn.

*phaseoli*) (root and stem rot) on soybeans and cotton; *Microdochium* (syn. *Fusarium*) *nivale* (pink snow mold) on cereals (e. g. wheat or barley); *Microsphaera diffusa* (powdery mildew) on soybeans; *Monilinia* spp., e. g. *M. laxa*, *M. fructicola* and *M. fructigena* (bloom and twig blight, brown rot) on stone fruits and other rosaceous plants; *Mycosphaerella* spp. on cereals, bananas, soft fruits and ground nuts, such as e. g. *M. graminicola* (anamorph: *Septoria tritici*, Septoria blotch) on wheat or *M. fijiensis* (black Sigatoka disease) on bananas; *Peronospora* spp. (downy mildew) on cabbage (e. g. *P. brassicae*), rape (e. g. *P. parasitica*), onions (e. g. *P. destructor*), tobacco (*P. tabacina*) and soybeans (e. g. *P. manshurica*); *Phakopsora pachyrhizi* and *P. meibomiae* (soybean rust) on soybeans; *Phialophora* spp. e. g. on vines (e. g. *P. tracheiphila* and *P. tetraspora*) and soybeans (e. g. *P. gregata*: stem rot); *Phoma lingam* (root and stem rot) on rape and cabbage and *P. betae* (root rot, leaf spot and damping-off) on sugar beets; *Phomopsis* spp. on sunflowers, vines (e. g. *P. viticola*: can and leaf spot) and soybeans (e. g. stem rot: *P. phaseoli*, teleomorph: *Diaporthe phaseolorum*); *Physoderma maydis* (brown spots) on corn; *Phytophthora* spp. (wilt, root, leaf, fruit and stem rot) on various plants, such as paprika and cucurbits (e. g. *P. capsici*), soybeans (e. g. *P. megasperma*, syn. *P. sojae*), potatoes and tomatoes (e. g. *P. infestans*: late blight) and broad-leaved trees (e. g. *P. ramorum*: sudden oak death); *Plasmodiophora brassicae* (club root) on cabbage, rape, radish and other plants; *Plasmopara* spp., e. g. *P. viticola* (grapevine downy mildew) on vines and *P. halstedii* on sunflowers; *Podosphaera* spp. (powdery mildew) on rosaceous plants, hop, pome and soft fruits, e. g. *P. leucotricha* on apples; *Polymyxa* spp., e. g. on cereals, such as barley and wheat (*P. graminis*) and sugar beets (*P. betae*) and thereby transmitted viral diseases; *Pseudocercospora herpotrichoides* (eyespot, teleomorph: *Tapesia yallundae*) on cereals, e. g. wheat or barley; *Pseudoperonospora* (downy mildew) on various plants, e. g. *P. cubensis* on cucurbits or *P. humili* on hop; *Pseudopezizcula tracheiphila* (red fire disease or 'rotbrenner', anamorph: *Phialophora*) on vines; *Puccinia* spp. (rusts) on various plants, e. g. *P. triticina* (brown or leaf rust), *P. striiformis* (stripe or yellow rust), *P. hordei* (dwarf rust), *P. graminis* (stem or black rust) or *P. recondita* (brown or leaf rust) on cereals, such as e. g. wheat, barley or rye, *P. kuehnii* (orange rust) on sugar cane and *P. asparagi* on asparagus; *Pyrenophora* (anamorph: *Drechslera*) *tritici-repentis* (tan spot) on wheat or *P. teres* (net blotch) on barley; *Pyricularia* spp., e. g. *P. oryzae* (teleomorph: *Magnaporthe grisea*, rice blast) on rice and *P. grisea* on turf and cereals; *Pythium* spp. (damping-off) on turf, rice, corn, wheat, cotton, rape, sunflowers, soybeans, sugar beets, vegetables and various other plants (e. g. *P. ultimum* or *P. aphanidermatum*); *Ramularia* spp., e. g. *R. collo-cygni* (*Ramularia* leaf spots, Physiological leaf spots) on barley and *R. beticola* on sugar beets; *Rhizoctonia* spp. on cotton, rice, potatoes, turf, corn, rape, potatoes, sugar beets, vegetables and various other plants, e. g. *R. solani* (root and stem rot) on soybeans, *R. solani* (sheath blight) on rice or *R. cerealis* (*Rhizoctonia* spring blight) on wheat or barley; *Rhizopus stolonifer* (black mold, soft rot) on strawberries, carrots, cabbage, vines and tomatoes; *Rhynchosporium secalis* (scald) on barley, rye and triticale; *Sarocladium oryzae* and *S. attenuatum* (sheath rot) on rice; *Sclerotinia* spp. (stem rot or white mold) on vegetables and field crops, such as rape, sunflowers (e. g. *S. sclerotiorum*) and soybeans (e. g. *S. rolfsii* or *S. sclerotiorum*); *Septoria* spp. on various plants, e. g. *S. glycines* (brown spot) on soybeans, *S. tritici* (*Septoria* blotch) on wheat and *S.* (syn. *Stagonospora*) *nodorum* (*Stagonospora* blotch) on cereals; *Uncinula* (syn. *Erysiphe*) *necator* (powdery mildew, anamorph: *Oidium tuckeri*) on vines; *Setosphaeria* spp. (leaf blight) on corn (e. g. *S. turcicum*, syn. *Helminthosporium turcicum*) and turf;

*Sphacelotheca* spp. (smut) on corn, (e. g. *S. reiliana*: head smut), sorghum und sugar cane; *Sphaerotheca fuliginea* (powdery mildew) on cucurbits; *Spongospora subterranea* (powdery scab) on potatoes and thereby transmitted viral diseases; *Stagonospora* spp. on cereals, e. g. *S. nodorum* (Stagonospora blotch, teleomorph: *Leptosphaeria* [syn. *Phaeosphaeria*] *nodorum*) on wheat; *Synchytrium endobioticum* on potatoes (potato wart disease); *Taphrina* spp., e. g. *T. deformans* (leaf curl disease) on peaches and *T. pruni* (plum pocket) on plums; *Thielaviopsis* spp. (black root rot) on tobacco, pome fruits, vegetables, soybeans and cotton, e. g. *T. basicola* (syn. *Chalara elegans*); *Tilletia* spp. (common bunt or stinking smut) on cereals, such as e. g. *T. tritici* (syn. *T. caries*, wheat bunt) and *T. controversa* (dwarf bunt) on wheat; *Typhula incarnata* (grey snow mold) on barley or wheat; *Urocystis* spp., e. g. *U. occulta* (stem smut) on rye; *Uromyces* spp. (rust) on vegetables, such as beans (e. g. *U. appendiculatus*, syn. *U. phaseoli*) and sugar beets (e. g. *U. betae*); *Ustilago* spp. (loose smut) on cereals (e. g. *U. nuda* and *U. avenae*), corn (e. g. *U. maydis*: corn smut) and sugar cane; *Venturia* spp. (scab) on apples (e. g. *V. inaequalis*) and pears; and *Verticillium* spp. (wilt) on various plants, such as fruits and ornamentals, vines, soft fruits, vegetables and field crops, e. g. *V. dahliae* on strawberries, rape, potatoes and tomatoes.

