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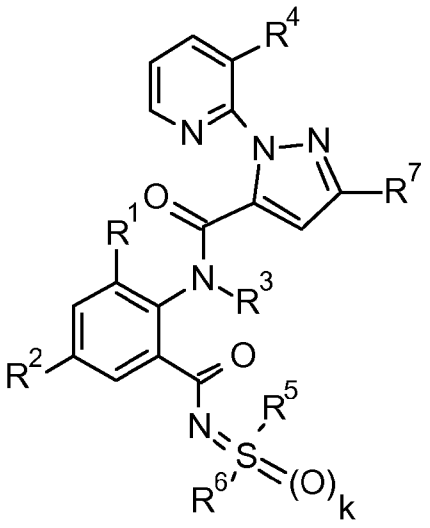
(54) Title: PESTICIDALLY ACTIVE MIXTURES COMPRISING ANTHRANILAMIDE COMPOUNDS



(I)

(57) Abstract: The present invention relates to pesticidal mixtures comprising as active compounds 1) at least one pesticidally active anthranilamide compound of formula (I) wherein R^1, R^2, R^3, R^4, R^5, R^6, R^7 and k are as defined in the description; and 2) at least one fungicidally active compound II selected from a group F comprising azoles, strobilurins, carboxamides, carbamates, heterocyclic and various other compounds as defined in the description, in synergistically effective amounts. The invention relates further to methods and use of these mixtures for combating and controlling insects, acarids or nematodes and harmful fungi in and on plants, and for protecting such plants being infested with pests, especially also for protecting plant propagation material, such as seeds.

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Pesticidally active mixtures comprising anthranilamide compounds

The present invention relates to mixtures of anthranilamide compounds with one or more fungicidal compounds and to methods comprising applying said mixtures. The mixtures have synergistically enhanced action. The invention also relates to the use of such combinations for controlling invertebrate pests and phytopathogenic fungi, in particular to the use for protecting plants and plant propagation material from infection by phytopathogenic fungi or from infestation and/or attack by invertebrate pest. The invention also relates to the use of these combinations for improving plant health and/or crop yield.

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.
Another problem encountered concerns the need to have available pest control agents which are effective against a broad spectrum of pests.
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.

The combating of harmful insects is in many regions not the only problem the farmer has to face. Also harmful phytopathogenic fungi can cause a great damage to crops and other plants. An efficient combination of insecticidal and fungicidal activity is desirable to overcome this problem. Thus, it is an object of the present invention to provide a combination which, on the one hand, has good insecticidal activity, and, on the other hand, good fungicidal activity. Moreover, it is desirable to have available pesticidal active agents which are effective against a broad spectrum of pests. Furthermore, application of the active ingredients should not damage crop plants.

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 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 induced by pesticides.

Furthermore, there is a desire for pesiticide compounds or combination of compounds, which when applied improve plants, which may result in “plant health”, “vitality of plant propagation material” or “increased plant yield”.
It is therefore an object of the present invention to provide agricultural combinations which solves one or more than one of the discussed problems as
- reducing the dosage rate,
- enhancing the spectrum of activity,
- combining knock-down activity with prolonged control,
- improving resistance management,
- Improved plant health;
- Improved vitality of plant propagation material, also termed seed vitality;

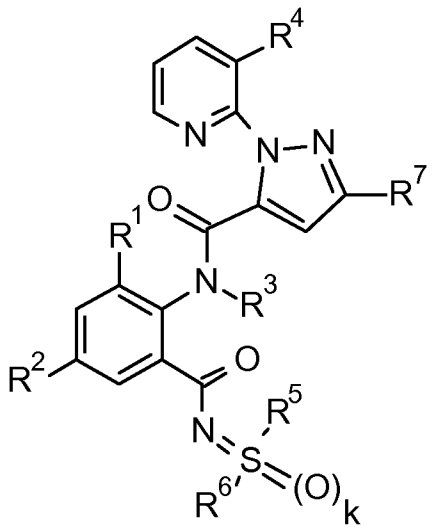
- Increased plant yield..

It was therefore an object of the present invention to provide pesticidal mixtures which solve at least one of the discussed problems as reducing the dosage rate, enhancing the spectrum of activity or combining knock-down activity with prolonged control or as to resistance management.

It has been found that this object is in part or in whole achieved by the combination of active compounds defined below.

The present invention relates to pesticidal mixtures comprising as active compounds

1) at least one pesticidally active anthranilamide compound of formula (I):



(I)

wherein

R^1 is selected from the group consisting of halogen, methyl and halomethyl;

R^2 is selected from the group consisting of hydrogen, halogen, halomethyl and cyano;

R^3 is selected from hydrogen, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_2-C_6-alkenyl, C_2-C_6-haloalkenyl, C_2-C_6-alkinyl, C_2-C_6-haloalkinyl, C_3-C_8-cycloalkyl, C_3-C_8-halocycloalkyl, C_1-C_4-alkoxy-C_1-C_4-alkyl, C_1-C_4-haloalkoxy-C_1-C_4-alkyl, $C(=O)R^a$, $C(=O)OR^b$ and $C(=O)NR^cR^d$;

R^4 is hydrogen or halogen;

R^5, R^6 are selected independently of one another from the group consisting of hydrogen, C_1-C_{10}-alkyl, C_3-C_8-cycloalkyl, C_2-C_{10}-alkenyl, C_2-C_{10}-alkynyl, wherein the aforementioned aliphatic and cycloaliphatic radicals may be substituted with 1 to 10 substituents R^e, and phenyl, which is unsubstituted or carries 1 to 5 substituents R^f; or

R^5 and R^6 together represent a C_2-C_7-alkylene, C_2-C_7-alkenylene or C_6-C_9-alkynylene chain forming together with the sulfur atom to which they are attached a 3-, 4-, 5-, 6-, 7-, 8-, 9- or 10-membered saturated, partially unsaturated or fully unsaturated ring, wherein 1 to 4 of the CH_2 groups in the C_2-C_7-alkylene chain or 1 to 4 of any of the CH_2 or CH groups in the C_2-C_7-alkenylene chain or 1 to 4 of any of the CH_2 groups in the C_6-C_9-alkynylene chain may be replaced by 1 to 4 groups independently selected from the group consisting of C=O, C=S, O, S, N, NO, SO, SO_2 and NH, and wherein the carbon and/or nitrogen atoms in the C_2-C_7-alkylene, C_2-C_7-alkenylene or C_6-C_9-alkynylene chain may be substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, C_1-C_6-alkyl, C_1-C_6-haloalkyl, C_1-C_6-alkoxy, C_1-C_6-haloalkoxy, C_1-C_6-alkylthio, C_1-C_6-haloalkylthio, C_3-C_8-cycloalkyl, C_3-C_8-halocycloalkyl, C_2-C_6-alkenyl, C_2-C_6-haloalkenyl, C_2-C_6-alkynyl and C_2-C_6-haloalkynyl; said substituents being identical or different from one another if more than one substituent is present;

R^7 is selected from the group consisting of bromo, chloro, difluoromethyl, trifluoromethyl, nitro, cyano, OCH_3, $OCHF_2$, OCH_2F, OCH_2CF_3, $S(=O)_nCH_3$, and $S(=O)_nCF_3$;

R^a is selected from the group consisting of C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkinyl, C_3-C_8-cycloalkyl, C_1-C_6-alkoxy, C_1-C_6-alkylthio, C_1-C_6-alkylsulfinyl, C_1-C_6-alkylsulfonyl, wherein one or more CH_2 groups of the aforementioned radicals may be replaced by a C=O group, and/or the aliphatic and cycloaliphatic moieties of the aforementioned radicals may be unsubstituted, partially or fully halogenated and/or may carry 1 or 2 substituents selected from C_1-C_4 alkoxy;
phenyl, benzyl, pyridyl and phenoxy, wherein the last four radicals may be unsubstituted, partially or fully halogenated and/or carry 1, 2 or 3 substituents selected from C_1-C_6-alkyl, C_1-C_6-haloalkyl, C_1-C_6-alkoxy, C_1-C_6-haloalkoxy, (C_1-C_6-alkoxy)carbonyl, C_1-C_6-alkylamino and di-(C_1-C_6-alkyl)amino,

R^b is selected from the group consisting of C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkinyl, C_3-C_8-cycloalkyl, C_1-C_6-alkoxy, C_1-C_6-alkylthio, C_1-C_6-alkylsulfinyl, C_1-C_6-alkylsulfonyl, wherein one or more CH_2 groups of the aforementioned radicals may be replaced by a C=O group, and/or the aliphatic and cycloaliphatic moieties of the aforementioned radicals may be unsubstituted, partially or fully halogenated and/or may carry 1 or 2 substituents selected from C_1-C_4-alkoxy;
phenyl, benzyl, pyridyl and phenoxy, wherein the last four radicals may be unsubstituted, partially or fully halogenated and/or carry 1, 2 or 3 substituents selected from C_1-C_6-alkyl, C_1-C_6-haloalkyl, C_1-C_6-alkoxy, C_1-C_6-haloalkoxy and (C_1-C_6-alkoxy)carbonyl;

R^c, R^d are, independently from one another and independently of each occurrence, selected from the group consisting of hydrogen, cyano, C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkinyl, C_3-C_8-cycloalkyl, wherein one or more CH_2 groups of the

aforementioned radicals may be replaced by a C=O group, and/or the aliphatic and cycloaliphatic moieties of the aforementioned radicals may be unsubstituted, partially or fully halogenated and/or may carry 1 or 2 radicals selected from C_1-C_4-alkoxy;

C_1-C_6-alkoxy, C_1-C_6-haloalkoxy, C_1-C_6-alkylthio, C_1-C_6-alkylsulfinyl, C_1-C_6-alkylsulfonyl, C_1-C_6-haloalkylthio, phenyl, benzyl, pyridyl and phenoxy, wherein the four last mentioned radicals may be unsubstituted, partially or fully halogenated and/or carry 1, 2 or 3 substituents selected from C_1-C_6-alkyl, C_1-C_6-haloalkyl, C_1-C_6-alkoxy, C_1-C_6 haloalkoxy and (C_1-C_6-alkoxy)carbonyl; or

R^c and R^d, together with the nitrogen atom to which they are bound, may form a 3-, 4-, 5-, 6- or 7-membered saturated, partially unsaturated or fully unsaturated heterocyclic ring which may additionally contain 1 or 2 further heteroatoms or heteroatom groups selected from N, O, S, NO, SO and SO_2, as ring members, where the heterocyclic ring may optionally be substituted with halogen, C_1-C_4-haloalkyl, C_1-C_4-alkoxy or C_1-C_4-haloalkoxy;

R^e is independently selected from the group consisting of halogen, cyano, nitro, -OH, -SH, -SCN, C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkinyl, C_3-C_8-cycloalkyl, wherein one or more CH_2 groups of the aforementioned radicals may be replaced by a C=O group, and/or the aliphatic and cycloaliphatic moieties of the aforementioned radicals may be unsubstituted, partially or fully halogenated and/or may carry 1 or 2 radicals selected from C_1-C_4 alkoxy;

C_1-C_6-alkoxy, C_1-C_6-haloalkoxy, C_1-C_6-alkylthio, C_1-C_6-alkylsulfinyl, C_1-C_6-alkylsulfonyl, C_1-C_6-haloalkylthio, $-OR^a$, $-NR^cR^d$, $-S(O)_nR^a$, $-S(O)_nNR^cR^d$, $-C(=O)R^a$, $-C(=O)NR^cR^d$, $-C(=O)OR^b$, $-C(=S)R^a$, $-C(=S)NR^cR^d$, $-C(=S)OR^b$, $-C(=S)SR^b$, $-C(=NR^c)R^b$, $-C(=NR^c)NR^cR^d$, phenyl, benzyl, pyridyl and phenoxy, wherein the last four radicals may be unsubstituted, partially or fully halogenated and/or carry 1, 2 or 3 substituents selected from C_1-C_6-alkyl, C_1-C_6-haloalkyl, C_1-C_6-alkoxy and C_1-C_6-haloalkoxy; or

two vicinal radicals R^e together form a group =O, =CH(C_1-C_4-alkyl), =C(C_1-C_4-alkyl)C_1-C_4-alkyl, =N(C_1-C_6-alkyl) or =NO(C_1-C_6-alkyl);

R^f is independently selected from the group consisting of halogen, cyano, nitro, -OH, -SH, -SCN, C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkinyl, C_3-C_8-cycloalkyl, wherein one or more CH_2 groups of the aforementioned radicals may be replaced by a C=O group, and/or the aliphatic and cycloaliphatic moieties of the aforementioned radicals may be unsubstituted, partially or fully halogenated and/or may carry 1 or 2 radicals selected from C_1-C_4 alkoxy;

C_1-C_6-alkoxy, C_1-C_6-haloalkoxy, C_1-C_6-alkylthio, C_1-C_6-alkylsulfinyl, C_1-C_6-alkylsulfonyl, C_1-C_6-haloalkylthio, $-OR^a$, $-NR^cR^d$, $-S(O)_nR^a$, $-S(O)_nNR^cR^d$, $-C(=O)R^a$, $-C(=O)NR^cR^d$, $-C(=O)OR^b$, $-C(=S)R^a$, $-C(=S)NR^cR^d$, $-C(=S)OR^b$, $-C(=S)SR^b$, $-C(=NR^c)R^b$, and $-C(=NR^c)NR^cR^d$;

k is 0 or 1;

n is 0, 1 or 2;

or a stereoisomer, salt, tautomer or N-oxide, or a polymorphic crystalline form, a co-crystal or a solvate of a compound or a stereoisomer, salt, tautomer or N-oxide thereof;

and

2) at least one pesticidally active compound II selected from group F consisting of

F.I) Respiration Inhibitors

F.I-1) Inhibitors of complex III at Qo site selected from the group of strobilurins including azoxystrobin, coumethoxystrobin, coumoxystrobin, dimoxystrobin, enestroburin, fluoxastrobin, kresoxim-methyl, mandestrobin, metominostrobin, orysastrobin, picoxystrobin, pyraclostrobin, pyrametostrobin, pyraoxystrobin, pyribencarb, triclopyricarb/chlorodincarb, trifloxystrobin, 2-[2-(2,5-dimethyl-phenoxymethyl)-phenyl]-3-methoxy-acrylic acid methyl ester and 2 (2-(3-(2,6-dichlorophenyl)-1-methyl-allylideneaminooxymethyl)-phenyl)-2-methoxyimino-N methyl-acetamide;
oxazolidinediones and imidazolinones selected from famoxadone, fenamidone;

F.I-2) Inhibitors of complex II selected from the group of carboxamides, including carboxanilides selected from benodanil, benzovindiflupyr, bixafen, boscalid, carboxin, fenfuram, fenhexamid, fluopyram, flutolanil, furametpyr, isofetamid, isopyrazam, isotianil, mepronil, oxycarboxin, penflufen, penthiopyrad, sedaxane, tecloftalam, thifluzamide, tiadinil, 2-amino-4 methyl-thiazole-5-carboxanilide, N-(3',4',5' trifluorobiphenyl-2 yl)-3-difluoromethyl-1-methyl-1H-pyrazole-4 carboxamide (fluxapyroxad), N-(4'-trifluoromethylthiobiphenyl-2-yl)-3-difluoromethyl-1-methyl-1H pyrazole-4-carboxamide, N-(2-(1,3,3-trimethyl-butyl)-phenyl)-1,3-dimethyl-5 fluoro-1H-pyrazole-4 carboxamide, 3-(difluoromethyl)-1-methyl-N-(1,1,3-trimethylindan-4-yl)pyrazole-4-carboxamide, 3-(trifluoromethyl)-1-methyl-N-(1,1,3-trimethyl-indan-4-yl)pyrazole-4-carboxamide, 1,3-dimethyl-N-(1,1,3-trimethylindan-4-yl)pyrazole-4-carboxamide, 3-(trifluoromethyl)-1,5-dimethyl-N-(1,1,3-trimethylindan-4-yl)pyrazole-4-carboxamide, 3-(difluoromethyl)-1,5-dimethyl-N-(1,1,3-trimethylindan-4-yl)pyrazole-4-carboxamide, 3-(trifluorometh¬yl)-1,5-dimethyl-N-(1,1,3-trimethylindan-4-yl)¬pyrazole-4-carboxamide, 1,3,5-tri-methyl-N-(1,1,3-trimethylindan-4-yl)pyrazole-4-carboxamide; N-(7-fluoro-1,1,3-trimethyl-indan-4-yl)-1,3-dimethyl-pyrazole-4-carbox¬amide , N-[2-(2,4-dichlorophenyl)-2-methoxy-1-methyl-ethyl]-3-(difluoromethyl)-1-methyl-pyrazole-4-carboxamide;

F.I-3) Inhibitors of complex III at Qi site including cyazofamid, amisulbrom, [(3S,6S,7R,8R)-8-benzyl-3-[(3-acetoxy-4-methoxy-pyridine-2-carbonyl)amino]-6-methyl-4,9-dioxo-1,5-dioxonan-7-yl] 2-methylpropanoate, [(3S,6S,7R,8R)-8-benzyl-3-[[3-(acetoxymethoxy)-4-methoxy-pyridine-2-carbonyl]amino]-6-

methyl-4,9-dioxo-1,5-dioxonan-7-yl] 2-methylpropanoate, [(3S,6S,7R,8R)-8-benzyl-3-[(3-isobutoxycarbonyloxy-4-methoxy-pyridine-2-carbonyl)amino]-6-methyl-4,9-dioxo-1,5-dioxonan-7-yl] 2-methylpropanoate, [(3S,6S,7R,8R)-8-benzyl-3-[[3-(1,3-benzodioxol-5-ylmethoxy)-4-methoxy-pyridine-2-carbonyl]amino]-6-methyl-4,9-dioxo-1,5-dioxonan-7-yl] 2-methylpropanoate, 3*S*,6*S*,7*R*,8*R*)-3-[[(3-hydroxy-4-methoxy-2-pyridinyl)carbonyl]amino]-6-methyl-4,9-dioxo-8-(phenylmethyl)-1,5-dioxonan-7-yl 2-methylpropanoate;

F.I-4) Other respiration inhibitors (complex I uncouplers), including diflumetorim; (5,8-difluoro¬quinazolin-4-yl)-{2-[2-fluoro-4-(4-trifluoromethylpyridin-2-yloxy)-phenyl]-ethyl}-amine; tecnazen; ametoctradin; silthiofam;
and including nitrophenyl derivates selected from binapacryl, dinobuton, dinocap, fluazinam, ferimzone; nitrthal-isopropyl,
and including organometal compounds selected from fentin salts, including fentin-acetate, fentin chloride or fentin hydroxide;

F.II) Sterol biosynthesis inhibitors (SBI fungicides)

F.II-1) C14 demethylase inhibitors,
including triazoles selected from azaconazole, bitertanol, bromuconazole, cyproconazole, difenoconazole, diniconazole, diniconazole-M, epoxiconazole, fenbuconazole, fluquinconazole, flusilazole, flutriafol, hexaconazole, imibenconazole, ipconazole, metconazole, myclobutanil, paclobutrazole, penconazole, propiconazole, prothioconazole, simeconazole, tebuconazole, tetraconazole, triadimefon, triadimenol, triticonazole, uniconazole, 1-[*rel*-(2*S*;3*R*)-3-(2-chlorophenyl)-2-(2,4-difluorophenyl)-oxiranylmethyl]-5-thiocyanato-1H-[1,2,4]triazole, 2-[*rel*-(2*S*;3*R*)-3-(2-chlorophenyl)-2-(2,4-difluorophenyl)-oxiranylmethyl]-2H-[1,2,4]triazole-3-thiol; 2-[2-chloro-4-(4-chlorophenoxy)phenyl]-1-(1,2,4-triazol-1-yl)pentan-2-ol, 1-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-cyclopropyl-2-(1,2,4-triazol-1-yl)ethanol, 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1,2,4-triazol-1-yl)butan-2-ol, 2-[2-chloro-4-(4-chlorophenoxy)phenyl]-1-(1,2,4-triazol-1-yl)butan-2-ol, 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-3-methyl-1-(1,2,4-triazol-1-yl)butan-2-ol, 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1,2,4-triazol-1-yl)propan-2-ol, 2-[2-chloro-4-(4-chlorophenoxy)phenyl]-3-methyl-1-(1,2,4-triazol-1-yl)butan-2-ol, 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1,2,4-triazol-1-yl)pentan-2-ol, 2-[4-(4-fluorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1,2,4-triazol-1-yl)propan-2-ol
and including imidazoles selected from imazalil, pefurazoate, oxpoconazole, prochloraz, triflumizole;
and including pyrimidines, pyridines and piperazines selected from fenarimol, nuarimol, pyrifenox, triforine, [3-(4-chloro-2-fluoro-phenyl)-5-(2,4-difluorophenyl)isoxazol-4-yl]-(3-pyridyl)methanol;

F.II-2) Delta14-reductase inhitors,
including morpholines selected from aldimorph, dodemorph, dodemorph-acetate, fenpropimorph, tridemorph;

and including piperidines selected from fenpropidin, piperalin;
and including spiroketalamines selected from spiroxamine;

F.II-3) Inhibitors of 3-keto reductase including hydroxyanilides selected from fenhexamid;

F.III) Nucleic acid synthesis inhibitors

F.III-1) RNA, DNA synthesis inhibitors,
including phenylamides or acyl amino acid fungicides selected from benalaxyl, benalaxyl-M, kiralaxyl, metalaxyl, metalaxyl-M (mefenoxam), ofurace, oxadixyl;
and including isoxazoles and iosothiazolones selected from hymexazole, octhilinone;

F.III-2) DNA topisomerase inhibitors selected from oxolinic acid;

F.III-3) Nucleotide metabolism inhibitors including hydroxy (2-amino)-pyrimidines selected from bupirimate;

F.IV) Inhibitors of cell division and or cytoskeleton

F.IV-1) Tubulin inhibitors:
including benzimidazoles and thiophanates selected from benomyl, carbendazim, fuberidazole, thiabendazole, thiophanate-methyl;
and including triazolopyrimidines selected from 5-chloro-7 (4-methylpiperidin-1-yl)-6-(2,4,6-trifluorophenyl)-[1,2,4]triazolo[1,5 a]pyrimidine

F.IV-2) Other cell division inhibitors
including benzamides and phenyl acetamides selected from diethofencarb, ethaboxam, pencycuron, fluopicolide, zoxamide;

F.IV-3) Actin inhibitors including benzophenones selected from metrafenone;
pyriofenone;

F.V) Inhibitors of amino acid and protein synthesis

F.V-1) Methionine synthesis inhibitors including anilino-pyrimidines selected from cyprodinil, mepanipyrim, nitrapyrin, pyrimethanil;

F.V-2) Protein synthesis inhibitors including antibiotics selected from blasticidin-S, kasugamycin, kasugamycin hydrochloride-hydrate, mildiomycin, streptomycin, oxytetracyclin, polyoxine, validamycin A;

F.VI) Signal transduction inhibitors

F.VI-1) MAP / Histidine kinase inhibitors including dicarboximides selected from fluoroimid, iprodione, procymidone, vinclozolin;
and including phenylpyrroles selected from fenpiclonil, fludioxonil;

F.VI-2) G protein inhibitors including quinolines selected from quinoxyfen;

F.VII) Lipid and membrane synthesis inhibitors

F.VII-1) Phospholipid biosynthesis inhibitors including organophosphorus compounds selected from edifenphos, iprobenfos, pyrazophos;
and including dithiolanes selected from isoprothiolane;

F.VII-2) Lipid peroxidation
including aromatic hydrocarbons selected from dicloran, quintozene, tecnazene, tolclofos-methyl, biphenyl, chloroneb, etridiazole;

F.VII-3) Carboxyl acid amides (CAA fungicides)

including cinnamic or mandelic acid amides selected from dimethomorph, flumorph, mandiproamid, pyrimorph;
and including valinamide carbamates selected from benthiavalicarb, iprovalicarb, pyribencarb, valifenalate and N-(1-(1-(4-cyano-phenyl)ethanesulfonyl)-but-2-yl) carbamic acid-(4-fluorophenyl) ester;

F.VII-4) Compounds affecting cell membrane permeability and fatty acids including carbamates selected from propamocarb, propamocarb-hydrochlorid;

F.VII-5) fatty acid amide hydrolase inhibitors: 1-[4-[4-[5-(2,6-difluorophenyl)-4,5-dihydro-3 isoxazolyl]-2-thiazolyl]-1-piperidinyl]-2-[5-methyl-3-(trifluoromethyl)-1H-pyrazol-1 yl]ethanone;

F.VIII) Inhibitors with Multi Site Action

F.VIII-1) Inorganic active substances selected from Bordeaux mixture, copper acetate, copper hydroxide, copper oxychloride, basic copper sulfate, sulfur;

F.VIII-2) Thio- and dithiocarbamates selected from ferbam, mancozeb, maneb, metam, methasulphocarb, metiram, propineb, thiram, zineb, ziram;

F.VIII-3) Organochlorine compounds including phthalimides, sulfamides, chloronitriles selected from anilazine, chlorothalonil, captafol, captan, folpet, dichlofluanid, dichlorophen, flusulfamide, hexachlorobenzene, pentachlorphenole and its salts, phthalide, tolylfluanid, N-(4-chloro-2-nitro-phenyl)-N-ethyl-4-methyl-benzenesulfonamide;

F.VIII-4) Guanidines selected from guanidine, dodine, dodine free base, guazatine, guazatine-acetate, iminoctadine, iminoctadine-triacetate, iminoctadine-tris(albesilate); dithianon, 2,6-dimethyl-1H,5H-[1,4]dithiino[2,3-c:5,6-c']dipyrrole-1,3,5,7(2H,6H)-tetraone;

F.VIII-5) Ahtraquinones selected from dithianon;

F.IX) Cell wall synthesis inhibitors

F.IX-1) Inhibitors of glucan synthesis selected from validamycin, polyoxin B;

F.IX-2) Melanin synthesis inhibitors selected from pyroquilon, tricyclazole, carpropamide, dicyclomet, fenoxanil;

F.X) Plant defence inducers

F.X-1) Salicylic acid pathway selected from acibenzolar-S-methyl;

F.X-2) Others selected from probenazole, isotianil, tiadinil, prohexadione-calcium; including phosphonates selected from fosetyl, fosetyl-aluminum, phosphorous acid and its salts;

F.XI) Unknown mode of action:
bronopol, chinomethionat, cyflufenamid, cymoxanil, dazomet, debacarb, diclomezine, difenzoquat, difenzoquat-methylsulfate, diphenylamin, fenpyrazamine, flumetover, flusulfamide, flutianil, methasulfocarb, nitrapyrin, nitrothal-isopropyl, oxathiapiprolin, tolprocarb, 2-[3,5-bis(difluoromethyl)-1H-pyrazol-1-yl]-1-[4-(4-{5-[2-(prop-2-yn-1-yloxy)phenyl]-4,5-dihydro-1,2-oxazol-3-yl}-1,3-thiazol-2-yl)piperidin-1-yl]ethanone, 2-[3,5-bis(difluoromethyl)-1H-pyrazol-1-yl]-1-[4-(4-{5-[2-fluoro-6-(prop-2-yn-1-yl-oxy)phenyl]-4,5-dihydro-1,2-oxazol-3-yl}-1,3-thi¬azol-2-yl)piperidin-1-yl]ethanone, 2 [3,5-bis(difluoromethyl)-1H-pyrazol-1-yl]-1-[4-(4-{5-[2-chloro-6-(prop-2-yn-1-yl-

oxy)phenyl]-4,5-dihydro-1,2-oxazol-3-yl}-1,3-thiazol-2 yl)piperidin-1-yl]ethanone, oxin-copper, proquinazid, tebufloquin, tecloftalam, triazoxide, 2-butoxy-6-iodo-3-propylchromen-4-one, N-(cyclopropylmethoxyimino-(6-difluoro-methoxy-2,3-difluoro-phenyl)-methyl)-2-phenyl acetamide, N'-(4-(4-chloro-3-trifluoromethyl-phenoxy)-2,5-dimethyl-phenyl)-N-ethyl-N methyl formamidine, N' (4-(4-fluoro-3-trifluoromethyl-phenoxy)-2,5-dimethyl-phenyl)-N-ethyl-N-methyl formamidine, N'-(2-methyl-5-trifluoromethyl-4-(3-trimethylsilanyl-propoxy)-phenyl)-N-ethyl-N-methyl formamidine, N'-(5-difluoromethyl-2 methyl-4-(3-trimethylsilanyl-propoxy)-phenyl)-N-ethyl-N-methyl formamidine, 2-{1-[2-(5-methyl-3-trifluoromethyl-pyrazole-1-yl)-acetyl]-piperidin-4-yl}-thiazole-4-carboxylic acid methyl-(1,2,3,4-tetrahydro-naphthalen-1-yl)-amide, 2-{1-[2-(5-methyl-3-trifluoromethyl-pyrazole-1-yl)-acetyl]-piperidin-4-yl}-thiazole-4-carboxylic acid methyl-(R)-1,2,3,4-tetrahydro-naphthalen-1-yl-amide, methoxy-acetic acid 6-tert-butyl-8-fluoro-2,3-dimethyl-quinolin-4-yl ester and N-Methyl-2-{1-[(5-methyl-3-trifluoromethyl-1H-pyrazol-1-yl)-acetyl]-piperidin-4-yl}-N-[(1R)-1,2,3,4-tetrahydronaphthalen-1-yl]-4-thiazolecarboxamide, 3-[5-(4-chloro-phenyl)-2,3-dimethyl-isoxazolidin-3 yl]-pyridine, pyrisoxazole, 5-amino-2-isopropyl-3-oxo-4-ortho-tolyl-2,3-dihydro-pyrazole-1 carbothioic acid S-allyl ester, N-(6-methoxy-pyridin-3-yl) cyclopropanecarboxylic acid amide, 5-chloro-1 (4,6-dimethoxy-pyrimidin-2-yl)-2-methyl-1H-benzoimidazole, 2-(4-chloro-phenyl)-N-[4-(3,4-dimethoxy-phenyl)-isoxazol-5-yl]-2-prop-2-ynyloxy-acetamide; ethyl (Z)-3-amino-2-cyano-3-phenyl-prop-2-enoate, tert-butyl N-[6-[[(Z)-[(1-methyltetrazol-5-yl)-phenyl-methylene]amino]oxymethyl]-2-pyridyl]carbamate (picarbutrazox), pentyl N-[6-[[(Z)-[(1-methyltetrazol-5-yl)-phenyl-methylene]amino]oxymethyl]-2-pyridyl]carbamate, 2-[2-[(7,8-difluoro-2-methyl-3-quinolyl)oxy]-6-fluoro-phenyl]propan-2-ol, 2-[2-fluoro-6-[(8-fluoro-2-methyl-3-quinolyl)oxy]phenyl]propan-2-ol, 3-(5-fluoro-3,3,4,4-tetramethyl-3,4-dihydroiso-quinolin-1-yl)quinoline, 3-(4,4-difluoro-3,3-dimethyl-3,4-dihydroisoquinolin-1-yl)quinoline, 3-(4,4,5-trifluoro-3,3-dimethyl-3,4-dihydroisoquinolin-1-yl)quinoline;