The mixtures according to the present invention and compositions thereof, respectively, are also suitable for controlling harmful fungi in the protection of stored products or harvest and in the protection of materials. The term "protection of materials" is to be understood to denote the protection of technical and non-living materials, such as adhesives, glues, wood, paper and paperboard, textiles, leather, paint dispersions, plastics, colling lubricants, fiber or fabrics, against the infestation and destruction by harmful microorganisms, such as fungi and bacteria. As to the protection of wood and other materials, the particular attention is paid to the following harmful fungi: Ascomycetes such as *Ophiostoma* spp., *Ceratocystis* spp., *Aureobasidium pullulans*, *Sclerophoma* spp., *Chaetomium* spp., *Humicola* spp., *Petriella* spp., *Trichurus* spp.; Basidiomycetes such as *Coniophora* spp., *Coriolus* spp., *Gloeophyllum* spp., *Lentinus* spp., *Pleurotus* spp., *Poria* spp., *Serpula* spp. and *Tyromyces* spp., Deuteromycetes such as *Aspergillus* spp., *Cladosporium* spp., *Penicillium* spp., *Trichorma* spp., *Alternaria* spp., *Paecilomyces* spp. and Zygomycetes such as *Mucor* spp., and in addition in the protection of stored products and harvest the following yeast fungi are worthy of note: *Candida* spp. and *Saccharomyces cerevisiae*.

They are particularly important for controlling a multitude of fungi on various cultivated plants, such as bananas, cotton, vegetable species (for example cucumbers, beans and cucurbits), cereals such as wheat, rye, barley, rice, oats; grass coffee, potatoes, corn, fruit species, soya, tomatoes, grapevines, ornamental plants, sugar cane and also on a large number of seeds. In a preferred embodiment, the inventive mixtures are used in soya (soybean), cereals and corn.

The inventive mixtures exhibit also outstanding action against animal pests from the following orders:

insects from the order of the lepidopterans (*Lepidoptera*), for example *Agrotis ypsilon*, *Agrotis segetum*, *Alabama argillacea*, *Anticarsia gemmatalis*, *Argyresthia conjugella*, *Autographa gamma*, *Bupalus piniarius*, *Cacoecia murinana*, *Capua reticulana*, *Cheimatobia brumata*, *Choris-*

- toneura fumiferana*, *Choristoneura occidentalis*, *Cirphis unipuncta*, *Cydia pomonella*, *Dendrolimus pini*, *Diaphania nitidalis*, *Diatraea grandiosella*, *Earias insulana*, *Elasmopalpus lignosellus*, *Eupoecilia ambiguella*, *Evetria bouliana*, *Feltia subterranea*, *Galleria mellonella*, *Grapholitha funebrana*, *Grapholitha molesta*, *Heliothis armigera*, *Heliothis virescens*, *Heliothis zea*, *Hellula undalis*, *Hibernia defoliaria*, *Hyphantria cunea*, *Hyponomeuta malinellus*, *Keiferia lycopersicella*, *Lambdina fiscellaria*, *Laphygma exigua*, *Leucoptera coffeella*, *Leucoptera scitella*, *Lithocolletis blancardella*, *Lobesia botrana*, *Loxostege sticticalis*, *Lymantria dispar*, *Lymantria monacha*, *Lyonetia clerkella*, *Malacosoma neustria*, *Mamestra brassicae*, *Orgyia pseudotsugata*, *Ostrinia nubilalis*, *Panolis flammea*, *Pectinophora gossypiella*, *Peridroma saucia*, *Phalera bucephala*, *Phthorimaea operculella*, *Phyllocnistis citrella*, *Pieris brassicae*, *Plathypena scabra*, *Plutella xylostella*, *Pseudoplusia includens*, *Rhyacionia frustrana*, *Scrobipalpula absoluta*, *Sitotroga cerealella*, *Sparganothis pillariana*, *Spodoptera frugiperda*, *Spodoptera littoralis*, *Spodoptera litura*, *Thaumatopoea pityocampa*, *Tortrix viridana*, *Trichoplusia ni* and *Zeiraphera canadensis*,
- 15 beetles (Coleoptera), for example *Agrilus sinuatus*, *Agriotes lineatus*, *Agriotes obscurus*, *Amphimallus solstitialis*, *Anisandrus dispar*, *Anthonomus grandis*, *Anthonomus pomorum*, *Aphthona euphoridae*, *Athous haemorrhoidalis*, *Atomaria linearis*, *Blastophagus piniperda*, *Blitophaga undata*, *Bruchus rufimanus*, *Bruchus pisorum*, *Bruchus lentis*, *Byctiscus betulae*, *Cassida nebulosa*, *Cerotoma trifurcata*, *Cetonia aurata*, *Ceuthorrhynchus assimilis*, *Ceuthorrhynchus napi*,
- 20 *Chaetocnema tibialis*, *Conoderus vespertinus*, *Crioceris asparagi*, *Ctenicera ssp.*, *Diabrotica longicornis*, *Diabrotica semipunctata*, *Diabrotica 12-punctata* *Diabrotica speciosa*, *Diabrotica virgifera*, *Epilachna varivestis*, *Epitrix hirtipennis*, *Eutinobothrus brasiliensis*, *Hylobius abietis*, *Hypera brunneipennis*, *Hypera postica*, *Ips typographus*, *Lema bilineata*, *Lema melanopus*, *Leptinotarsa decemlineata*, *Limonius californicus*, *Lissorhoptrus oryzophilus*, *Melanotus communis*, *Meligethes aeneus*, *Melolontha hippocastani*, *Melolontha melolontha*, *Oulema oryzae*,
- 25 *Ortiorrhynchus sulcatus*, *Otiorrhynchus ovatus*, *Phaedon cochleariae*, *Phyllobius pyri*, *Phyllotreta chrysocephala*, *Phyllophaga sp.*, *Phyllopertha horticola*, *Phyllotreta nemorum*, *Phyllotreta striolata*, *Popillia japonica*, *Sitona lineatus* and *Sitophilus granaria*,
- 30 flies, mosquitoes (Diptera), e.g. *Aedes aegypti*, *Aedes albopictus*, *Aedes vexans*, *Anastrepha ludens*, *Anopheles maculipennis*, *Anopheles crucians*, *Anopheles albimanus*, *Anopheles gambiae*, *Anopheles freeborni*, *Anopheles leucosphyrus*, *Anopheles minimus*, *Anopheles quadrimaculatus*, *Calliphora vicina*, *Ceratitis capitata*, *Chrysomya bezziana*, *Chrysomya hominivorax*, *Chrysomya macellaria*, *Chrysops discalis*, *Chrysops silacea*, *Chrysops atlanticus*, *Cochliomyia hominivorax*, *Contarinia sorghicola* *Cordylobia anthropophaga*, *Culicoides furens*, *Culex pipiens*,
- 35 *Culex nigripalpus*, *Culex quinquefasciatus*, *Culex tarsalis*, *Culiseta inornata*, *Culiseta melanura*, *Dacus cucurbitae*, *Dacus oleae*, *Dasineura brassicae*, *Delia antique*, *Delia coarctata*, *Delia platura*, *Delia radicum*, *Dermatobia hominis*, *Fannia canicularis*, *Geomyza Tripunctata*, *Gasterophilus intestinalis*, *Glossina morsitans*, *Glossina palpalis*, *Glossina fuscipes*, *Glossina tachinoides*,
- 40 *Haematobia irritans*, *Haplodiplosis equestris*, *Hippelates spp.*, *Hylemyia platura*, *Hypoderma lineata*, *Leptoconops torrens*, *Liriomyza sativae*, *Liriomyza trifolii*, *Lucilia caprina*, *Lucilia cuprina*, *Lucilia sericata*, *Lycoria pectoralis*, *Mansonia titillanus*, *Mayetiola destructor*, *Musca domestica*, *Muscina stabulans*, *Oestrus ovis*, *Opomyza florum*, *Oscinella frit*, *Pegomya hysocyami*, *Phorbia antiqua*, *Phorbia brassicae*, *Phorbia coarctata*, *Phlebotomus argentipes*, *Psorophora*

*columbiae*, *Psila rosae*, *Psorophora discolor*, *Prosimulium mixtum*, *Rhagoletis cerasi*, *Rhagoletis pomonella*, *Sarcophaga haemorrhoidalis*, *Sarcophaga sp.*, *Simulium vittatum*, *Stomoxys calcitrans*, *Tabanus bovinus*, *Tabanus atratus*, *Tabanus lineola*, and *Tabanus similis*, *Tipula oleracea*, and *Tipula paludosa*

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thrips (Thysanoptera), e.g. *Dichromothrips corbetti*, *Dichromothrips ssp* , *Frankliniella fusca*, *Frankliniella occidentalis*, *Frankliniella tritici*, *Scirtothrips citri*, *Thrips oryzae*, *Thrips palmi* and *Thrips tabaci*,

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termites (Isoptera), e.g. *Calotermes flavicollis*, *Leucotermes flavipes*, *Heterotermes aureus*, *Reticulitermes flavipes*, *Reticulitermes virginicus*, *Reticulitermes lucifugus*, *Termes natalensis*, and *Coptotermes formosanus*,

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cockroaches (Blattaria - Blattodea), e.g. *Blattella germanica*, *Blattella asahinae*, *Periplaneta americana*, *Periplaneta japonica*, *Periplaneta brunnea*, *Periplaneta fuliginosa*, *Periplaneta australasiae*, and *Blatta orientalis*,

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true bugs (Hemiptera), e.g. *Acrosternum hilare*, *Blissus leucopterus*, *Cyrtopeltis notatus*, *Dysdercus cingulatus*, *Dysdercus intermedius*, *Eurygaster integriceps*, *Euschistus impictiventris*, *Leptoglossus phyllopus*, *Lygus lineolaris*, *Lygus pratensis*, *Nezara viridula*, *Piesma quadrata*, *Solubea insularis* , *Thyanta perditor*, *Acyrtosiphon onobrychis*, *Adelges laricis*, *Aphidula nasturtii*, *Aphis fabae*, *Aphis forbesi*, *Aphis pomi*, *Aphis gossypii*, *Aphis grossulariae*, *Aphis schneideri*, *Aphis spiraeicola*, *Aphis sambuci*, *Acyrtosiphon pisum*, *Aulacorthum solani*, *Bemisia argentifolii*, *Brachycaudus cardui*, *Brachycaudus helichrysi*, *Brachycaudus persicae*, *Brachycaudus prunicola*, *Brevicoryne brassicae*, *Capitophorus horni*, *Cerosiphia gossypii*, *Chaetosiphon fragaefolii*, *Cryptomyzus ribis*, *Dreyfusia nordmanniana*, *Dreyfusia piceae*, *Dysaphis radicola*, *Dysaulacorthum pseudosolani*, *Dysaphis plantaginea*, *Dysaphis pyri*, *Empoasca fabae*, *Hyalopterus pruni*, *Hyperomyzus lactucae*, *Macrosiphum avenae*, *Macrosiphum euphorbiae*, *Macrosiphum rosae*, *Megoura viciae*, *Melanaphis pyramis*, *Metopolophium dirhodum*, *Myzus persicae*, *Myzus ascalonicus*, *Myzus cerasi*, *Myzus varians*, *Nasonovia ribis-nigri*, *Nilaparvata lugens*, *Pemphigus bursarius*, *Perkinsiella saccharicida*, *Phorodon humuli*, *Psylla mali*, *Psylla piri*, *Rhopalomyzus ascalonicus*, *Rhopalosiphum maidis*, *Rhopalosiphum padi*, *Rhopalosiphum insertum*, *Sappaphis mala*, *Sappaphis mali*, *Schizaphis graminum*, *Schizoneura lanuginosa*, *Sitobion avenae*, *Trialeurodes vaporariorum*, *Toxoptera aurantiiand*, *Viteus vitifolii*, *Cimex lectularius*, *Cimex hemipterus*, *Reduvius senilis*, *Triatoma spp.*, and *Arilus critatus*.

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ants, bees, wasps, sawflies (Hymenoptera), e.g. *Athalia rosae*, *Atta cephalotes*, *Atta capiguara*, *Atta cephalotes*, *Atta laevigata*, *Atta robusta*, *Atta sexdens*, *Atta texana*, *Crematogaster spp.*, *Hoplocampa minuta*, *Hoplocampa testudinea*, *Monomorium pharaonis*, *Solenopsis geminata*, *Solenopsis invicta*, *Solenopsis richteri*, *Solenopsis xyloni*, *Pogonomyrmex barbatus*, *Pogonomyrmex californicus*, *Pheidole megacephala*, *Dasymutilla occidentalis*, *Bombus spp.* *Vespula squamosa*, *Paravespula vulgaris*, *Paravespula pennsylvanica*, *Paravespula germanica*, *Dolichovespula maculata*, *Vespa crabro*, *Polistes rubiginosa*, *Camponotus floridanus*, and *Linepithema humile*,