F.XII) Growth regulators:
abscisic acid, amidochlor, ancymidol, 6-benzylaminopurine, brassinolide, butralin, chlormequat (chlormequat chloride), choline chloride, cyclanilide, daminozide, dikegulac, dimethipin, 2,6-dimethylpuridine, ethephon, flumetralin, flurprimidol, fluthiacet, forchlorfenuron, gibberellic acid, inabenfide, indole-3-acetic acid , maleic hydrazide, mefluidide, mepiquat (mepiquat chloride), naphthaleneacetic acid, N 6 benzyladenine, paclobutrazol, prohexadione (prohexadione-calcium), prohydrojasmon, thidiazuron, triapenthenol, tributyl phosphorotrithioate, 2,3,5 tri iodobenzoic acid , trinexapac-ethyl and uniconazole;

F.XIII) Biopesticides:

F.XIII-1) Microbial pesticides with fungicidal, bactericidal, viricidal and/or plant defense activator activity: Ampelomyces quisqualis, Aspergillus flavus, Aureobasidium

pullulans, Bacillus amyloliquefaciens, B. mojavensis, B. pumilus, B. simplex, B. solisalsi, B. subtilis, B. subtilis var. amyloliquefaciens, Candida oleophila, C. saitoana, Clavibacter michiganensis (bacteriophages), Coniothyrium minitans, Cryphonectria parasitica, Cryptococcus albidus, Fusarium oxysporum, Clonostachys rosea f. catenulate (also named Gliocladium catenulatum), Gliocladium roseum, Metschnikowia fructicola, Microdochium dimerum, Paenibacillus polymyxa, Pantoea agglomerans, Phlebiopsis gigantea, Pseudozyma flocculosa, Pythium oligandrum, Sphaerodes mycoparasitica, Streptomyces lydicus, S. violaceusniger, Talaromyces flavus, Trichoderma asperellum, T. atroviride, T. fertile, T. gamsii, T. harmatum; mixture of T. harzianum and T. viride; mixture of T. polysporum and T. harzianum; T. stromaticum, T. virens (also named Gliocladium virens), T. viride, Typhula phacorrhiza, Ulocladium oudema, U. oudemansii, Verticillium dahlia, zucchini yellow mosaic virus (avirulent strain);

F.XIII-2) Biochemical pesticides with fungicidal, bactericidal, viricidal and/or plant defense activator activity: chitosan (hydrolysate), jasmonic acid or salts or derivatives thereof, laminarin, Menhaden fish oil, natamycin, Plum pox virus coat protein, Reynoutria sachlinensis extract, salicylic acid, tea tree oil;

F.XIII-3) Microbial pesticides with plant stress reducing, plant growth regulator, plant growth promoting and/or yield enhancing activity: Azospirillum amazonense A. brasilense, A. lipoferum, A. irakense, A. halopraeferens, Bradyrhizobium sp., B. japonicum, Glomus intraradices, Mesorhizobium sp., Paenibacillus alvei, Penicillium bilaiae, Rhizobium leguminosarum bv. phaseolii, R. l. trifolii, R. l. bv. viciae, Sinorhizobium meliloti;

F.XIII-4) Biochemical pesticides with plant stress reducing, plant growth regulator and/or plant yield enhancing activity: abscisic acid, aluminium silicate (kaolin), 3-decen-2-one, homobrassinlide, humates, lysophosphatidyl ethanolamine, polymeric polyhydroxy acid, Ascophyllum nodosum (Norwegian kelp, Brown kelp) extract and Ecklonia maxima (kelp) extract,

in synergistically effective amounts.

Moreover, it has been found that simultaneous, that is joint or separate, application of one or more active compound(s) I and one or more compound(s) II or successive application (that is immediately one after another and thereby creating the mixture "in-situ" on the desired location, as e.g. the plant) of one or more active compound(s) I and one or more active compound(s) II allows enhanced control of pests compared to the control rates that are possible with the individual compounds.

Therefore, the term “mixture” as used herein is intended to include also combinations.

Moreover, the present invention relates to:

- the combination of at least one compound of formula I and at least one fungicidal compound II;

- pesticidal compositions comprising at least one compound of formula I and at least one fungicidal compound II as defined herein;
- the use of a combination according to the present invention for combating phytopathogenic harmful fungi;
- The use of a combination according to the present invention for combating invertebrate pests;
- the use of a combination according to the present invention for protecting plants against infection by phytopathogenic harmful fungi and/or against infestation or attack by invertebrate pests;
- the use of a combination according to the present invention for protecting plant propagation material against infection by phytopathogenic harmful fungi and/or against infestation or attack by invertebrate pests; the use of a combination according to the present invention for improving the health of plants and/or increasing the yield;
- a method for controlling phytopathogenic harmful fungi, wherein the fungi, their habitat, their locus or the plants to be protected against fungal attack, the soil, or plant propagation material are treated with an effective amount of a combination according to the present invention;
- a method for controlling invertebrate pests comprising contacting invertebrate pests or their food supply, habitat, breeding grounds or their locus with an effective amount of a combination according to the present invention;
- a method for protecting plants from infection by phytopathogenic harmful fungi and/or attack or infestation by invertebrate pests, comprising contacting the plant, or the soil or water in which the plant is growing, with an effective amount of a combination according to the present invention;
- a method for protecting plant propagation materials and/or plants growing therefrom from phytopathogenic harmful fungi and/or attack or infestation by invertebrate pests comprising contacting the plant propagation materials with an effective amount of a combination according to the present invention;
- a method for improving the health of plants and/or increasing the yield, 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 effective amount of a combination according to the present invention;

and to

- plant propagation material, containing at least one compound of formula I and at least one fungicidal compound II as defined herein, preferably in a total amount of from 0.01 g to 10 kg per 100 kg of plant propagation materials;

In particular, the invention relates to the use of a mixture as defined herein
for combating invertebrate pests,
for combating phytopathogenic fungi,
for protecting plants against attack and/or infestation by invertebrate pests,
protecting plants against infection by phytopathogenic fungi,
for protecting plant propagation material against attack and/or infestation by in-vertebrate pests,
for protecting plant propagation material against infection by phytopathogenic fungi,

for improving the health of plants and/or increasing crop yield.

In particular, the invention relates to a method for controlling phytopathogenic harmful fungi, wherein the fungi, their habitat, or their locus are treated with an effective amount of a mixture as defined herein.

In particular, the invention relates to a method for improving the health of plants and/or increasing the yield, 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 effective amount of a mixture as defined herein.

The present invention also provides methods for the control of insects, acarids or nematodes comprising contacting the insect, acarid or nematode or their food supply, habitat, breeding grounds or their locus with a pesticidally effective amount of mixtures of at least one active compound I with at least one active compound II.

Moreover, the present invention also relates to a method of protecting plants from attack or infestation by 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 a mixture of at least one active compound I with at least one active compound II.

The invention also provides a method for the protection of plant propagation material, preferably seeds, from soil insects and of the seedlings' roots and shoots from soil and foliar insects which comprises contacting the plant progagation material as e.g. the seeds before sowing and/or after pregermination with a pesticidally effective amount of a mixture of at least one active compound I with at least one active compound II.

The invention also provides seeds comprising a mixture of at least one active compound I with at least one active compound II.

The invention also provides pesticidal compositions, comprising a liquid or solid carrier and a mixture of at least one active compound I with at least one active compound II.

The invention also relates to the use of a mixture of at least one active compound I with at least one active compound II for combating insects, arachnids or nematodes.

The mixture(s) of at least one active compound of formula (I) with at least one active compound II are herein referred to as "mixture(s) according to the invention".

In a specific embodiment, the mixture according to the invention is a mixture of one active compound of formula (I) with one active compound II (binary mixture).

In another embodiment, the mixture according to the invention is a mixture of one active compound of formula (I) with at least one active compound II.

In another embodiment, the mixture according to the invention is a mixture of one active compound of formula (I) with two active compounds II, or with one active compund II and a further active compound, e.g. selected from group M, as described herein (ternary mixture).
In another embodiment, the mixture according to the invention is a mixture of one active compound of formula (I) with three active compounds II, or with three active compounds selected from group M and group F, wherein at least one compound is selected from group F (4-way mixture).
In another embodiment, the mixture according to the invention is a mixture of one active compound of formula (I) with four active compounds II, or with three active compounds selected from group M and group F, wherein at least one compound is selected from group F (5-way mixture).

Compounds of formula I

WO 2007/006670, describes N-thio-anthranilamide compounds with a sulfilimine or sulfoximine group and their use as pesticides. PCT/EP2012/065650, PCT/EP2012/065651, and the unpublished applications US 61/578267, US 61/593897 and US 61/651050 describe certain N-Thio-anthranilamide compounds and their use as pesticides.
PCT/EP2012/065648, PCT/EP2012/065649 and EP11189973.8 describe processes for the synthesis of N-Thio-anthranilamide compounds.

The prior art does not disclose pesticidal mixtures comprising selective anthranilamide compounds according to the present invention showing unexpected and synergistic effects in combination with other pesticidically active compounds.

The compounds of formula I as well as the terms "compounds for methods according to the (present) invention", "compounds according to the (present) invention" or "compounds of formula (I)" or “compound(s) II”, which all compound(s) are applied in methods and uses according to the present invention comprise the compound(s) as defined herein as well as a known stereoisomer, salt, tautomer or N-oxide thereof.

The term "composition(s) according to the invention" or "composition(s) of the present invention" encompasses composition(s) comprising at least one compound of formula I or mixtures of the compounds of formula I with other pesticidally active compound(s) II for being used and/or applied in methods according to the invention as defined above.

Depending on the substitution pattern, the compounds of the formula (I) may have one or more centers of chirality, in which case they are present as mixtures of enantiomers or diastereomers. The invention provides both the pure enantiomers or pure diastereomers of the compounds of formula (I), and their mixtures and the use according to the invention of the pure enantiomers or pure diastereomers of the compound of formula (I) or its mixtures. Suitable compounds of the formula (I) also include all possible geometrical stereoisomers (cis/trans isomers) and mixtures thereof. Cis/trans isomers may be present with respect to an alkene, carbon-nitrogen double-bond, nitrogen-sulfur double bond or amide group. The term "stereoisomer(s)" encompasses

both optical isomers, such as enantiomers or diastereomers, the latter existing due to more than one center of chirality in the molecule, as well as geometrical isomers (cis/trans isomers).

Salts of the compounds of the present invention are preferably agriculturally and veterinarily acceptable salts. They can be formed in a customary method, e.g. by reacting the compound with an acid if the compound of the present invention has a basic functionality or by reacting the compound with a suitable base if the compound of the present invention has an acidic functionality.

In general, suitable “agriculturally useful salts” or “agriculturally acceptable salts” are especially the salts of those cations or the acid addition salts of those acids whose cations and anions, respectively, do not have any adverse effect on the action of the compounds according to the present invention. Suitable cations are in particular the ions of the alkali metals, preferably lithium, sodium and potassium, of the alkaline earth metals, preferably calcium, magnesium and barium, and of the transition metals, preferably manganese, copper, zinc and iron, and also ammonium (NH_4^+) and substituted ammonium in which one to four of the hydrogen atoms are replaced by C_1-C_4-alkyl, C_1-C_4-hydroxyalkyl, C_1-C_4-alkoxy, C_1-C_4-alkoxy-C_1-C_4-alkyl, hydroxy-C_1-C_4-alkoxy-C_1-C_4-alkyl, phenyl or benzyl. Examples of substituted ammonium ions comprise methylammonium, isopropylammonium, dimethylammonium, diisopropylammonium, trimethylammonium, tetramethylammonium, tetraethylammonium, tetrabutylammonium, 2-hydroxyethylammonium, 2-(2-hydroxyethoxy)ethyl-ammonium, bis(2-hydroxyethyl)ammonium, benzyltrimethylammonium and benzyltriethylammonium, furthermore phosphonium ions, sulfonium ions, preferably tri(C_1-C_4-alkyl)sulfonium, and sulfoxonium ions, preferably tri(C_1-C_4-alkyl)sulfoxonium.

Anions of useful acid addition salts are primarily chloride, bromide, fluoride, hydrogen sulfate, sulfate, dihydrogen phosphate, hydrogen phosphate, phosphate, nitrate, hydrogen carbonate, carbonate, hexafluorosilicate, hexafluorophosphate, benzoate, and the anions of C_1-C_4-alkanoic acids, preferably formate, acetate, propionate and butyrate. They can be formed by reacting the compounds of the formulae I with an acid of the corresponding anion, preferably of hydrochloric acid, hydrobromic acid, sulfuric acid, phosphoric acid or nitric acid.

The compounds of the formula (I) may be present in the form of their N-oxides. The term “N-oxide” includes any compound of the present invention which has at least one tertiary nitrogen atom that is oxidized to an N-oxide moiety. N-oxides of compounds (I) can in particular be prepared by oxidizing the ring nitrogen atom(s) of the pyridine ring and/or the pyrazole ring with a suitable oxidizing agent, such as peroxo carboxylic acids or other peroxides. The person skilled in the art knows if and in which positions compounds of the formula (I) of the present invention may form N-oxides.

The compounds of the present invention may be amorphous or may exist in one ore more different crystalline states (polymorphs) which may have different macroscopic properties such as stability or show different biological properties such as activities. The present invention includes both amorphous and crystalline compounds of formula (I), their enantiomers or diastereomers, mixtures of different crystalline states of the respective compound of formula (I), its enantiomers or diastereomers, as well as amorphous or crystalline salts thereof.

The term “co-crystal” denotes a complex of the compounds according to the invention or a stereoisomer, salt, tautomer or N-oxide thereof, with one or more other molecules (preferably one molecule type), wherein usually the ratio of the compound according to the invention and the other molecule is a stoichiometric ratio.

The term “solvate” denotes a co-complex of the compounds according to the invention, or a stereoisomer, salt, tautomer or N-oxide thereof, with solvent molecules. The solvent is usually liquid. Examples of solvents are methanol, ethanol, toluol, xylol. A preferred solvent which forms solvates is water, which solvates are referred to as “hydrates”. A solvate or hydrate is usually characterized by the presence of a fixed number of n molecules solvent per m molecules compound according to the invention.

The organic moieties mentioned in the above definitions of the variables are - like the term halogen - collective terms for individual listings of the individual group members. The prefix C_n-C_m indicates in each case the possible number of carbon atoms in the group.

The term halogen denotes in each case fluorine, bromine, chlorine or iodine, in particular fluorine, chlorine or bromine.

The term "partially or fully halogenated" will be taken to mean that 1 or more, e.g. 1, 2, 3, 4 or 5 or all of the hydrogen atoms of a given radical have been replaced by a halogen atom, in particular by fluorine or chlorine. A partially or fully halogenated radical is termed below also "halo-radical”. For example, partially or fully halogenated alkyl is also termed haloalkyl.

The term "alkyl" as used herein (and in the alkyl moieties of other groups comprising an alkyl group, e.g. alkoxy, alkylcarbonyl, alkylthio, alkylsulfinyl, alkylsulfonyl and alkoxyalkyl) denotes in each case a straight-chain or branched alkyl group having usually from 1 to 12 or 1 to 10 carbon atoms, frequently from 1 to 6 carbon atoms, preferably 1 to 4 carbon atoms and in particular from 1 to 3 carbon atoms. Examples of C_1-C_4-alkyl are methyl, ethyl, n-propyl, isopropyl, n-butyl, 2-butyl (sec-butyl), isobutyl and tert-butyl. Examples for C_1-C_6-alkyl are, apart those mentioned for C_1-C_4-alkyl, n-pentyl, 1-methylbutyl, 2-methylbutyl, 3-methylbutyl, 2,2-dimethylpropyl, 1-ethylpropyl, n-hexyl, 1,1-dimethylpropyl, 1,2-dimethylpropyl, 1-methylpentyl, 2-methylpentyl, 3-methylpentyl, 4-methylpentyl, 1,1-dimethylbutyl, 1,2-dimethylbutyl, 1,3-dimethylbutyl, 2,2-dimethylbutyl, 2,3-dimethylbutyl, 3,3-dimethylbutyl, 1-ethylbutyl, 2-ethylbutyl, 1,1,2-trimethylpropyl, 1,2,2-trimethylpropyl, 1-ethyl-1-methylpropyl and 1-ethyl-2-methylpropyl. Examples for C_1-C_{10}-alkyl are, apart those mentioned for C_1-C_6-alkyl, n-heptyl, 1-methylhexyl, 2-methylhexyl, 3-methylhexyl, 4-methylhexyl, 5-methylhexyl, 1-ethylpentyl, 2-ethylpentyl, 3-ethylpentyl, n-octyl, 1-methyloctyl, 2-methylheptyl, 1-ethylhexyl, 2-ethylhexyl, 1,2-dimethylhexyl, 1-propylpentyl, 2-propylpentyl, nonyl, decyl, 2-propylheptyl and 3-propylheptyl.

The term "alkylene" (or alkanediyl) as used herein in each case denotes an alkyl radical as defined above, wherein one hydrogen atom at any position of the carbon backbone is replaced by one further binding site, thus forming a bivalent moiety.

The term "haloalkyl" as used herein (and in the haloalkyl moieties of other groups comprising a haloalkyl group, e.g. haloalkoxy, haloalkylthio, haloalkylcarbonyl, haloalkylsulfonyl and haloalkylsulfinyl) denotes in each case a straight-chain or branched alkyl group having usually from 1 to 10 carbon atoms ("C_1-C_{10}-haloalkyl"), frequently from 1 to 6 carbon atoms ("C_1-C_6-haloalkyl"), more frequently 1 to 4 carbon atoms ("C_1-C_{10}-haloalkyl"), wherein the hydrogen atoms of this group are partially or totally replaced with halogen atoms. Preferred haloalkyl

moieties are selected from C_1-C_4-haloalkyl, more preferably from C_1-C_2-haloalkyl, more preferably from halomethyl, in particular from C_1-C_2-fluoroalkyl. Halomethyl is methyl in which 1, 2 or 3 of the hydrogen atoms are replaced by halogen atoms. Examples are bromomethyl, chloromethyl, dichloromethyl, trichloromethyl, fluoromethyl, difluoromethyl, trifluoromethyl, chlorofluoromethyl, dichlorofluoromethyl, chlorodifluoromethyl and the like. Examples for C_1-C_2-fluoroalkyl are fluoromethyl, difluoromethyl, trifluoromethyl, 1-fluoroethyl, 2-fluoroethyl, 2,2-difluoroethyl, 2,2,2-trifluoroethyl, pentafluoroethyl, and the like. Examples for C_1-C_2-haloalkyl are, apart those mentioned for C_1-C_2-fluoroalkyl, chloromethyl, dichloromethyl, trichloromethyl, bromomethyl, chlorofluoromethyl, dichlorofluoromethyl, chlorodifluoromethyl, 1-chloroethyl, 2-chloroethyl, 2,2,-dichloroethyl, 2,2,2-trichloroethyl, 2-chloro-2-fluoroethyl, 2-chloro-2,2-difluoroethyl, 2,2-dichloro-2-fluoroethyl, 1-bromoethyl, and the like. Examples for C_1-C_4-haloalkyl are, apart those mentioned for C_1-C_2-haloalkyl, 1-fluoropropyl, 2-fluoropropyl, 3-fluoropropyl, 3,3-difluoropropyl, 3,3,3-trifluoropropyl, heptafluoropropyl, 1,1,1-trifluoroprop-2-yl, 3-chloropropyl, 4-chlorobutyl and the like.

The term "cycloalkyl" as used herein (and in the cycloalkyl moieties of other groups comprising a cycloalkyl group, e.g. cycloalkoxy and cycloalkylalkyl) denotes in each case a mono- or bicyclic cycloaliphatic radical having usually from 3 to 10 carbon atoms ("C_3-C_{10}-cycloalkyl"), preferably 3 to 8 carbon atoms ("C_3-C_8-cycloalkyl") or in particular 3 to 6 carbon atoms ("C_3-C_6-cycloalkyl"). Examples of monocyclic radicals having 3 to 6 carbon atoms comprise cyclopropyl, cyclobutyl, cyclopentyl and cyclohexyl. Examples of monocyclic radicals having 3 to 8 carbon atoms comprise cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, cycloheptyl and cyclooctyl. Examples of bicyclic radicals having 7 or 8 carbon atoms comprise bicyclo[2.1.1]hexyl, bicyclo[2.2.1]heptyl, bicyclo[3.1.1]heptyl, bicyclo[2.2.1]heptyl, bicyclo[2.2.2]octyl and bicyclo[3.2.1]octyl.

The term "cycloalkylene" (or cycloalkanediyl) as used herein in each case denotes an cycloalkyl radical as defined above, wherein one hydrogen atom at any position of the carbon backbone is replaced by one further binding site, thus forming a bivalent moiety.

The term "halocycloalkyl" as used herein (and in the halocycloalkyl moieties of other groups comprising an halocycloalkyl group, e.g. halocycloalkylmethyl) denotes in each case a mono- or bicyclic cycloaliphatic radical having usually from 3 to 10 carbon atoms, preferably 3 to 8 carbon atoms or in particular 3 to 6 carbon atoms, wherein at least one, e.g. 1, 2, 3, 4 or 5 of the hydrogen atoms are replaced by halogen, in particular by fluorine or chlorine. Examples are 1- and 2- fluorocyclopropyl, 1,2-, 2,2- and 2,3-difluorocyclopropyl, 1,2,2-trifluorocyclopropyl, 2,2,3,3-tetrafluorocyclpropyl, 1- and 2-chlorocyclopropyl, 1,2-, 2,2- and 2,3-dichlorocyclopropyl, 1,2,2-trichlorocyclopropyl, 2,2,3,3-tetrachlorocyclpropyl, 1-,2- and 3-fluorocyclopentyl, 1,2-, 2,2-, 2,3-, 3,3-, 3,4-, 2,5-difluorocyclopentyl, 1-,2- and 3-chlorocyclopentyl, 1,2-, 2,2-, 2,3-, 3,3-, 3,4-, 2,5-dichlorocyclopentyl and the like.

The term "cycloalkyl-alkyl" used herein denotes a cycloalkyl group, as defined above, which is bound to the remainder of the molecule via an alkylene group. The term "C_3-C_8-cycloalkyl-C_1-C_4-alkyl" refers to a C_3-C_8-cycloalkyl group as defined above which is bound to the remainder of the molecule via a C_1-C_4-alkyl group, as defined above. Examples are cyclopropylmethyl, cyclopropylethyl, cyclopropylpropyl, cyclobutylmethyl, cyclobutylethyl, cyclobutylpropyl, cyclopentylmethyl, cyclopentylethyl, cyclopentylpropyl, cyclohexylmethyl, cyclohexylethyl, cyclohexylpropyl, and the like.

The term "alkenyl" as used herein denotes in each case a monounsaturated straight-chain or branched hydrocarbon radical having usually 2 to 10 ("C_2-C_{10}-alkenyl"), preferably 2 to 6 carbon atoms ("C_2-C_6-alkenyl"), in particular 2 to 4 carbon atoms ("C_2-C_4-alkenyl"), and a double bond in any position, for example C_2-C_4-alkenyl, such as ethenyl, 1-propenyl, 2-propenyl, 1-methylethenyl, 1-butenyl, 2-butenyl, 3-butenyl, 1-methyl-1-propenyl, 2-methyl-1-propenyl, 1-methyl-2-propenyl or 2-methyl-2-propenyl; C_2-C_6-alkenyl, such as ethenyl, 1-propenyl, 2-propenyl, 1-methylethenyl, 1-butenyl, 2-butenyl, 3-butenyl, 1-methyl-1-propenyl, 2-methyl-1-propenyl, 1-methyl-2-propenyl, 2-methyl-2-propenyl, 1-pentenyl, 2-pentenyl, 3-pentenyl, 4-pentenyl, 1-methyl-1-butenyl, 2-methyl-1-butenyl, 3-methyl-1-butenyl, 1-methyl-2-butenyl, 2-methyl-2-butenyl, 3-methyl-2-butenyl, 1-methyl-3-butenyl, 2-methyl-3-butenyl, 3-methyl-3-butenyl, 1,1-dimethyl-2-propenyl, 1,2-dimethyl-1-propenyl, 1,2-dimethyl-2-propenyl, 1-ethyl-1-propenyl, 1-ethyl-2-propenyl, 1-hexenyl, 2-hexenyl, 3-hexenyl, 4-hexenyl, 5-hexenyl, 1-methyl-1-pentenyl, 2-methyl-1-pentenyl, 3-methyl-1-pentenyl, 4-methyl-1-pentenyl, 1-methyl-2-pentenyl, 2-methyl-2-pentenyl, 3-methyl-2-pentenyl, 4-methyl-2-pentenyl, 1-methyl-3-pentenyl, 2-methyl-3-pentenyl, 3-methyl-3-pentenyl, 4-methyl-3-pentenyl, 1-methyl-4-pentenyl, 2-methyl-4-pentenyl, 3-methyl-4-pentenyl, 4-methyl-4-pentenyl, 1,1-dimethyl-2-butenyl, 1,1-dimethyl-3-butenyl, 1,2-dimethyl-1-butenyl, 1,2-dimethyl-2-butenyl, 1,2-dimethyl-3-butenyl, 1,3-dimethyl-1-butenyl, 1,3-dimethyl-2-butenyl, 1,3-dimethyl-3-butenyl, 2,2-dimethyl-3-butenyl, 2,3-dimethyl-1-butenyl, 2,3-dimethyl-2-butenyl, 2,3-dimethyl-3-butenyl, 3,3-dimethyl-1-butenyl, 3,3-dimethyl-2-butenyl, 1-ethyl-1-butenyl, 1-ethyl-2-butenyl, 1-ethyl-3-butenyl, 2-ethyl-1-butenyl, 2-ethyl-2-butenyl, 2-ethyl-3-butenyl, 1,1,2-trimethyl-2-propenyl, 1-ethyl-1-methyl-2-propenyl, 1-ethyl-2-methyl-1-propenyl, 1-ethyl-2-methyl-2-propenyl and the like, or C_2-C_{10}-alkenyl, such as the radicals mentioned for C_2-C_6-alkenyl and additionally 1-heptenyl, 2-heptenyl, 3-heptenyl, 1-octenyl, 2-octenyl, 3-octenyl, 4-octenyl, 1-nonenyl, 2-nonenyl, 3-nonenyl, 4-nonenyl, 1-decenyl, 2-decenyl, 3-decenyl, 4-decenyl, 5-decenyl and the positional isomers thereof.

The term "alkenylene" (or alkenediyl) as used herein in each case denotes an alkenyl radical as defined above, wherein one hydrogen atom at any position of the carbon backbone is replaced by one further binding site, thus forming a bivalent moiety.

The term "haloalkenyl" as used herein, which may also be expressed as "alkenyl which may be substituted by halogen", and the haloalkenyl moieties in haloalkenyloxy, haloalkenylcarbonyl and the like refers to unsaturated straight-chain or branched hydrocarbon radicals having 2 to 10 ("C_2-C_{10}-haloalkenyl") or 2 to 6 ("C_2-C_6-haloalkenyl") or 2 to 4 ("C_2-C_4-haloalkenyl") carbon atoms and a double bond in any position, where some or all of the hydrogen atoms in these groups are replaced by halogen atoms as mentioned above, in particular fluorine, chlorine and bromine, for example chlorovinyl, chloroallyl and the like.

The term "alkynyl" as used herein denotes unsaturated straight-chain or branched hydrocarbon radicals having usually 2 to 10 ("C_2-C_{10}-alkynyl"), frequently 2 to 6 ("C_2-C_6-alkynyl"), preferably 2 to 4 carbon atoms ("C_2-C_4-alkynyl") and one or two triple bonds in any position, for example C_2-C_4-alkynyl, such as ethynyl, 1-propynyl, 2-propynyl, 1-butynyl, 2-butynyl, 3-butynyl, 1-methyl-2-propynyl and the like, C_2-C_6-alkynyl, such as ethynyl, 1-propynyl, 2-propynyl, 1-butynyl, 2-butynyl, 3-butynyl, 1-methyl-2-propynyl, 1-pentynyl, 2-pentynyl, 3-pentynyl, 4-pentynyl, 1-methyl-2-butynyl, 1-methyl-3-butynyl, 2-methyl-3-butynyl, 3-methyl-1-butynyl, 1,1-dimethyl-2-propynyl, 1-ethyl-2-propynyl, 1-hexynyl, 2-hexynyl, 3-hexynyl, 4-hexynyl, 5-hexynyl, 1-methyl-2-pentynyl, 1-methyl-3-pentynyl, 1-methyl-4-pentynyl, 2-methyl-3-pentynyl, 2-methyl-4-pentynyl, 3-

methyl-1-pentynyl, 3-methyl-4-pentynyl, 4-methyl-1-pentynyl, 4-methyl-2-pentynyl, 1,1-dimethyl-2-butynyl, 1,1-dimethyl-3-butynyl, 1,2-dimethyl-3-butynyl, 2,2-dimethyl-3-butynyl, 3,3-dimethyl-1-butynyl, 1-ethyl-2-butynyl, 1-ethyl-3-butynyl, 2-ethyl-3-butynyl, 1-ethyl-1-methyl-2-propynyl and the like.

The term "alkynylene" (or alkynediyl) as used herein in each case denotes an alkynyl radical as defined above, wherein one hydrogen atom at any position of the carbon backbone is replaced by one further binding site, thus forming a bivalent moiety.

The term "haloalkynyl" as used herein, which is also expressed as "alkynyl which may be substituted by halogen", refers to unsaturated straight-chain or branched hydrocarbon radicals having iusually 3 to 10 carbon atoms ("C_2-C_{10}-haloalkynyl"), frequently 2 to 6 ("C_2-C_6-haloalkynyl"), preferabyl 2 to 4 carbon atoms ("C_2-C_4-haloalkynyl"), and one or two triple bonds in any position (as mentioned above), where some or all of the hydrogen atoms in these groups are replaced by halogen atoms as mentioned above, in particular fluorine, chlorine and bromine.