- crickets, grasshoppers, locusts (Orthoptera), e.g. *Acheta domestica*, *Grylotalpa grylotalpa*, *Locusta migratoria*, *Melanoplus bivittatus*, *Melanoplus femurrubrum*, *Melanoplus mexicanus*, *Melanoplus sanguinipes*, *Melanoplus spretus*, *Nomadacris septemfasciata*, *Schistocerca americana*, *Schistocerca gregaria*, *Dociostaurus maroccanus*, *Tachycines asynamorus*, *Oedaleus senegalensis*, *Zonozerus variegatus*, *Hieroglyphus daganensis*, *Kraussaria angulifera*, *Calliptamus italicus*, *Chortoicetes terminifera*, and *Locustana pardalina*,
- Arachnoidea, such as arachnids (Acarina), e.g. of the families *Argasidae*, *Ixodidae* and *Sarcoptidae*, such as *Amblyomma americanum*, *Amblyomma variegatum*, *Amblyomma maculatum*, *Argas persicus*, *Boophilus annulatus*, *Boophilus decoloratus*, *Boophilus microplus*, *Dermacentor silvarum*, *Dermacentor andersoni*, *Dermacentor variabilis*, *Hyalomma truncatum*, *Ixodes ricinus*, *Ixodes rubicundus*, *Ixodes scapularis*, *Ixodes holocyclus*, *Ixodes pacificus*, *Ornithodoros moubata*, *Ornithodoros hermsi*, *Ornithodoros turicata*, *Ornithonyssus bacoti*, *Otobius megnini*, *Dermanyssus gallinae*, *Psoroptes ovis*, *Rhipicephalus sanguineus*, *Rhipicephalus appendiculatus*, *Rhipicephalus evertsi*, *Sarcoptes scabiei*, and *Eriophyidae* spp. such as *Aculus schlechtendali*, *Phyllocoptera oleivora* and *Eriophyes sheldoni*; *Tarsonemidae* spp. such as *Phytonemus pallidus* and *Polyphagotarsonemus latus*; *Tenuipalpidae* spp. such as *Brevipalpus phoenicis*; *Tetranychidae* spp. such as *Tetranychus cinnabarinus*, *Tetranychus kanzawai*, *Tetranychus pacificus*, *Tetranychus telarius* and *Tetranychus urticae*, *Panonychus ulmi*, *Panonychus citri*, and *Oligonychus pratensis*; *Araneida*, e.g. *Latrodectus mactans*, and *Loxosceles reclusa*,
- fleas (Siphonaptera), e.g. *Ctenocephalides felis*, *Ctenocephalides canis*, *Xenopsylla cheopis*, *Pulex irritans*, *Tunga penetrans*, and *Nosopsyllus fasciatus*,
- silverfish, firebrat (Thysanura), e.g. *Lepisma saccharina* and *Thermobia domestica*,
- centipedes (Chilopoda), e.g. *Scutigera coleoptrata*,
- millipedes (Diplopoda), e.g. *Narceus* spp.,
- Earwigs (Dermaptera), e.g. *forficula auricularia*,
- lice (Phthiraptera), e.g. *Pediculus humanus capitis*, *Pediculus humanus corporis*, *Pthirus pubis*, *Haematopinus eurytenuis*, *Haematopinus suis*, *Linognathus vituli*, *Bovicola bovis*, *Menopon gallinae*, *Menacanthus stramineus* and *Solenopotes capillatus*,
- plant parasitic nematodes such as root-knot nematodes, *Meloidogyne arenaria*, *Meloidogyne chitwoodi*, *Meloidogyne exigua*, *Meloidogyne hapla*, *Meloidogyne incognita*, *Meloidogyne javanica* and other *Meloidogyne* species; cyst nematodes, *Globodera rostochiensis*, *Globodera pallida*, *Globodera tabacum* and other *Globodera* species, *Heterodera avenae*, *Heterodera glycines*, *Heterodera schachtii*, *Heterodera trifolii*, and other *Heterodera* species; seed gall nematodes, *Anguina funesta*, *Anguina tritici* and other *Anguina* species; stem and foliar nematodes, *Aphelenchoides besseyi*, *Aphelenchoides fragariae*, *Aphelenchoides ritzemabosi* and other

*Aphelenchoides species*; sting nematodes, *Belonolaimus longicaudatus* and other *Belonolaimus species*; pine nematodes, *Bursaphelenchus xylophilus* and other *Bursaphelenchus species*; ring nematodes, *Criconema species*, *Criconemella species*, *Criconemoides species*, and *Meso-criconema species*; stem and bulb nematodes, *Ditylenchus destructor*, *Ditylenchus dipsaci*,  
5 *Ditylenchus myceliophagus* and other *Ditylenchus species*; awl nematodes, *Dolichodorus species*; spiral nematodes, *Helicotylenchus dihystera*, *Helicotylenchus multicinctus* and other *Helicotylenchus species*, *Rotylenchus robustus* and other *Rotylenchus species*; sheath nematodes, *Hemicycliophora species* and *Hemicriconemoides species*; *Hirshmanniella species*; lance nematodes, *Hoplolaimus columbus*, *Hoplolaimus galeatus* and other *Hoplolaimus species*; false  
10 root-knot nematodes, *Nacobbus aberrans* and other *Nacobbus species*; needle nematodes, *Longidorus elongates* and other *Longidorus species*; pin nematodes, *Paratylenchus species*; lesion nematodes, *Pratylenchus brachyurus*, *Pratylenchus coffeae*, *Pratylenchus curvatus*, *Pratylenchus goodeyi*, *Pratylenchus neglectus*, *Pratylenchus penetrans*, *Pratylenchus scribneri*, *Pratylenchus vulnus*, *Pratylenchus zaeae* and other *Pratylenchus species*; *Radinaphelenchus cocophilus* and other *Radinaphelenchus species*; burrowing nematodes, *Radopholus similis* and other *Radopholus species*; reniform nematodes, *Rotylenchulus reniformis* and other *Rotylenchulus species*; *Scutellonema species*; stubby root nematodes, *Trichodorus primitivus* and other *Trichodorus species*; *Paratrichodorus minor* and other *Paratrichodorus species*; stunt nematodes, *Tylenchorhynchus claytoni*, *Tylenchorhynchus dubius* and other *Tylenchorhynchus species* and *Merlinius species*; citrus nematodes, *Tylenchulus semipenetrans* and other *Tylenchulus species*; dagger nematodes, *Xiphinema americanum*, *Xiphinema index*, *Xiphinema diversicaudatum* and other *Xiphinema species*; and other plant parasitic nematode species.

The mixtures according to the invention can be applied to any and all developmental stages of  
25 pests, such as egg, larva, pupa, and adult. The pests may be controlled by contacting the target pest, its food supply, habitat, breeding ground or its locus with a pesticidally effective amount of the inventive mixtures or of compositions comprising the mixtures.

"Locus" means a plant, plant propagation material (preferably seed), soil, area, material or environment in which a pest is growing or may grow.  
30

In general, "pesticidally effective amount" means the amount of the inventive mixtures or of compositions comprising the mixtures needed to achieve an observable effect on growth, including the effects of necrosis, death, retardation, prevention, and removal, destruction, or otherwise diminishing the occurrence and activity of the target organism. The pesticidally effective amount can vary for the various mixtures / compositions used in the invention. A pesticidally effective amount of the mixtures / compositions will also vary according to the prevailing conditions such as desired pesticidal effect and duration, weather, target species, locus, mode of application, and the like.  
35

40

As said above, the present invention comprises a method for improving the health of plants, wherein the plant, the locus where the plant is growing or is expected to grow or plant propagation material, from which the plant grows, is treated with an plant health effective amount of an inventive mixture.

The term "plant effective amount" denotes an amount of the inventive mixtures, which is sufficient for achieving plant health effects as defined herein below. More exemplary information about amounts, ways of application and suitable ratios to be used is given below. Anyway, the skilled artisan is well aware of the fact that such an amount can vary in a broad range and is dependent on various factors, e.g. the treated cultivated plant or material and the climatic conditions.

When preparing the mixtures, it is preferred to employ the pure active compounds, to which further active compounds against pests, such as insecticides, herbicides, fungicides or else herbicidal or growth-regulating active compounds or fertilizers can be added as further active components according to need.

The inventive mixtures are employed by treating the fungi or the plants, plant propagation materials (preferably seeds), materials or soil to be protected from fungal attack with a pesticidally effective amount of the active compounds. The application can be carried out both before and after the infection of the materials, plants or plant propagation materials (preferably seeds) by the pests.

In the context of the present invention, the term plant refers to an entire plant, a part of the plant or the propagation material of the plant.

The inventive mixtures and compositions thereof are particularly important in the control of a multitude of phytopathogenic fungi on various cultivated plants, such as cereals, e. g. wheat, rye, barley, triticale, oats or rice; beet, e. g. sugar beet or fodder beet; fruits, such as pomes, stone fruits or soft fruits, e. g. apples, pears, plums, peaches, almonds, cherries, strawberries, raspberries, blackberries or gooseberries; leguminous plants, such as lentils, peas, alfalfa or soybeans; oil plants, such as rape, mustard, olives, sunflowers, coconut, cocoa beans, castor oil plants, oil palms, ground nuts or soybeans; cucurbits, such as squashes, cucumber or melons; fiber plants, such as cotton, flax, hemp or jute; citrus fruit, such as oranges, lemons, grapefruits or mandarins; vegetables, such as spinach, lettuce, asparagus, cabbages, carrots, onions, tomatoes, potatoes, cucurbits or paprika; lauraceous plants, such as avocados, cinnamon or camphor; energy and raw material plants, such as corn, soybean, rape, sugar cane or oil palm; corn; tobacco; nuts; coffee; tea; bananas; vines (table grapes and grape juice grape vines); hop; turf; sweet leaf (also called Stevia); natural rubber plants or ornamental and forestry plants, such as flowers, shrubs, broad-leaved trees or evergreens, e. g. conifers; and on the plant propagation material, such as seeds, and the crop material of these plants.