The term "alkoxy" as used herein denotes in each case a straight-chain or branched alkyl group usually having from 1 to 10 carbon atoms ("C_1-C_{10}-alkoxy"), frequently from 1 to 6 carbon atoms ("C_1-C_6-alkoxy"), preferably 1 to 4 carbon atoms ("C_1-C_4-alkoxy"), which is bound to the remainder of the molecule via an oxygen atom. C_1-C_2-Alkoxy is methoxy or ethoxy. C_1-C_4-Alkoxy is additionally, for example, n-propoxy, 1-methylethoxy (isopropoxy), butoxy, 1-methylpropoxy (sec-butoxy), 2-methylpropoxy (isobutoxy) or 1,1-dimethylethoxy (tert-butoxy). C_1-C_6-Alkoxy is additionally, for example, pentoxy, 1-methylbutoxy, 2-methylbutoxy, 3-methylbutoxy, 1,1-dimethylpropoxy, 1,2-dimethylpropoxy, 2,2-dimethylpropoxy, 1-ethylpropoxy, hexoxy, 1-methylpentoxy, 2-methylpentoxy, 3-methylpentoxy, 4-methylpentoxy, 1,1-dimethylbutoxy, 1,2-dimethylbutoxy, 1,3-dimethylbutoxy, 2,2-dimethylbutoxy, 2,3-dimethylbutoxy, 3,3-dimethylbutoxy, 1-ethylbutoxy, 2-ethylbutoxy, 1,1,2-trimethylpropoxy, 1,2,2-trimethylpropoxy, 1-ethyl-1-methylpropoxy or 1-ethyl-2-methylpropoxy. C_1-C_8-Alkoxy is additionally, for example, heptyloxy, octyloxy, 2-ethylhexyloxy and positional isomers thereof. C_1-C_{10}-Alkoxy is additionally, for example, nonyloxy, decyloxy and positional isomers thereof.

The term "haloalkoxy" as used herein denotes in each case a straight-chain or branched alkoxy group, as defined above, having from 1 to 10 carbon atoms ("C_1-C_{10}-haloalkoxy"), frequently from 1 to 6 carbon atoms ("C_1-C_6-haloalkoxy"), preferably 1 to 4 carbon atoms ("C_1-C_4-haloalkoxy"), more preferably 1 to 3 carbon atoms ("C_1-C_3-haloalkoxy"), wherein the hydrogen atoms of this group are partially or totally replaced with halogen atoms, in particular fluorine atoms. C_1-C_2-Haloalkoxy is, for example, OCH_2F, $OCHF_2$, OCF_3, OCH_2Cl, $OCHCl_2$, $OCCl_3$, chlorofluoromethoxy, dichlorofluoromethoxy, chlorodifluoromethoxy, 2-fluoroethoxy, 2-chloroethoxy, 2-bromoethoxy, 2-iodoethoxy, 2,2-difluoroethoxy, 2,2,2-trifluoroethoxy, 2-chloro-2-fluoroethoxy, 2-chloro-2,2-difluoroethoxy, 2,2-dichloro-2-fluoroethoxy, 2,2,2-trichloroethoxy or OC_2F_5. C_1-C_4-Haloalkoxy is additionally, for example, 2-fluoropropoxy, 3-fluoropropoxy, 2,2-difluoropropoxy, 2,3-difluoropropoxy, 2-chloropropoxy, 3-chloropropoxy, 2,3-dichloropropoxy, 2-bromopropoxy, 3-bromopropoxy, 3,3,3-trifluoropropoxy, 3,3,3-trichloropropoxy, OCH_2-C_2F_5, OCF_2-C_2F_5, 1-(CH_2F)-2-fluoroethoxy, 1-(CH_2Cl)-2-chloroethoxy, 1-(CH_2Br)-2-bromoethoxy, 4-fluorobutoxy, 4-chlorobutoxy, 4-bromobutoxy or nonafluorobutoxy. C_1-C_6-Haloalkoxy is additionally, for example, 5-fluoropentoxy, 5-chloropentoxy, 5-brompentoxy, 5-iodopentoxy, undecafluoropentoxy, 6-fluorohexoxy, 6-chlorohexoxy, 6-bromohexoxy, 6-iodohexoxy or dodecafluorohexoxy.

The term "alkoxyalkyl" as used herein denotes in each case alkyl usually comprising 1 to 6 carbon atoms, preferably 1 to 4 carbon atoms, wherein 1 carbon atom carries an alkoxy radical usually comprising 1 to 10, frequently 1 to 6, in particular 1 to 4, carbon atoms as defined above. "C_1-C_6-Alkoxy-C_1-C_6-alkyl" is a C_1-C_6-alkyl group, as defined above, in which one hydrogen atom is replaced by a C_1-C_6-alkoxy group, as defined above. Examples are CH_2OCH_3, CH_2-OC_2H_5, n-propoxymethyl, CH_2-$OCH(CH_3)_2$, n-butoxymethyl, (1-methylpropoxy)-methyl, (2-methylpropoxy)methyl, CH_2-$OC(CH_3)_3$, 2-(methoxy)ethyl, 2-(ethoxy)ethyl, 2-(n-propoxy)-ethyl, 2-(1-methylethoxy)-ethyl, 2-(n-butoxy)ethyl, 2-(1-methylpropoxy)-ethyl, 2-(2-methylpropoxy)-ethyl, 2-(1,1-dimethylethoxy)-ethyl, 2-(methoxy)-propyl, 2-(ethoxy)-propyl, 2-(n-propoxy)-propyl, 2-(1-methylethoxy)-propyl, 2-(n-butoxy)-propyl, 2-(1-methylpropoxy)-propyl, 2-(2-methylpropoxy)-propyl, 2-(1,1-dimethylethoxy)-propyl, 3-(methoxy)-propyl, 3-(ethoxy)-propyl, 3-(n-propoxy)-propyl, 3-(1-methylethoxy)-propyl, 3-(n-butoxy)-propyl, 3-(1-methylpropoxy)-propyl, 3-(2-methylpropoxy)-propyl, 3-(1,1-dimethylethoxy)-propyl, 2-(methoxy)-butyl, 2-(ethoxy)-butyl, 2-(n-propoxy)-butyl, 2-(1-methylethoxy)-butyl, 2-(n-butoxy)-butyl, 2-(1-methylpropoxy)-butyl, 2-(2-methyl-propoxy)-butyl, 2-(1,1-dimethylethoxy)-butyl, 3-(methoxy)-butyl, 3-(ethoxy)-butyl, 3-(n-propoxy)-butyl, 3-(1-methylethoxy)-butyl, 3-(n-butoxy)-butyl, 3-(1-methylpropoxy)-butyl, 3-(2-methylpropoxy)-butyl, 3-(1,1-dimethylethoxy)-butyl, 4-(methoxy)-butyl, 4-(ethoxy)-butyl, 4-(n-propoxy)-butyl, 4-(1-methylethoxy)-butyl, 4-(n-butoxy)-butyl, 4-(1-methylpropoxy)-butyl, 4-(2-methylpropoxy)-butyl, 4-(1,1-dimethylethoxy)-butyl and the like.

The term "haloalkoxy-alkyl" as used herein denotes in each case alkyl as defined above, usually comprising 1 to 6 carbon atoms, preferably 1 to 4 carbon atoms, wherein 1 carbon atom carries an haloalkoxy radical as defined above, usually comprising 1 to 10, frequently 1 to 6, in particular 1 to 4, carbon atoms as defined above. Examples are fluoromethoxymethyl, difluoromethoxymethyl, trifluoromethoxymethyl, 1-fluoroethoxymethyl, 2-fluoroethoxymethyl, 1,1-difluoroethoxymethyl, 1,2-difluoroethoxymethyl, 2,2-difluoroethoxymethyl, 1,1,2-trifluoroethoxymethyl, 1,2,2-trifluoroethoxymethyl, 2,2,2-trifluoroethoxymethyl, pentafluoroethoxymethyl, 1-fluoroethoxy-1-ethyl, 2-fluoroethoxy-1-ethyl, 1,1-difluoroethoxy-1-ethyl, 1,2-difluoroethoxy-1-ethyl, 2,2-difluoroethoxy-1-ethyl, 1,1,2-trifluoroethoxy-1-ethyl, 1,2,2-trifluoroethoxy-1-ethyl, 2,2,2-trifluoroethoxy-1-ethyl, pentafluoroethoxy-1-ethyl, 1-fluoroethoxy-2-ethyl, 2-fluoroethoxy-2-ethyl, 1,1-difluoroethoxy-2-ethyl, 1,2-difluoroethoxy-2-ethyl, 2,2-difluoroethoxy-2-ethyl, 1,1,2-trifluoroethoxy-2-ethyl, 1,2,2-trifluoroethoxy-2-ethyl, 2,2,2-trifluoroethoxy-2-ethyl, pentafluoroethoxy-2-ethyl, and the like.

The term "alkylthio"(also alkylsulfanyl or alkyl-S-)" as used herein denotes in each case a straight-chain or branched saturated alkyl group as defined above, usually comprising 1 to 10 carbon atoms ("C_1-C_{10}-alkylthio"), frequently comprising 1 to 6 carbon atoms ("C_1-C_6-alkylthio"), preferably 1 to 4 carbon atoms ("C_1-C_4-alkylthio"), which is attached via a sulfur atom at any position in the alkyl group. C_1-C_2-Alkylthio is methylthio or ethylthio. C_1-C_4-Alkylthio is additionally, for example, n-propylthio, 1-methylethylthio (isopropylthio), butylthio, 1-methylpropylthio (sec-butylthio), 2-methylpropylthio (isobutylthio) or 1,1-dimethylethylthio (tert-butylthio). C_1-C_6-Alkylthio is additionally, for example, pentylthio, 1-methylbutylthio, 2-methylbutylthio, 3-methylbutylthio, 1,1-dimethylpropylthio, 1,2-dimethylpropylthio, 2,2-dimethylpropylthio, 1-ethylpropylthio, hexylthio, 1-methylpentylthio, 2-methylpentylthio, 3-methylpentylthio, 4-methylpentylthio, 1,1-dimethylbutylthio, 1,2-dimethylbutylthio, 1,3-dimethylbutylthio, 2,2-dimethylbutylthio, 2,3-dimethylbutylthio, 3,3-dimethylbutylthio,

1-ethylbutylthio, 2-ethylbutylthio, 1,1,2-trimethylpropylthio, 1,2,2-trimethylpropylthio, 1-ethyl-1-methylpropylthio or 1-ethyl-2-methylpropylthio. C_1-C_8-Alkylthio is additionally, for example, heptylthio, octylthio, 2-ethylhexylthio and positional isomers thereof. C_1-C_{10}-Alkylthio is additionally, for example, nonylthio, decylthio and positional isomers thereof.

The term "haloalkylthio" as used herein refers to an alkylthio group as defined above wherein the hydrogen atoms are partially or fully substituted by fluorine, chlorine, bromine and/or iodine. C_1-C_2-Haloalkylthio is, for example, SCH_2F, $SCHF_2$, SCF_3, SCH_2Cl, $SCHCl_2$, $SCCl_3$, chlorofluoromethylthio, dichlorofluoromethylthio, chlorodifluoromethylthio, 2-fluoroethylthio, 2-chloroethylthio, 2-bromoethylthio, 2-iodoethylthio, 2,2-difluoroethylthio, 2,2,2-trifluoroethylthio, 2-chloro-2-fluoroethylthio, 2-chloro-2,2-difluoroethylthio, 2,2-dichloro-2-fluoroethylthio, 2,2,2-trichloroethylthio or SC_2F_5. C_1-C_4-Haloalkylthio is additionally, for example, 2-fluoropropylthio, 3-fluoropropylthio, 2,2-difluoropropylthio, 2,3-difluoropropylthio, 2-chloropropylthio, 3-chloropropylthio, 2,3-dichloropropylthio, 2-bromopropylthio, 3-bromopropylthio, 3,3,3-trifluoropropylthio, 3,3,3-trichloropropylthio, SCH_2-C_2F_5, SCF_2-C_2F_5, 1-(CH_2F)-2-fluoroethylthio, 1-(CH_2Cl)-2-chloroethylthio, 1-(CH_2Br)-2-bromoethylthio, 4-fluorobutylthio, 4-chlorobutylthio, 4-bromobutylthio or nonafluorobutylthio. C_1-C_6-Haloalkylthio is additionally, for example, 5-fluoropentylthio, 5-chloropentylthio, 5-brompentylthio, 5-iodopentylthio, undecafluoropentylthio, 6-fluorohexylthio, 6-chlorohexylthio, 6-bromohexylthio, 6-iodohexylthio or dodecafluorohexylthio.

The terms "alkylsulfinyl" and "$S(O)_n$-alkyl" (wherein n is 1) are equivalent and, as used herein, denote an alkyl group, as defined above, attached via a sulfinyl [S(O)] group. For example, the term "C_1-C_2-alkylsulfinyl" refers to a C_1-C_2-alkyl group, as defined above, attached via a sulfinyl [S(O)] group. The term "C_1-C_4-alkylsulfinyl" refers to a C_1-C_4-alkyl group, as defined above, attached via a sulfinyl [S(O)] group. The term "C_1-C_6-alkylsulfinyl" refers to a C_1-C_6-alkyl group, as defined above, attached via a sulfinyl [S(O)] group. C_1-C_2-alkylsulfinyl is methylsulfinyl or ethylsulfinyl. C_1-C_4-alkylsulfinyl is additionally, for example, n-propylsulfinyl, 1-methylethylsulfinyl (isopropylsulfinyl), butylsulfinyl, 1-methylpropylsulfinyl (sec-butylsulfinyl), 2-methylpropylsulfinyl (isobutylsulfinyl) or 1,1-dimethylethylsulfinyl (tert-butylsulfinyl). C_1-C_6-alkylsulfinyl is additionally, for example, pentylsulfinyl, 1-methylbutylsulfinyl, 2-methylbutylsulfinyl, 3-methylbutylsulfinyl, 1,1-dimethylpropylsulfinyl, 1,2-dimethylpropylsulfinyl, 2,2-dimethylpropylsulfinyl, 1-ethylpropylsulfinyl, hexylsulfinyl, 1-methylpentylsulfinyl, 2-methylpentylsulfinyl, 3-methylpentylsulfinyl, 4-methylpentylsulfinyl, 1,1-dimethylbutylsulfinyl, 1,2-dimethylbutylsulfinyl, 1,3-dimethylbutylsulfinyl, 2,2-dimethylbutylsulfinyl, 2,3-dimethylbutylsulfinyl, 3,3-dimethylbutylsulfinyl, 1-ethylbutylsulfinyl, 2-ethylbutylsulfinyl, 1,1,2-trimethylpropylsulfinyl, 1,2,2-trimethylpropylsulfinyl, 1-ethyl-1-methylpropylsulfinyl or 1-ethyl-2-methylpropylsulfinyl.