Preferably, the inventive mixtures and compositions thereof, respectively are used for controlling a multitude of fungi on field crops, such as potatoes sugar beets, tobacco, wheat, rye, barley, oats, rice, corn, cotton, soybeans, rape, legumes, sunflowers, coffee or sugar cane; fruits; vines; ornamentals; or vegetables, such as cucumbers, tomatoes, beans or squashes.

Preferably, treatment of plant propagation materials with the inventive mixtures and compositions thereof, respectively, is used for controlling a multitude of fungi on cereals, such as wheat, rye, barley and oats; potatoes, tomatoes, vines, rice, corn, cotton and soybeans.

The term "cultivated plants" is to be understood as including plants which have been modified by breeding, mutagenesis or genetic engineering including but not limiting to agricultural biotech products on the market or in development (cf. <http://cera-gmc.org/>, see GM crop database therein). Genetically modified plants are plants, which genetic material has been so modified by the use of recombinant DNA techniques that under natural circumstances cannot readily be obtained by cross breeding, mutations or natural recombination. Typically, one or more genes have been integrated into the genetic material of a genetically modified plant in order to improve certain properties of the plant. Such genetic modifications also include but are not limited to targeted post-translational modification of protein(s), oligo- or polypeptides e. g. by glycosylation or polymer additions such as prenylated, acetylated or farnesylated moieties or PEG moieties.

Plants that have been modified by breeding, mutagenesis or genetic engineering, e. g. have been rendered tolerant to applications of specific classes of herbicides, such as auxin herbicides such as dicamba or 2,4-D; bleacher herbicides such as hydroxyphenylpyruvate dioxygenase (HPPD) inhibitors or phytoene desaturase (PDS) inhibitors; acetolactate synthase (ALS) inhibitors such as sulfonyl ureas or imidazolinones; enolpyruvylshikimate-3-phosphate synthase (EPSPS) inhibitors, such as glyphosate; glutamine synthetase (GS) inhibitors such as glufosinate; protoporphyrinogen-IX oxidase inhibitors; lipid biosynthesis inhibitors such as acetyl CoA carboxylase (ACCase) inhibitors; or oxynil (i. e. bromoxynil or ioxynil) herbicides as a result of conventional methods of breeding or genetic engineering. Furthermore, plants have been made resistant to multiple classes of herbicides through multiple genetic modifications, such as resistance to both glyphosate and glufosinate or to both glyphosate and a herbicide from another class such as ALS inhibitors, HPPD inhibitors, auxin herbicides, or ACCase inhibitors. These herbicide resistance technologies are e. g. described in Pest Managem. Sci. 61, 2005, 246; 61, 2005, 258; 61, 2005, 277; 61, 2005, 269; 61, 2005, 286; 64, 2008, 326; 64, 2008, 332; Weed Sci. 57, 2009, 108; Austral. J. Agricult. Res. 58, 2007, 708; Science 316, 2007, 1185; and references quoted therein. Several cultivated plants have been rendered tolerant to herbicides by conventional methods of breeding (mutagenesis), e. g. Clearfield® summer rape (Canola, BASF SE, Germany) being tolerant to imidazolinones, e. g. imazamox, or ExpressSun® sunflowers (DuPont, USA) being tolerant to sulfonyl ureas, e. g. tribenuron. Genetic engineering methods have been used to render cultivated plants such as soybean, cotton, corn, beets and rape, tolerant to herbicides such as glyphosate and glufosinate, some of which are commercially available under the trade names RoundupReady® (glyphosate-tolerant, Monsanto, U.S.A.), Cultivance® (imidazolinone tolerant, BASF SE, Germany) and LibertyLink® (glufosinate-tolerant, Bayer CropScience, Germany).

Furthermore, plants are also covered that are by the use of recombinant DNA techniques capable to synthesize one or more insecticidal proteins, especially those known from the bacterial genus *Bacillus*, particularly from *Bacillus thuringiensis*, such as  $\delta$ -endotoxins, e. g. CryIA(b), CryIA(c), CryIF, CryIF(a2), CryIIA(b), CryIIIA, CryIIIB(b1) or Cry9c; vegetative insecticidal proteins (VIP), e. g. VIP1, VIP2, VIP3 or VIP3A; insecticidal proteins of bacteria colonizing nematodes, e. g. *Photorhabdus* spp. or *Xenorhabdus* spp.; toxins produced by animals, such as scorpion toxins, arachnid toxins, wasp toxins, or other insect-specific neurotoxins; toxins produced by fungi, such Streptomyces toxins, plant lectins, such as pea or barley lectins; agglutinins; proteinase inhibitors, such as trypsin inhibitors, serine protease inhibitors, patatin, cystatin

or papain inhibitors; ribosome-inactivating proteins (RIP), such as ricin, maize-RIP, abrin, luffin, saporin or bryodin; steroid metabolism enzymes, such as 3-hydroxysteroid oxidase, ecdysteroid-IDP-glycosyl-transferase, cholesterol oxidases, ecdysone inhibitors or HMG-CoA-reductase; ion channel blockers, such as blockers of sodium or calcium channels; juvenile hormone esterase; diuretic hormone receptors (helicokinin receptors); stilben synthase, bibenzyl synthase, chitinases or glucanases. In the context of the present invention these insecticidal proteins or toxins are to be understood expressly also as pre-toxins, hybrid proteins, truncated or otherwise modified proteins. Hybrid proteins are characterized by a new combination of protein domains, (see, e. g. WO 02/015701). Further examples of such toxins or genetically modified plants capable of synthesizing such toxins are disclosed, e. g., in EP-A 374 753, WO 93/007278, WO 95/34656, EP-A 427 529, EP-A 451 878, WO 03/18810 und WO 03/52073. The methods for producing such genetically modified plants are generally known to the person skilled in the art and are described, e. g. in the publications mentioned above. These insecticidal proteins contained in the genetically modified plants impart to the plants producing these proteins tolerance to harmful pests from all taxonomic groups of arthropods, especially to beetles (Coleoptera), two-winged insects (Diptera), and moths (Lepidoptera) and to nematodes (Nematoda). Genetically modified plants capable to synthesize one or more insecticidal proteins are, e. g., described in the publications mentioned above, and some of which are commercially available such as YieldGard® (corn cultivars producing the Cry1Ab toxin), YieldGard® Plus (corn cultivars producing Cry1Ab and Cry3Bb1 toxins), Starlink® (corn cultivars producing the Cry9c toxin), Herculex® RW (corn cultivars producing Cry34Ab1, Cry35Ab1 and the enzyme Phosphinothricin-N-Acetyltransferase [PAT]); NuCOTN® 33B (cotton cultivars producing the Cry1Ac toxin), Bollgard® I (cotton cultivars producing the Cry1Ac toxin), Bollgard® II (cotton cultivars producing Cry1Ac and Cry2Ab2 toxins); VIPCOT® (cotton cultivars producing a VIP-toxin); NewLeaf® (potato cultivars producing the Cry3A toxin); Bt-Xtra®, NatureGard®, KnockOut®, BiteGard®, Protecta®, Bt11 (e. g. Agrisure® CB) and Bt176 from Syngenta Seeds SAS, France, (corn cultivars producing the Cry1Ab toxin and PAT enzyme), MIR604 from Syngenta Seeds SAS, France (corn cultivars producing a modified version of the Cry3A toxin, c.f. WO 03/018810), MON 863 from Monsanto Europe S.A., Belgium (corn cultivars producing the Cry3Bb1 toxin), IPC 531 from Monsanto Europe S.A., Belgium (cotton cultivars producing a modified version of the Cry1Ac toxin) and 1507 from Pioneer Overseas Corporation, Belgium (corn cultivars producing the Cry1F toxin and PAT enzyme).

Furthermore, plants are also covered that are by the use of recombinant DNA techniques capable to synthesize one or more proteins to increase the resistance or tolerance of those plants to bacterial, viral or fungal pathogens. Examples of such proteins are the so-called "pathogenesis-related proteins" (PR proteins, see, e. g. EP-A 392 225), plant disease resistance genes (e. g. potato cultivars, which express resistance genes acting against *Phytophthora infestans* derived from the mexican wild potato *Solanum bulbocastanum*) or T4-lysozym (e. g. potato cultivars capable of synthesizing these proteins with increased resistance against bacteria such as *Erwinia amylovora*). The methods for producing such genetically modified plants are generally known to the person skilled in the art and are described, e. g. in the publications mentioned above.

Furthermore, plants are also covered that are by the use of recombinant DNA techniques capable to synthesize one or more proteins to increase the productivity (e. g. bio mass produc-

tion, grain yield, starch content, oil content or protein content), tolerance to drought, salinity or other growth-limiting environmental factors or tolerance to pests and fungal, bacterial or viral pathogens of those plants.

5 Furthermore, plants are also covered that contain by the use of recombinant DNA techniques a modified amount of substances of content or new substances of content, specifically to improve human or animal nutrition, e. g. oil crops that produce health-promoting long-chain omega-3 fatty acids or unsaturated omega-9 fatty acids (e. g. Nexera® rape, DOW Agro Sciences, Canada).

10 Furthermore, plants are also covered that contain by the use of recombinant DNA techniques a modified amount of substances of content or new substances of content, specifically to improve raw material production, e. g. potatoes that produce increased amounts of amylopectin (e. g. Amflora® potato, BASF SE, Germany).

15 The separate or joint application of the compounds of the inventive mixtures is carried out by spraying or dusting the seeds, the seedlings, the plants or the soils before or after sowing of the plants or before or after emergence of the plants.

20 The inventive mixtures are effective through both contact (via soil, glass, wall, bed net, carpet, plant parts or animal parts), and ingestion (bait, or plant part) and through trophallaxis and transfer.

Preferred application methods are into water bodies, via soil, cracks and crevices, pastures, manure piles, sewers, into water, on floor, wall, or by perimeter spray application and bait.

25 According to another preferred embodiment of the invention, for use against non crop pests such as ants, termites, wasps, flies, mosquitoes, crickets, locusts, or cockroaches the inventive mixtures are prepared into a bait preparation.

30 The bait can be a liquid, a solid or a semisolid preparation (e.g. a gel). The bait employed in the composition is a product which is sufficiently attractive to incite insects such as ants, termites, wasps, flies, mosquitoes, crickets etc. or cockroaches to eat it. This attractant may be chosen from feeding stimulants or para and / or sex pheromones readily known in the art.

35 Methods to control infectious diseases transmitted by insects (e.g. malaria, dengue and yellow fever, lymphatic filariasis, and leishmaniasis) with the inventive mixtures and their respective compositions also comprise treating surfaces of huts and houses, air spraying and impregnation of curtains, tents, clothing items, bed nets, tsetse-fly trap or the like. Insecticidal compositions for application to fibers, fabric, knitgoods, non-wovens, netting material or foils and tarpaulins preferably comprise a composition including the inventive mixtures, optionally a repellent and at least one binder.

40 The inventive mixtures and the compositions comprising them can be used for protecting wooden materials such as trees, board fences, sleepers, etc. and buildings such as houses, out-houses, factories, but also construction materials, furniture, leathers, fibers, vinyl articles, electric wires and cables etc. from ants and/or termites, and for controlling ants and termites from

doing harm to crops or human being (e.g. when the pests invade into houses and public facilities).

5 In the case of soil treatment or of application to the pests dwelling place or nest, the quantity of active ingredient ranges from 0.0001 to 500 g per 100 m<sup>2</sup>, preferably from 0.001 to 20 g per 100 m<sup>2</sup>.

10 Customary application rates in the protection of materials are, for example, from 0.01 g to 1000 g of active compound per m<sup>2</sup> treated material, desirably from 0.1 g to 50 g per m<sup>2</sup>.

Insecticidal compositions for use in the impregnation of materials typically contain from 0.001 to 95 weight %, preferably from 0.1 to 45 weight %, and more preferably from 1 to 25 weight % of at least one repellent and / or insecticide.

15 For use in bait compositions, the typical content of active ingredient is from 0.0001 weight % to 15 weight %, desirably from 0.001 weight % to 5% weight % of active compound. The composition used may also comprise other additives such as a solvent of the active material, a flavoring agent, a preserving agent, a dye or a bitter agent. Its attractiveness may also be enhanced by a special color, shape or texture.

20 For use in spray compositions, the content of the mixture of the active ingredients is from 0.001 to 80 weights %, preferably from 0.01 to 50 weight % and most preferably from 0.01 to 15 weight %.

#### 25 Biological Data

The active compounds were formulated separately as a stock solution having a concentration of 10000 ppm in dimethyl sulfoxide.

30 Compound No C-1 is N<sup>2</sup>-[2-(3-chloro-2-pyridyl)-5-[(5-methyltetrazol-2-yl)methyl] pyrazol-3-yl]-5-cyano-N<sup>1</sup>,3-dimethyl-phthalamide) as indicated above.

1. Activity against the late blight pathogen *Phytophthora infestans* in the microtiter test (Phyitin)  
35 The stock solutions were mixed according to the ratio, pipetted onto a micro titer plate (MTP) and diluted with water to the stated concentrations. A spore suspension of *Phytophthora infestans* containing a pea juice-based aqueous nutrient medium or DDC medium was then added. The plates were placed in a water vapor-saturated chamber at a temperature of 18°C. Using an absorption photometer, the MTPs were measured at 405 nm 7 days after the inoculation.

40 The expected efficacies of active compound mixtures were determined using Colby's formula [R.S. Colby, "Calculating synergistic and antagonistic responses of herbicide combinations", Weeds 15, 20-22 (1967)] and compared with the observed efficacies.

The results are shown below in table 1.