The terms "alkylsulfonyl" and "$S(O)_n$-alkyl" (wherein n is 2) are equivalent and, as used herein, denote an alkyl group, as defined above, attached via a sulfonyl [$S(O)_2$] group. The term "C_1-C_2-alkylsulfonyl" refers to a C_1-C_2-alkyl group, as defined above, attached via a sulfonyl [$S(O)_2$] group. The term "C_1-C_4-alkylsulfonyl" refers to a C_1-C_4-alkyl group, as defined above, attached via a sulfonyl [$S(O)_2$] group. The term "C_1-C_6-alkylsulfonyl" refers to a C_1-C_6-alkyl group, as defined above, attached via a sulfonyl [$S(O)_2$] group. C_1-C_2-alkylsulfonyl is methylsulfonyl or ethylsulfonyl. C_1-C_4-alkylsulfonyl is additionally, for example, n-propylsulfonyl, 1-methylethylsulfonyl (isopropylsulfonyl), butylsulfonyl, 1-methylpropylsulfonyl (sec-butylsulfonyl), 2-methylpropylsulfonyl (isobutylsulfonyl) or 1,1-dimethylethylsulfonyl (tert-

butylsulfonyl). C_1-C_6-alkylsulfonyl is additionally, for example, pentylsulfonyl, 1-methylbutylsulfonyl, 2-methylbutylsulfonyl, 3-methylbutylsulfonyl, 1,1-dimethylpropylsulfonyl, 1,2-dimethylpropylsulfonyl, 2,2-dimethylpropylsulfonyl, 1-ethylpropylsulfonyl, hexylsulfonyl, 1-methylpentylsulfonyl, 2-methylpentylsulfonyl, 3-methylpentylsulfonyl, 4-methylpentylsulfonyl, 1,1-dimethylbutylsulfonyl, 1,2-dimethylbutylsulfonyl, 1,3-dimethylbutylsulfonyl, 2,2-dimethylbutylsulfonyl, 2,3-dimethylbutylsulfonyl, 3,3-dimethylbutylsulfonyl, 1-ethylbutylsulfonyl, 2-ethylbutylsulfonyl, 1,1,2-trimethylpropylsulfonyl, 1,2,2-trimethylpropylsulfonyl, 1-ethyl-1-methylpropylsulfonyl or 1-ethyl-2-methylpropylsulfonyl.

The term "alkylamino" as used herein denotes in each case a group -NHR, wherein R is a straight-chain or branched alkyl group usually having from 1 to 6 carbon atoms ("C_1-C_6-alkylamino"), preferably 1 to 4 carbon atoms("C_1-C_4-alkylamino"). Examples of C_1-C_6-alkylamino are methylamino, ethylamino, n-propylamino, isopropylamino, n-butylamino, 2-butylamino, iso-butylamino, tert-butylamino, and the like.

The term "dialkylamino" as used herein denotes in each case a group-NRR', wherein R and R', independently of each other, are a straight-chain or branched alkyl group each usually having from 1 to 6 carbon atoms ("di-(C_1-C_6-alkyl)-amino"), preferably 1 to 4 carbon atoms ("di-(C_1-C_4-alkyl)-amino"). Examples of a di-(C_1-C_6-alkyl)-amino group are dimethylamino, diethylamino, dipropylamino, dibutylamino, methyl-ethyl-amino, methyl-propyl-amino, methyl-isopropylamino, methyl-butyl-amino, methyl-isobutyl-amino, ethyl-propyl-amino, ethyl-isopropylamino, ethyl-butyl-amino, ethyl-isobutyl-amino, and the like.

The term "cycloalkylamino" as used herein denotes in each case a group -NHR, wherein R is a cycloalkyl group usually having from 3 to 8 carbon atoms ("C_3-C_8-cycloalkylamino"), preferably 3 to 6 carbon atoms("C_3-C_6-cycloalkylamino"). Examples of C_3-C_8-cycloalkylamino are cyclopropylamino, cyclobutylamino, cyclopentylamino, cyclohexylamino, and the like.

The term "alkylaminosulfonyl" as used herein denotes in each case a straight-chain or branched alkylamino group as defined above, which is bound to the remainder of the molecule via a sulfonyl [$S(O)_2$] group. Examples of an alkylaminosulfonyl group are methylaminosulfonyl, ethylaminosulfonyl, n-propylaminosulfonyl, isopropylaminosulfonyl, n-butylaminosulfonyl, 2-butylaminosulfonyl, iso-butylaminosulfonyl, tert-butylaminosulfonyl, and the like.

The term "dialkylaminosulfonyl" as used herein denotes in each case a straight-chain or branched alkylamino group as defined above, which is bound to the remainder of the molecule via a sulfonyl [$S(O)_2$] group. Examples of an dialkylaminosulfonyl group are dimethylaminosulfonyl, diethylaminosulfonyl, dipropylaminosulfonyl, dibutylaminosulfonyl, methyl-ethyl-aminosulfonyl, methyl-propyl-aminosulfonyl, methyl-isopropylaminosulfonyl, methyl-butyl-aminosulfonyl, methyl-isobutyl-aminosulfonyl, ethyl-propyl-aminosulfonyl, ethyl-isopropylaminosulfonyl, ethyl-butyl-aminosulfonyl, ethyl-isobutyl-aminosulfonyl, and the like.

The suffix „-carbonyl" in a group denotes in each case that the group is bound to the remainder of the molecule via a carbonyl C=O group. This is the case e.g. in alkylcarbonyl, haloalkylcarbonyl, aminocarbonyl, alkylaminocarbonyl, dialkylaminocarbonyl, alkoxycarbonyl, haloalkoxycarbonyl.

The term "aryl" as used herein refers to a mono-, bi- or tricyclic aromatic hydrocarbon radical such as phenyl or naphthyl, in particular phenyl.

The term "het(ero)aryl" as used herein refers to a mono-, bi- or tricyclic heteroaromatic hydrocarbon radical, preferably to a monocyclic heteroaromatic radical, such as pyridyl, pyrimidyl and the like.

A saturated, partially unsaturated or unsaturated 3- to 8-membered ring system which contains 1 to 4 heteroatoms selected from oxygen, nitrogen, sulfur, is a ring system wherein two oxygen atoms must not be in adjacent positions and wherein at least 1 carbon atom must be in the ring system e.g. thiophene, furan, pyrrole, thiazole, oxazole, imidazole, isothiazole, isoxazole, pyrazole, 1,3,4-oxadiazole, 1,3,4-thiadiazole, 1,3,4-triazole, 1,2,4-oxadiazole, 1,2,4-thiadiazole, 1,2,4-triazole, 1,2,3-triazole, 1,2,3,4-tetrazole, benzo[b]thiophene, benzo[b]furan, indole, benzo[c]thiophene, benzo[c]furan, isoindole, benzoxazole, benzthiazole, benzimidazole, benzisoxazole, benzisothiazole, benzopyrazole, benzothiadiazole, benztriazole, dibenzofuran, dibenzothiophene, carbazole, pyridine, pyrazine, pyrimidine, pyridazine, 1,3,5-triazine, 1,2,4-triazine, 1,2,4,5-tetrazine, quinoline, isoquinoline, quinoxaline, quinazoline, cinnoline, 1,8-naphthyridine, 1,5-naphthyridine, 1,6-naphthyridine, 1,7-naphthyridine, phthalazine, pyridopyrimidine, purine, pteridine, 4H-quinolizine, piperidine, pyrrolidine, oxazoline, tetrahydrofuran, tetrahydropyran, isoxazolidine or thiazolidine, oxirane or oxetane.

A saturated, partially unsaturated or unsaturated 3- to 8-membered ring system which contains 1 to 4 heteroatoms selected from oxygen, nitrogen, sulfur also is e.g.
a saturated, partially unsaturated or unsaturated 5-or 6-membered heterocycle which contains 1 to 4 heteroatoms selected from oxygen, nitrogen and sulfur, such as pyridine, pyrimidine, (1,2,4)-oxadiazole, (1,3,4)-oxadiazole, pyrrole, furan, thiophene, oxazole, thiazole, imidazole, pyrazole, isoxazole, 1,2,4-triazole, tetrazole, pyrazine, pyridazine, oxazoline, thiazoline, tetrahydrofuran, tetrahydropyran, morpholine, piperidine, piperazine, pyrroline, pyrrolidine, oxazolidine, thiazolidine; or
a saturated, partially unsaturated or unsaturated 5-or 6-membered heterocycle which contains 1 nitrogen atom and 0 to 2 further heteroatoms selected from oxygen, nitrogen and sulfur, preferably from oxygen and nitrogen, such as piperidine, piperazin and morpholine.

Preferably, this ring system is a saturated, partially unsaturated or unsaturated 3- to 6-membered ring system which contains 1 to 4 heteroatoms selected from oxygen, nitrogen, sulfur, wherein two oxygen atoms must not be in adjacent positions and wherein at least 1 carbon atom must be in the ring system.

Most preferably, this ring system is a radical of pyridine, pyrimidine, (1,2,4)-oxadiazole, 1,3,4-oxadiazole, pyrrole, furan, thiophene, oxazole, thiazole, imidazole, pyrazole, isoxazole, 1,2,4-triazole, tetrazole, pyrazine, pyridazine, oxazoline, thiazoline, tetrahydrofuran, tetrahydropyran, morpholine, piperidine, piperazine, pyrroline, pyrrolidine, oxazolidine, thiazolidine, oxirane or oxetane.

Preparation of the compounds of formula I can be accomplished according to standard methods of organic chemistry, e.g. by the methods or working examples described in WO 2007/006670, PCT/EP2012/065650 and PCT/EP2012/065651, without being limited to the routes given therein.

The preparation of the compounds of formula I above may lead to them being obtained as isomer mixtures. If desired, these can be resolved by the methods customary for this purpose, such as crystallization or chromatography, also on optically active adsorbate, to give the pure isomers.

Agronomically acceptable salts of the compounds I can be formed in a customary manner, e.g. by reaction with an acid of the anion in question.

Compounds II

The commercially available compounds II of the group F listed above may be found in The Pesticide Manual, 15th Edition, C. D. S. Tomlin, British Crop Protection Council (2011) among other publications. Their preparation and their activity against harmful fungi is known (cf.: http://www.alanwood.net/pesticides/); these substances are commercially available. The compounds described by IUPAC nomenclature, their preparation and their fungicidal activity are also known (cf. Can. J. Plant Sci. 48(6), 587-94, 1968; EP A 141 317; EP-A 152 031; EP-A 226 917; EP A 243 970; EP A 256 503; EP-A 428 941; EP-A 532 022; EP-A 1 028 125; EP-A 1 035 122; EP A 1 201 648; EP A 1 122 244, JP 2002316902; DE 19650197; DE 10021412; DE 102005009458; US 3,296,272; US 3,325,503; WO 98/46608; WO 99/14187; WO 99/24413; WO 99/27783; WO 00/29404; WO 00/46148; WO 00/65913; WO 01/54501; WO 01/56358; WO 02/22583; WO 02/40431; WO 03/10149; WO 03/11853; WO 03/14103; WO 03/16286; WO 03/53145; WO 03/61388; WO 03/66609; WO 03/74491; WO 04/49804; WO 04/83193; WO 05/120234; WO 05/123689; WO 05/123690; WO 05/63721; WO 05/87772; WO 05/87773; WO 06/15866; WO 06/87325; WO 06/87343; WO 07/82098; WO 07/90624, WO 11/028657).

Biopesticides

The biopesticides from group F.XIII) [and from group M.Y as described below], their preparation and their biological activity e.g. against harmful fungi, pests is known (e-Pesticide Manual V 5.2 (ISBN 978 1 901396 85 0) (2008-2011); http://www.epa.gov/opp00001/biopesticides/, see product lists therein; http://www.omri.org/omri-lists, see lists therein; Bio-Pesticides Database BPDB http://sitem.herts.ac.uk/aeru/bpdb/, see A to Z link therein). Many of these biopesticides are registered and/or are commercially available: aluminium silicate (SCREEN™ DUO from Certis LLC, USA), Ampelomyces quisqualis M-10 (e.g. AQ 10® from Intrachem Bio GmbH & Co. KG, Germany), Ascophyllum nodosum (Norwegian kelp, Brown kelp) extract (e.g. ORKA GOLD from Becker Underwood, South Africa), Aspergillus flavus NRRL 21882 (e.g. AFLA-GUARD® from Syngenta, CH), Aureobasidium pullulans (e.g. BOTECTOR® from bio-ferm GmbH, Germany), Azospirillum brasilense XOH (e.g. AZOS from Xtreme Gardening, USA USA or RTI Reforestation Technologies International; USA), Bacillus amyloliquefaciens IT-45 (CNCM I 3800, NCBI 1091041) (e.g. RHIZOCELL C from ITHEC, France), B. amyloliquefaciens subsp. plantarum MBI600 (NRRL B-50595, deposited at United States Department of Agriculture) (e.g. INTEGRAL®, CLARITY, SUBTILEX NG from Becker Underwood, USA), B. pumilus QST 2808 (NRRL Accession No. B 30087) (e.g. SONATA® and BALLAD® Plus from AgraQuest Inc., USA), B. subtilis GB03 (e.g. KODIAK from Gustafson, Inc., USA), B. subtilis GB07 (EPIC from Gustafson, Inc., USA), B. subtilis QST-713 (NRRL-Nr. B 21661 in RHAPSODY®, SERENADE® MAX and SERENADE® ASO from Agra-Quest Inc., USA), B. subtilis var. amylolique¬faciens FZB24 (e.g. TAEGRO® from Novozyme Biologicals, Inc., USA), B. subtilis var.