Table 1

Active compound / active mixture	Concentration (ppm)	Mixture	Observed efficacy	Calculated efficacy according to Colby (%)	Synergism (%)
Pyraclostrobin	0.063	-	25		
C-1	16 4	- -	11 3		
Pyraclostrobin C-1	0.063 16	1 : 250	58	33	25
Pyraclostrobin C-1	0.063 4	1 : 63	45	27	18

### 2. Activity against rice blast *Pyricularia oryzae* in the microtiterplate test (Pyrior)

- The stock solutions were mixed according to the ratio, pipetted onto a micro titer plate (MTP) and diluted with water to the stated concentrations. A spore suspension of *Pyricularia oryzae* in an aqueous biomalt or yeast-bactopeptone-glycerine solution was then added. The plates were placed in a water vapor-saturated chamber at a temperature of 18°C. Using an absorption photometer, the MTPs were measured at 405 nm 7 days after the inoculation.
- The expected efficacies of active compound mixtures were determined using Colby's formula [R.S. Colby, "Calculating synergistic and antagonistic responses of herbicide combinations", Weeds 15, 20-22 (1967)] and compared with the observed efficacies.

The results are shown below in table 2.

Table 2

Active compound / active mixture	Concentration (ppm)	Mixture	Observed efficacy	Calculated efficacy according to Colby (%)	Synergism (%)
Pyraclostrobin	0.004	-	27		
C-1	16 4	- -	25 4		
Pyraclostrobin C-1	0.004 4	1 : 1000	58	30	28
Pyraclostrobin C-1	0.004 16	1 : 4000	67	46	21

15

### 3. Activity against leaf blotch on wheat caused by *Septoria tritici* (Septtr)

- The stock solutions were mixed according to the ratio, pipetted onto a micro titer plate (MTP) and diluted with water to the stated concentrations. A spore suspension of *Septoria tritici* in an aqueous biomalt or yeast-bactopeptone-glycerine solution was then added. The plates were

20

placed in a water vapor-saturated chamber at a temperature of 18°C. Using an absorption photometer, the MTPs were measured at 405 nm 7 days after the inoculation.

The expected efficacies of active compound mixtures were determined using Colby's formula [R.S. Colby, "Calculating synergistic and antagonistic responses of herbicide combinations", Weeds 15, 20-22 (1967)] and compared with the observed efficacies.

The results are shown below in table 3.

10 Table 3

Active compound / active mixture	Concentration (ppm)	Mixture	Observed efficacy	Calculated efficacy according to Colby (%)	Synergism (%)
Pyraclostrobin	0.004	-	33		
C-1	63	-	19		
	16	-	18		
	4	-	14		
flupyradifurone	63	-	16		
Pyraclostrobin C-1	0.004 4	1 : 1000	66	43	23
Pyraclostrobin C-1	0.004 16	1 : 4000	65	45	20
Pyraclostrobin C-1	0.004 63	1 : 16 000	86	46	40
Pyraclostrobin flupyradifurone	0.004 63	1 : 16 000	63	44	19

#### 4. Activity against early blight caused by *Alternaria solani*

15 The stock solutions were mixed according to the ratio, pipetted onto a micro titer plate (MTP) and diluted with water to the stated concentrations. A spore suspension of *Alternaria solani* in an aqueous biomalt or yeast-bactopeptone-glycerine solution was then added. The plates were placed in a water vapor-saturated chamber at a temperature of 18°C. Using an absorption photometer, the MTPs were measured at 405 nm 7 days after the inoculation.

20 The measured parameters were compared to the growth of the active compound-free control variant (100%) and the fungus-free and active compound-free blank value to determine the relative growth in % of the pathogens in the respective active compounds.

These percentages were converted into efficacies.

The expected efficacies of active compound mixtures were determined using Colby's formula [R.S. Colby, "Calculating synergistic and antagonistic responses of herbicide combinations", Weeds 15, 20-22 (1967)] and compared with the observed efficacies.

The results are shown below in table 4.

5

Table 4

Active compound / active mixture	Concentration (ppm)	Mixture	Observed efficacy	Calculated efficacy according to Colby (%)	Synergism (%)
Pyraclostrobin	0.016	-	19		
	0.004	-	3		
C-1	63	-	0		
flupyradifurone	63	-	0		
Pyraclostrobin	0.016	1 : 4000	57	19	38
C-1	63				
Pyraclostrobin	0.004	1 : 16 000	30	3	27
C-1	63				
Pyraclostrobin	0.016	1 : 4000	41	19	22
flupyradifurone	63				
Pyraclostrobin	0.004	1 : 16 000	22	3	19
flupyradifurone	63				

## Claims

## 1. Pesticidal mixtures comprising, as active components,

- 5           1)     pyraclostrobin as compound I; and
- 2)     one insecticidal compound II selected from the group consisting of flupyradifurone, N2-[2-(3-chloro-2-pyridyl)-5-[(5-methyltetrazol-2-yl)methyl]pyrazol-3-yl]-5-cyano-N1,3-dimethyl-phthalamide, cycloxaprid, flometoquin, fluensulfone, flufiprole, , fufeno-  
10     zide, pyflubumide, , 3-bromo-N2-[5-bromo-2-(3-chloro-2-pyridyl)pyrazol-3-yl]-5-chloro-N1-(1-cyclopropylethyl)phthalamide, 1-[2-fluoro-4-methyl-5-(2,2,2-trifluoroethylsulfinyl)phenyl]-3-(trifluoromethyl)-1,2,4-triazole, 2-[2-fluoro-4-methyl-5-(2,2,2-trifluoroethylsulfinyl)phenyl]-5-(trifluoromethyl)-1,2,4-triazol-3-amine, 1-(4-chloro-3-fluoro-phenyl)-N-[(2-methyl-3-phenyl-phenyl)methoxy]-2-methylsulfanyl-  
15     ethanimine, 2-(5-amino-1,3,4-thiadiazol-2-yl)-N-[5-bromo-2-(3-chloro-2-pyridyl)pyrazol-3-yl]-4-chloro-6-methyl-benzamide, 1-[(6-chloro-3-pyridyl)methyl]-7-methyl-8-nitro-5-propoxy-3,5,6,7-tetrahydro-2H-imidazo[1,2-a]pyridine, methyl (E)-2-[2-[[2-(2,4-dichloroanilino)-6-(trifluoromethyl)pyrimidin-4-yl]oxymethyl]phenyl]-3-methoxy-prop-2-enoate and 1-[(E)-[2-(4-cyanophenyl)-1-[3-(trifluoromethyl)phenyl]ethylidene]amino]-3-(4-(difluoromethoxy)phenyl)urea  
20     in synergistic effective amounts.
2.     The mixture according to claim 1, wherein compound II is selected from the group consisting of flupyradifurone, N2-[2-(3-chloro-2-pyridyl)-5-[(5-methyltetrazol-2-yl)methyl]pyrazol-3-yl]-5-cyano-N1,3-dimethyl-phthalamide, cycloxaprid, flometoquin, flufiprole, , fufenozide,  
25     pyflubumide, , 3-bromo-N2-[5-bromo-2-(3-chloro-2-pyridyl)pyrazol-3-yl]-5-chloro-N1-(1-cyclopropylethyl)phthalamide, 1-[2-fluoro-4-methyl-5-(2,2,2-trifluoroethylsulfinyl)phenyl]-3-(trifluoromethyl)-1,2,4-triazole, 2-[2-fluoro-4-methyl-5-(2,2,2-trifluoroethylsulfinyl)phenyl]-5-(trifluoromethyl)-1,2,4-triazol-3-amine, 2-(5-amino-1,3,4-thiadiazol-2-yl)-N-[5-bromo-2-(3-chloro-2-pyridyl)pyrazol-3-yl]-4-chloro-6-methyl-benzamide and 1-[(6-chloro-3-pyridyl)methyl]-7-methyl-8-nitro-5-propoxy-3,5,6,7-tetrahydro-2H-imidazo[1,2-a]pyridine.  
30
3.     The mixture according to claim 1, wherein compound II is selected from the group consisting of flupyradifurone, N2-[2-(3-chloro-2-pyridyl)-5-[(5-methyltetrazol-2-yl)methyl]pyrazol-3-yl]-5-cyano-N1,3-dimethyl-phthalamide, cycloxaprid, flufiprole, 3-bromo-N2-[5-bromo-2-(3-chloro-2-pyridyl)pyrazol-3-yl]-5-chloro-N1-(1-cyclopropylethyl)phthalamide, 1-[2-fluoro-4-methyl-5-(2,2,2-trifluoroethylsulfinyl)phenyl]-3-(trifluoromethyl)-1,2,4-triazole, 2-[2-fluoro-4-methyl-5-(2,2,2-trifluoroethylsulfinyl)phenyl]-5-(trifluoromethyl)-1,2,4-triazol-3-amine, 2-(5-amino-1,3,4-thiadiazol-2-yl)-N-[5-bromo-2-(3-chloro-2-pyridyl)pyrazol-3-yl]-4-chloro-6-  
35