amyloliquefaciens D747 (e.g. Double Nickel 55 from Certis LLC, USA), Bacillus thuringiensis ssp. kurstaki SB4 (e.g. BETA PRO® from Becker Underwood, South Africa), Beauveria bassiana GHA (BOTANIGARD® 22WGP from Laverlam Int. Corp., USA), B. bassiana 12256 (e.g. BIOEXPERT® SC from Live Sytems Technology S.A., Colombia), B. bassiana PRPI 5339 (ARSEF number 5339 in the USDA ARS collection of entomopathogenic fungal cultures) (e.g. BROAD¬BAND® from Becker Underwood, South Africa), Bradyrhizobium sp. (e.g. VAULT® from Becker Underwood, USA), B. japonicum (e.g. VAULT® from Becker Underwood, USA), Candida oleophila I-82 (e.g. ASPIRE® from Ecogen Inc., USA), Candida saitoana (e.g. BIOCURE® (in mixture with lysozyme) and BIOCOAT® from Micro Flo Company, USA (BASF SE) and Arysta), Chitosan (e.g. ARMOUR-ZEN from BotriZen Ltd., NZ), Clonostachys rosea f. catenulata, also named Gliocladium catenulatum (e.g. isolate J1446: PRESTOP® from Verdera, Finland), Coniothyrium minitans CON/M/91-08 (e.g. Contans® WG from Prophyta, Germany), Cryphonectria parasitica (e.g. Endothia parasitica from CNICM, France), Cryptococcus albidus (e.g. YIELD PLUS® from Anchor Bio-Technologies, South Africa), Ecklonia maxima (kelp) extract (e.g. KELPAK SL from Kelp Products Ltd, South Africa), Fusarium oxysporum (e.g. BIOFOX® from S.I.A.P.A., Italy, FUSACLEAN® from Natural Plant Protection, France), Glomus intraradices (e.g. MYC 4000 from ITHEC, France), Glomus intraradices RTI-801 (e.g. MYKOS from Xtreme Gardening, USA or RTI Reforestation Technologies International; USA), grapefruit seeds and pulp extract (e.g. BC-1000 from Chemie S.A., Chile), Isaria fumosorosea Apopka-97 (ATCC 20874) (PFR-97™ from Certis LLC, USA), Lecanicillium muscarium (formerly Verticillium lecanii) (e.g. MYCOTAL from Koppert BV, Netherlands), Lecanicillium longisporum KV42 and KV71 (e.g. VERTALEC® from Koppert BV, Netherlands), Metarhizium anisopliae var. acridum IMI 330189 (deposited in European Culture Collections CABI) (e.g. GREEN MUSCLE® from Becker Underwood, South Africa), M. anisopliae FI-1045 (e.g. BIOCANE® from Becker Underwood Pty Ltd, Australia), M. anisopliae var. acridum FI-985 (e.g. GREEN GUARD® SC from Becker Underwood Pty Ltd, Australia), M. anisopliae F52 (e.g. MET52® Novozymes Biologicals BioAg Group, Canada), M. anisopliae ICIPE 69 (e.g. METATHRI¬POL from ICIPE, Kenya), Metschnikowia fructicola (e.g. SHEMER® from Agrogreen, Israel), Microdochium dimerum (e.g. ANTIBOT® from Agrauxine, France), Neem oil (e.g. TRILOGY®, TRIACT® 70 EC from Certis LLC, USA), Paecilomyces fumosoroseus strain FE 9901 (e.g. NO FLY™ from Natural Industries, Inc., USA), P. lilacinus DSM 15169 (e.g. NEMATA® SC from Live Systems Technology S.A., Colombia), P. lilacinus BCP2 (e.g. PL GOLD from Becker Underwood BioAg SA Ltd, South Africa), mixture of Paenibacillus alvei NAS6G6 and Bacillus pumilis (e.g. BAC-UP from Becker Underwood South Africa), Penicillium bilaiae (e.g. JUMP START® from Novozymes Biologicals BioAg Group, Canada),Phlebiopsis gigantea (e.g. ROTSTOP® from Verdera, Finland), potassium silicate (e.g. Sil-MATRIX™ from Certis LLC, USA), Pseudozyma flocculosa (e.g. SPORODEX® from Plant Products Co. Ltd., Canada), Pythium oligandrum DV74 (e.g. POLYVERSUM® from Remeslo SSRO, Biopreparaty, Czech Rep.), Reynoutria sachlinensis extract (e.g. REGALIA® from Marrone BioInnovations, USA), Rhizobium leguminosarum bv. phaseolii (e.g. RHIZO-STICK from Becker Underwood, USA), R. l. trifolii (e.g. DORMAL from Becker Underwood, USA), R. l. bv. viciae (e.g. NODULATOR from Becker Underwood, USA), Sinorhizobium meliloti (e.g. DORMAL ALFALFA from Becker Underwood, USA; NITRAGIN® Gold from Novozymes Biologicals BioAg Group, Canada), Steinernema feltiae (NEMA¬SHIELD® from BioWorks, Inc., USA), Streptomyces lydicus WYEC 108 (e.g.

Actinovate® from Natural Industries, Inc., USA, US 5,403,584), S. violaceusniger YCED-9 (e.g. DT-9® from Natural Industries, Inc., USA, US 5,968,503), Talaromyces flavus V117b (e.g. PROTUS® from Prophyta, Germany), Trichoderma asperellum SKT-1 (e.g. ECO-HOPE® from Kumiai Chemical Industry Co., Ltd., Japan), T. atroviride LC52 (e.g. SENTINEL® from Agrimm Technologies Ltd, NZ), T. fertile JM41R (e.g. RICHPLUS™ from Becker Underwood Bio Ag SA Ltd, South Africa), T. harzianum T-22 (e.g. PLANTSHIELD® der Firma BioWorks Inc., USA), T. harzianum TH 35 (e.g. ROOT PRO® from Mycontrol Ltd., Israel), T. harzianum T-39 (e.g. TRICHODEX® and TRICHODERMA 2000® from Mycontrol Ltd., Israel and Makhteshim Ltd., Israel), T. harzianum and T. viride (e.g. TRICHOPEL from Agrimm Technologies Ltd, NZ), T. harzianum ICC012 and T. viride ICC080 (e.g. REMEDIER® WP from Isagro Ricerca, Italy), T. polysporum and T. harzianum (e.g. BINAB® from BINAB Bio-Innovation AB, Sweden), T. stromaticum (e.g. TRICOVAB® from C.E.P.L.A.C., Brazil), T. virens GL-21 (also named Gliocladium virens) (e.g. SOILGARD® from Certis LLC, USA), T. viride (e.g. TRIECO® from Ecosense Labs. (India) Pvt. Ltd., Indien, BIO-CURE® F from T. Stanes & Co. Ltd., Indien), T. viride TV1 (e.g. T. viride TV1 from Agribiotec srl, Italy), Ulocladium oudemansii HRU3 (e.g. BOTRY-ZEN® from Botry-Zen Ltd, NZ), Bacillus amyloliquefaciens AP-136 (NRRL B-50614), B. amyloliquefaciens AP-188 (NRRL B-50615), B. amyloliquefaciens AP-218 (NRRL B-50618), B. amyloliquefaciens AP-219 (NRRL B-50619), B. amyloliquefaciens AP-295 (NRRL B-50620), B. mojavensis AP-209 (No. NRRL B-50616), B. solisalsi AP-217 (NRRL B-50617), B. pumilus strain INR-7 (otherwise referred to as BU-F22 (NRRL B-50153) and BU-F33 (NRRL B-50185)), B. simplex ABU 288 (NRRL B-50340) and B. amyloliquefaciens subsp. plantarum MBI600 (NRRL B-50595) have been mentioned i.a. in US patent appl. 20120149571, WO 2012/079073. Beauveria bassiana DSM 12256 is known from US200020031495. Bradyrhizobium japonicum USDA is known from US patent 7,262,151. Sphaerodes mycoparasitica IDAC 301008-01 (IDAC = International Depositary Authority of Canada Collection) is known from WO 2011/022809. Bacillus amyloliquefaciens subsp. plantarum MBI600 having the accession number NRRL B-50595 is deposited with the United States Department of Agriculture on Nov. 10, 2011 under the strain designation Bacillus subtilis 1430. It has also been deposited at The National Collections of Industrial and Marine Bacteria Ltd. (NCIB), Torry Research Station, P.O. Box 31, 135 Abbey Road, Aberdeen, AB9 8DG, Scotland.under accession number 1237 on December 22, 1986. Bacillus amyloliquefaciens MBI600 is known as plant growth-promoting rice seed treatment from Int. J. Microbiol. Res. ISSN 0975-5276, 3(2) (2011), 120-130 and further described e.g. in US 2012/0149571 A1. This strain MBI600 is commercially available as liquid formulation product Integral® (Becker-Underwood Inc., USA). Recently, the strain MBI 600 has been re-classified as Bacillus amyloliquefaciens subsp. plantarum based on polyphasic testing which combines classical microbiological methods relying on a mixture of traditional tools (such as culture-based methods) and molecular tools (such as genotyping and fatty acids analysis). Thus, Bacillus subtilis MBI600 (or MBI 600 or MBI-600) is identical to Bacillus amyloliquefaciens subsp. plantarum MBI600, formerly Bacillus subtilis MBI600.

Metarhizium anisopliae IMI33 is commercially available from Becker Underwood as product Green Guard. M. anisopliae var acridium strain IMI 330189 (NRRL-50758) is commercially available from Becker Underwood as product Green Muscle.

Bacillus subtilis strain FB17 was originally isolated from red beet roots in North America (System Appl. Microbiol 27 (2004) 372-379). This Bacillus subtilis strain promotes plant health

(US 2010/0260735 A1; WO 2011/109395 A2). B. subtilis FB17 has also been deposited at American Type Culture Collection (ATCC), Manassas, VA, USA, under accession number PTA-11857 on April 26, 2011. Bacillus subtilis strain FB17 may also be referred to as UD1022 or UD10-22.

According to one embodiment of the inventive mixtures, the at least one biopesticide II is selected from the groups F.XIII-1) to F.XIII-4):

F.XIII-1) Microbial pesticides with fungicidal, bactericidal, viricidal and/or plant defense activator activity: Ampelomyces quisqualis M-10, Aspergillus flavus NRRL Accession No. 21882, Aureobasidium pullulans DSM 14940, A. pullulans DSM 14941, Bacillus amyloliquefaciens AP-136 (NRRL B-50614), B. amyloliquefaciens AP-188 (NRRL B-50615), B. amyloliquefaciens AP-218 (NRRL B-50618), B. amyloliquefaciens AP-219 (NRRL B-50619), B. amyloliquefaciens AP-295 (NRRL B-50620), B. amyloliquefaciens IT-45 (CNCM I 3800, NCBI 1091041), B. amyloliquefaciens subsp. plantarum MBI600 (NRRL B-50595), B. mojavensis AP-209 (No. NRRL B-50616), B. pumilus INR-7 (otherwise referred to as BU-F22 (NRRL B-50153) and BU-F33 (NRRL B-50185)), B. pumilus KFP9F, B. pumilus QST 2808 (NRRL B 30087), B. pumilus GHA 181, B. simplex ABU 288 (NRRL B-50340), B. solisalsi AP-217 (NRRL B-50617), B. subtilis CX-9060, B. subtilis GB03, B. subtilis GB07, B. subtilis QST-713 (NRRL B-21661), B. subtilis var. amyloliquefaciens FZB23, B. subtilis var. amyloliquefaciens D747, Candida oleophila I-82, C. oleophila O, C. saitoana, Clavibacter michiganensis (bacteriophages), Coniothyrium minitans CON/M/91-08, Cryphonectria parasitica, Cryptococcus albidus, Fusarium oxysporum, Clonostachys rosea f. catenulata J1446 (also named Gliocladium catenulatum), Gliocladium roseum 321U, Metschnikowia fructicola, Microdochium dimerum, Paenibacillus polymyxa PKB1 (ATCC No. 202127), Pantoea agglomerans c91, Phlebiopsis gigantea, Pseudozyma flocculosa, Pythium oligandrum DV74, Sphaerodes mycoparasitica IDAC 301008-01, Streptomyces lydicus WYEC 108, S. violaceusniger XL-2, S. violaceusniger YCED-9, Talaromyces flavus V117b, Trichoderma asperellum T34, T. asperellum SKT-1, T. atroviride LC52, T. fertile JM41R, T. gamsii, T. harmatum TH 382, T. harzianum TH-35, T. harzianum T-22, T. harzianum T-39, ; mixture of T. harzianum ICC012 and T. viride ICC080; mixture of T. polysporum and T. harzianum; T. stromaticum, T. virens (also named Gliocladium virens) GL-21, T. virens G41, T. viride TV1, Typhula phacorrhiza 94671, Ulocladium oudema, U. oudemansii HRU3, Verticillium dahlia, zucchini yellow mosaic virus (avirulent strain);

F.XIII-2) Biochemical pesticides with fungicidal, bactericidal, viricidal and/or plant defense activator activity: chitosan (hydrolysate), laminarin, methyl jasmonate, cis-jasmone, Menhaden fish oil, natamycin, Plum pox virus coat protein, Reynoutria sachlinensis extract, salicylic acid, tea tree oil;

F.XIII-3) Microbial pesticides with plant stress reducing, plant growth regulator, plant growth promoting and/or yield enhancing activity: Azospirillum amazonense BR 11140 (SpY2T), A. brasilense XOH, A. brasilense BR 11005 (Sp245), A. brasilense BR 11002, A. lipoferum BR 11646 (Sp31), A. irakense, A. halopraeferens, Bradyrhizobium sp. (Vigna), B. japonicum USDA 3, B. japonicum USDA 31, B. japonicum USDA 76, B.

japonicum USDA 110, B. japonicum USDA 121, Glomus intraradices RTI-801, Paenibacillus alvei NAS6G6, Penicillium bilaiae, Rhizobium leguminosarum bv. phaseolii, R. l. trifolii, R. l. bv. viciae, Sinorhizobium meliloti;

F.XIII-4) Biochemical pesticides with plant stress reducing, plant growth regulator and/or plant yield enhancing activity: abscisic acid, aluminium silicate (kaolin), 3-decen-2-one, homobrassinlide, humates, lysophosphatidyl ethanlamine, polymeric polyhydroxy acid, salicylic acid, Ascophyllum nodosum (Norwegian kelp, Brown kelp) extract and Ecklonia maxima (kelp) extract.

According to one embodiment of the inventive mixtures, the at least one biopesticide II is selected from group F.XIII-1 or F.XIII-2.
According to one embodiment of the inventive mixtures, the at least one biopesticide II is selected from group F.XIII-3 or F.XIII-4.
According to one embodiment of the inventive mixtures, the at least one biopesticide II is selected from group F.XIII-1 or F.XIII-3.
According to one embodiment of the inventive mixtures, the at least one biopesticide II is selected from group F.XIII-2 or F.XIII-4.

According to one embodiment of the inventive mixtures, the at least one biopesticide II is Bacillus amyloliquefaciens subsp. plantarum MBI600. These mixtures are particularly suitable in soybean.
According to another embodiment of the inventive mixtures, the at least one biopesticide II is B. pumilus strain INR-7 (otherwise referred to as BU-F22 (NRRL B-50153) and BU-F33 (NRRL B-50185; see WO 2012/079073). These mixtures are particularly suitable in soybean and corn.
According to another embodiment of the inventive mixtures, the at least one biopesticide II is Bacillus pumilus, preferably B. pumilis strain INR-7 (otherwise referred to as BU-F22 (NRRL B-50153) and BU-F33 (NRRL B-50185). These mixtures are particularly suitable in soybean and corn.
According to another embodiment of the inventive mixtures, the at least one biopesticide II is Bacillus simplex, preferably B. simplex strain ABU 288 (NRRL B-50340). These mixtures are particularly suitable in soybean and corn.
According to another embodiment of the inventive mixtures, the at least one biopesticide II is selected from Trichoderma asperellum, T. atroviride, T. fertile, T. gamsii, T. harmatum; mixture of T. harzia¬num and T. viride; mixture of T. polysporum and T. harzianum; T. stromaticum, T. virens (also named Gliocladium virens) and T. viride; preferably Trichoderma fertile, in particular T. fertile strain JM41R. These mixtures are particularly suitable in soybean and corn.
According to another embodiment of the inventive mixtures, the at least one biopesticide II is Sphaerodes mycoparasitica, preferably Sphaerodes mycoparasitica strain IDAC 301008-01 (also referred to as strain SMCD2220-01). These mixtures are particularly suitable in soybean and corn.
According to another embodiment of the inventive mixtures, the at least one biopesticide II is Beauveria bassiana, preferably Beauveria bassiana strain PPRI5339. These mixtures are particularly suitable in soybean and corn.

According to another embodiment of the inventive mixtures, the at least one biopesticide II is Metarhizium anisopliae or M. anisopliae var. acridium, preferably selectged from M anisolpiae strain IMI33 and M. anisopliae var. acridium strain IMI 330189. These mixtures are particularly suitable in soybean and corn.

According to another embodiment of the inventive mixtures, Bradyrhizobium sp. (meaning any Bradyrhizobium species and/or strain) as biopesticide II is Bradyrhizobium japonicum (B. japonicum). These mixtures are particularly suitable in soybean. Preferably B. japonicum is not one of the strains TA-11 or 532c. B. japonicum strains were cultivated using media and fermentation techniques known in the art, e.g. in yeast extract-mannitol broth (YEM) at 27°C for about 5 days.