methyl-benzamide and 1-[(6-chloro-3-pyridyl)methyl]-7-methyl-8-nitro-5-propoxy-3,5,6,7-tetrahydro-2H-imidazo[1,2-a]pyridine.

4. A mixture as claimed in any of claims 1 to 3, wherein compound II is N2-[2-(3-chloro-2-pyridyl)-5-[(5-methyltetrazol-2-yl)methyl]pyrazol-3-yl]-5-cyano-N1,3-dimethyl-phthalamide or flupyradifurone.  
5
5. A mixture as claimed in any of claims 1 to 4, wherein the weight ratio of the compound of formula I to compound of formula II is from 20000:1 to 1:20000.  
10
6. A mixture as claimed in any of claims 1 to 4, wherein the weight ratio of the compound of formula I to compound of formula II is from 100:1 to 1:100
7. A pesticidal composition, comprising a liquid or solid carrier and a mixture as defined in any of claims 1 to 6.  
15
8. A method for controlling phytopathogenic pests, wherein the pest, their habitat, breeding grounds, their locus or the plants to be protected against pest attack, the soil or plant propagation material are treated with an effective amount of a mixture as defined in any of claims 1 to 6.  
20
9. A method for improving the health of plants, wherein the plant, the locus where the plant is growing or is expected to grow or plant propagation material from which the plant grows are treated with an effective amount of a mixture as defined in any of claims 1 to 6.  
25
10. A method for protection of plant propagation material from pests comprising contacting the plant propagation materials with a mixture as defined in any of claims 1 to 5 in pesticidally effective amounts.
- 30 11. A method as claimed in claim 10, wherein the mixture as defined in any of claims 1 to 6 is applied in an amount of from 0.01 g to 10 kg per 100 kg of plant propagation materials.
12. A method as claimed in claims 8 to 11, wherein the mixture as defined in any of claims 1 to 6 are applied simultaneously, that is jointly or separately, or in succession.  
35
13. Plant propagation material, comprising the mixture as defined in any of claims 1 to 5 in an amount of from 0.01 g to 10 kg per 100 kg of plant propagation materials.

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/EP2013/057285

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

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

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

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

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

see additional sheet

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

1-13(partially)

### Remark on Protest

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

**INTERNATIONAL SEARCH REPORT**

International application No  
PCT/EP2013/057285

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>					
INV.	A01N47/24	A01N43/90	A01N47/06	A01N43/78	A01N47/02
	A01N43/40	A01N43/12	A01N43/56	A01N43/713	A01N43/653
	A01N35/10	A01N43/82	A01N43/54	A01N47/34	A01P7/00
According to International Patent Classification (IPC) or to both national classification and IPC					

**B. FIELDS SEARCHED**  
Minimum documentation searched (classification system followed by classification symbols)  
A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2010/043639 A2 (BASF SE [DE]; JAMET LAURENT [FR]; GERHARD RALF WILLI [DE]; WILHELM RON) 22 April 2010 (2010-04-22) abstract; example 1 -----	1-13
A	WO 2010/108507 A2 (BAYER CROPSCIENCE AG [DE]; JESCHKE PETER [DE]; VELTEN ROBERT [DE]; HUN) 30 September 2010 (2010-09-30) cited in the application abstract page 2, line 21 - page 3, line 11 page 28, line 11 - page 29, line 1 page 72, line 3 - line 5 compounds I-5, 2-12 example B -----	1-13

Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search <p align="center">26 April 2013</p>	Date of mailing of the international search report <p align="center">14/08/2013</p>
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer <p align="center">Molina de Alba, José</p>
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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No

PCT/EP2013/057285

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2010043639 A2	22-04-2010	AR 075649 A1	20-04-2011
		WO 2010043639 A2	22-04-2010
-----			
WO 2010108507 A2	30-09-2010	AU 2009342807 A1	13-10-2011
		CN 102365018 A	29-02-2012
		EA 201171136 A1	30-05-2012
		EP 2410850 A2	01-02-2012
		US 2012035050 A1	09-02-2012
		WO 2010108507 A2	30-09-2010
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**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

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

## 1. claims: 1-13(partially)

Pesticidal mixtures comprising pyraclostrobin and flupyradifurone in synergistic effective amounts  
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## 2. claims: 1-13(partially)

Pesticidal mixtures comprising pyraclostrobin and compound C-1 as defined on p. 3 in synergistic effective amounts  
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## 3. claims: 1-3, 5-13(all partially)

Pesticidal mixtures comprising pyraclostrobin and cycloxadprid in synergistic effective amounts  
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## 4. claims: 1, 2, 5-13(all partially)

Pesticidal mixtures comprising pyraclostrobin and flometoquin in synergistic effective amounts  
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## 5. claims: 1, 5-13(all partially)

Pesticidal mixtures comprising pyraclostrobin and fluensulfone in synergistic effective amounts  
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## 6. claims: 1-3, 5-13(all partially)

Pesticidal mixtures comprising pyraclostrobin and flufiprole in synergistic effective amounts  
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## 7. claims: 1, 2, 5-13(all partially)

Pesticidal mixtures comprising pyraclostrobin and fufenozide in synergistic effective amounts  
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## 8. claims: 1, 2, 5-13(all partially)

Pesticidal mixtures comprising pyraclostrobin and pyflubumide in synergistic effective amounts  
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## 9. claims: 1-3, 5-13(all partially)

Pesticidal mixtures comprising pyraclostrobin and compound C-2 as defined on p. 3 in synergistic effective amounts

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

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

Pesticidal mixtures comprising pyraclostrobin and compound C-3 as defined on p. 3 in synergistic effective amounts

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

Pesticidal mixtures comprising pyraclostrobin and compound C-4 as defined on p. 4 in synergistic effective amounts

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

Pesticidal mixtures comprising pyraclostrobin and compound C-5 as defined on p. 4 in synergistic effective amounts

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

Pesticidal mixtures comprising pyraclostrobin and compound C-6 as defined on p. 4 in synergistic effective amounts

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

Pesticidal mixtures comprising pyraclostrobin and compound C-7 as defined on p. 4 in synergistic effective amounts

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

Pesticidal mixtures comprising pyraclostrobin and compound C-8 as defined on p. 4, l. 18-p. 5, l. 1 in synergistic effective amounts

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

Pesticidal mixtures comprising pyraclostrobin and compound C-9 as defined on p. 5 in synergistic effective amounts

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