References for various B. japonicum strains are given e.g. in US 7,262,151 (B. japonicum strains USDA 110 (= IITA 2121, SEMIA 5032, RCR 3427, ARS I-110, Nitragin 61A89; isolated from Glycine max in Florida in 1959, Serogroup 110; Appl Environ Microbiol 60, 940-94, 1994), USDA 31 (= Nitragin 61A164; isolated from Glycine max in Wisoconsin in 1941, USA, Serogroup 31), USDA 76 (plant passage of strain USDA 74 which has been isolated from Glycine max in California, USA, in 1956, Serogroup 76), USDA 121 (isolated from Glycine max in Ohio, USA, in 1965), USDA 3 (isolated from Glycine max in Virginia, USA, in 1914, Serogroup 6) and USDA 136 (= CB 1809, SEMIA 586, Nitragin 61A136, RCR 3407; isolated from Glycine max in Beltsville, Maryland in 1961; Appl Environ Microbiol 60, 940-94, 1994). USDA refers to United States Department of Agriculture Culture Collection, Beltsville, Md., USA (see e.g. Beltsville Rhizobium Culture Collection Catalog March 1987 ARS-30). Further suitable B. japonicum strain G49 (INRA, Angers, France) is described in Fernandez-Flouret, D. & Cleyet-Marel, J. C. (1987) C R Acad Agric Fr 73, 163-171), especially for soybean grown in Europe, in particular in France. Further suitable B. japonicum strain TA-11 (TA11 NOD+) (NRRL B-18466) is i.a. described in US 5,021,076; Appl Environ Microbiol (1990) 56, 2399-2403 and commercially available as liquid inoculant for soybean (VAULT® NP, Becker Underwood, USA). Further B. japonicum strains as example for biopesticide II are described in US2012/0252672A. Further suitable and especially in Canada commercially available strain 532c (The Nitragin Company, Milwaukee, Wisconsin, USA, field isolate from Wisconsin; Nitragin strain collection No. 61A152; Can J Plant Sci 70 (1990), 661-666).

Other suitable and commercially available B. japonicum strains (see e.g. Appl Environ Microbiol 2007, 73(8), 2635) are SEMIA 566 (isolated from North American inoculant in 1966 and used in Brazilian commercial inoculants from 1966 to 1978), SEMIA 586 (= CB 1809; originally isolated in Maryland, USA but received from Austrailia in 1966 and used in Brazilian inoculants in 1977), CPAC 15 (= SEMIA 5079; a natural varaiant of SEMIA 566 used in commercial inoculants since 1992) and CPAC 7 (= SEMIA 5080; a natural variant of SEMIA 586 used in commercial inoculants since 1992). These strains are especially suitable for soybean grown in Australia or South America, in particular in Brazil. Some of the abovementioned strains have been re-classified as a novel species Bradyrhizobium elkanii, e.g. strain USDA 76 (Can. J. Microbiol., 1992, 38, 501-505).

Another suitable and commercially available B. japonicum strain is E-109 (variant of strain USDA 138, see e.g. Eur. J. Soil Biol. 45 (2009) 28–35; Biol Fertil Soils (2011) 47:81–89, deposited at Agriculture Collection Laboratory of the Instituto de Microbiologia y Zoologia

Agrıcola (IMYZA), Instituto Nacional de Tecnologı´a Agropecuaria (INTA), Castelar, Argentina). This strain is especially suitable for soybean grown in South America, in particular in Argentina.

The present invention also relates to mixtures, wherein the at least one biopesticide II is selected from Bradyrhizobium elkanii and Bradyrhizobium liaoningense (B. elkanii and B. liaoningense), more preferably from B. elkanii. These mixtures are particularly suitable in soybean. B. elkanii and liaoningense were cultivated using media and fermentation techniques known in the art, e.g. in yeast extract-mannitol broth (YEM) at 27°C for about 5 days. Suitable and commercially available B. elkanii strains are SEMIA 587 and SEMIA 5019 (=29W) (see e.g. Appl Environ Microbiol 2007, 73(8), 2635) and USDA 3254 and USDA 76 and USDA 94. Further commercially available B. elkanii strains are U-1301 and U-1302 (e.g. product Nitroagin® Optimize from Novozymes Bio As S.A., Brazil or NITRASEC for soybean from LAGE y Cia, Brazil). These strains are especially suitable for soybean grown in Australia or South America, in particular in Brazil.

The present invention also relates to mixtures, wherein the at least one biopesticide II is selected from Bradyrhizobium japonicum (B. japonicum) and further comprisies a compound III, wherein compound III is selected from jasmonic acid or salts or derivatives thereof including cis-jasmone, preferably methyl-jasmonate or cis-jasmone.

The present invention also relates to mixtures, wherein biopesticide II is selected from Bradyrhizobium sp. (Arachis) (B. sp. Arachis) which shall describe the cowpea miscellany cross-inoculation group which includes inter alia indigenous cowpea bradyrhizobia on cowpea (Vigna unguiculata), siratro (Macroptilium atropurpureum), lima bean (Phaseolus lunatus), and peanut (Arachis hypogaea). This mixture comprising as biopesticide II B. sp. Arachis is especially suitable for use in peanut, Cowpea, Mung bean, Moth bean, Dune bean, Rice bean, Snake bean and Creeping vigna, in particular peanut.

Suitable and commercially available B. sp. (Arachis) strain is CB1015 (= IITA 1006, USDA 3446 presumably originally collected in India; from Australian Inoculants Research Group; see e.g. http://www.qaseeds.com.au/inoculant_applic.php; Beltsville Rhizobium Culture Collection Catalog March 1987 USDA-ARS ARS-30). These strains are especially suitable for peanut grown in Australia, North America or South America, in particular in Brazil. Further suitable strain is bradyrhizobium sp. PNL01 (Becker Underwood; ISO Rep Marita McCreary, QC Manager Padma Somasageran; IDENTIFICATION OF RHIZOBIA SPECIES THAT CAN ESTABLISH NITROGEN-FIXING NODULES IN CROTALARIA LONGIROSTRATA. April 29, 2010, University of Massachusetts Amherst: http://www.wpi.edu/Pubs/E-project/Available/E-project-042810-163614/unrestricted/Bisson.Mason._Identification_of_Rhizobia_Species_That_can_Establish_Nitrogen-Fixing_Nodules_in_Crotalia_Longirostrata.pdf).

Suitable and commercially available Bradyrhizobium sp. (Arachis) strains especially for cowpea and peanut but also for soybean are Bradyrhizobium SEMIA 6144, SEMIA 6462 (= BR 3267) and SEMIA 6464 (= BR 3262) (deposited at FEPAGRO-MIRCEN, R. Gonçalves Dias, 570 Porto Alegre - RS, 90130-060, Brazil; see e.g. FEMS Microbiology Letters (2010) 303(2), 123–131; Revista Brasileira de Ciencia do Solo (2011) 35(3);739-742, ISSN 0100-0683).

The present invention also relates to mixtures wherein the at least one biopesticide II is selected from Bradyrhizobium sp. (Arachis) and further comprises a compound III, wherein compound III

is selected from jasmonic acid or salts or derivatives thereof including cis-jasmone, preferably methyl-jasmonate or cis-jasmone.

The present invention also relates to mixtures, wherein the at least one biopesticide II is selected from Bradyrhizobium sp. (Lupine) (also called B. lupini, B. lupines or Rhizobium lupini). This mixture is especially suitable for use in dry beans and lupins.

Suitable and commercially available B. lupini strain is LL13 (isolated from Lupinus iuteus nodules from French soils; deposited at INRA, Dijon and Angers, France; http://agriculture.gouv.fr/IMG/pdf/ch20060216.pdf). This strain is especially suitable for lupins grown in Australia, North America or Europe, in particular in Europe.

Further suitable and commercially available B. lupini strains WU425 (isolated in Esperance, Western Australia from a non-Australian legume Ornthopus compressus), WSM4024 (isolated from lupins in Australia by CRS during a 2005 survey) and WSM471 (isolated from Ornithopus pinnatus in Oyster Harbour, Western Australia) are described e.g. in Palta J.A. and Berger J.B. (eds), 2008, Proceedings 12th International Lupin Conference, 14-18 Sept. 2008, Fremantle, Western Australia. International Lupin Association, Canterbury, New Zealand, 47-50, ISBN 0-86476-153-8: http://www.lupins.org/pdf/conference/2008/Agronomy%20and%20Production/John%20Howieson%20and%20G%20OHara.pdf; Appl Environ Microbiol (2005) 71, 7041-7052 and Australian J. Exp. Agricult. (1996) 36(1), 63-70.

The present invention also relates to mixtures wherein the at least one biopesticide II is selected from Bradyrhizobium sp. (Lupine) (B. lupini) and further comprises a compound III, wherein compound III is selected from jasmonic acid or salts or derivatives thereof including cis-jasmone, preferably methyl-jasmonate or cis-jasmone.

The present invention also relates to mixtures, wherein the at least one biopesticide II is selected from Mesorhizobium sp. (meaning any Mesorhizobium species and/or strain), more preferably Mesorhizobium ciceri. These mixtures are particularly suitable in cowpea.

Suitable and commercially available M. sp. strains are e.g. M. ciceri CC1192 (=UPM 848, CECT 5549; from Horticultural Research Station, Gosford, Australia; collected in Israel from Cicer arietinum nodules; Can J Microbial (2002) 48, 279-284) and Mesorhizobium sp. strains WSM1271 (collected in Sardinia, Italy, from plant host Biserrula pelecinus), WSM 1497 (collected in Mykonos, Greece, from plant host Biserrula pelecinus), M. loti strains CC829 (commerical inoculant for Lotus pedunculatus and L. ulginosus in Australia, isolated from L. ulginosus nodules in USA) and SU343 (commercial inoculant for Lotus corniculatus in Australia; isolated from host nodules in USA) all of which are deposited at Western Australian Soil Microbiology (WSM) culture collection, Australia and/or CSIRO collection (CC), Canberra, Australian Capirtal Territory (see e.g. Soil Biol Biochem (2004) 36(8), 1309-1317; Plant and Soil (2011) 348(1-2), 231-243).

Suitable and commercially available M. loti strains are e.g. M. loti CC829 for Lotus pedunculatus.

The present invention also relates to mixtures wherein the at least one biopesticide II is selected from Bradyrhizobium sp. (Lupine) (B. lupini) and further comprises a compound III, wherein compound III is selected from jasmonic acid or salts or derivatives thereof including cis-jasmone, preferably methyl-jasmonate or cis-jasmone.

The present invention also relates to mixtures wherein the at least one biopesticide II is selected from Mesorhizobium huakuii, also referred to as Rhizobium huakuii (see e.g. Appl. Environ. Microbiol. 2011, 77(15), 5513-5516). These mixtures are particularly suitable in Astralagus, e.g. Astalagus sinicus (Chinese milkwetch), Thermopsis, e.g. Thermopsis luinoides (Goldenbanner) and alike.

Suitable and commercially available M. huakuii strain is HN3015 which was isolated from Astralagus sinicus in a rice-growing field of Southern China (see e.g. World J. Microbiol. Biotechn. (2007) 23(6), 845-851, ISSN 0959-3993).

The present invention also relates to mixtures wherein the at least one biopesticide II is selected from Mesorhizobium huakuii and further comprises a compound III, wherein compound III is selected from jasmonic acid or salts or derivatives thereof including cis-jasmone, preferably methyl-jasmonate or cis-jasmone.

The present invention also relates to mixtures, wherein the at least one biopesticide II is selected from Azospirillum amazonense, A. brasilense, A. lipoferum, A. irakense, A. halopraeferens, more preferably from A. brasilense, in particular selected from A. brasilense strains BR 11005 (SP 245) and AZ39 which are both commercially used in Brazil and are obtainable from EMBRAPA, Brazil. These mixtures are particularly suitable in soybean.

Humates are humic and fulvic acids extracted from a form of lignite coal and clay, known as leonardite. Humic acids are organic acids that occur in humus and other organically derived materials such as peat and certain soft coal. They have been shown to increase fertilizer efficiency in phosphate and micro-nutrient uptake by plants as well as aiding in the development of plant root systems.

Salts of jasmonic acid (jasmonate) or derivatives include without limitation the jasmonate salts potassium jasmonate, sodium jasmonate, lithium jasmonate, ammonium jasmonate, dimethylammonium jasmonate, isopropylammonium jasmonate, diolammonium jasmonate, diethtriethanolammonium jasmonate, jasmonic acid methyl ester, jasmonic acid amide, jasmonic acid methylamide, jasmonic acid-L-amino acid (amide-linked) conjugates (e.g., conjugates with L- isoleucine, L- valine, L-leucine, or L-phenylalanine), 12-oxo-phytodienoic acid, coronatine, coronafacoyl- L-serine, coronafacoyl-L-threonine, methyl esters of 1 - oxo-indanoyl-isoleucine, methyl esters of 1-oxo-indanoyl-leucine, coronalon (2- [(6- ethyl-l-oxo-indane-4-carbonyl) -amino] -3- methyl -pentanoic acid methyl ester), linoleic acid or derivatives thereof and cis-jasmone, or combinations of any of the above.

According to one embodiment, the microbial pesticides embrace not only the isolated, pure cultures of the respective micro-organism as defined herein, but also its cell-free extract, its suspensions in a whole broth culture or as a metabolite-containing supernatant or a purified metabolite obtained from a whole broth culture of the microorganism or microorganism strain.

According to a further embodiment, the microbial pesticides embrace not only the isolated, pure cultures of the respective micro-organism as defined herein, but also a cell-free extract thereof or at least one metabolite thereof, and/or a mutant of the respective micro-organism having all the identifying characteristics thereof and also a cell-free extract or at least one metabolite of the mutant.

"Whole broth culture" refers to a liquid culture containing both cells and media.

"Supernatant" refers to the liquid broth remaining when cells grown in broth are removed by centrifugation, filtration, sedimentation, or other means well known in the art.

The term "metabolite" refers to any compound, substance or byproduct produced by a microorganism (such as fungi and bacteria) that has improves plant growth, water use efficiency of the plant, plant health, plant appearance, or the population of beneficial microorganisms in the soil around the plant activity.

The term "mutant" refers a microorganism obtained by direct mutant selection but also includes microorganisms that have been further mutagenized or otherwise manipulated (e.g., via the introduction of a plasmid). Accordingly, embodiments include mutants, variants, and or derivatives of the respective microorganism, both naturally occurring and artificially induced mutants. For example, mutants may be induced by subjecting the microorganism to known mutagens, such as N-methyl-nitrosoguanidine, using conventional methods.

According to the invention, the solid material (dry matter) of the biopesticides (with the exception of oils such as Neem oil, Tagetes oil, etc.) are considered as active components (e.g. to be obtained after drying or evaporation of the extraction medium or the suspension medium in case of liquid formulations of the microbial pesticides).

In accordance with the present invention, the weight ratios and percentages used herein for biological extract such as Quillay extract are based on the total weight of the dry content (solid material) of the respective extract(s).

For microbial pesticides, weight ratios and/or percentages refer to the total weight of a preparation of the respective biopesticide with at least 1 x 106 CFU/g ("colony forming units per gram total weight"), preferably with at least 1 x 108 CFU/g, even more preferably from 1 x 108 to 1 x 1012 CFU/g dry matter. Colony forming unit is measure of viable microbial cells, in particular fungal and bacterial cells. In addition, here CFU may also be understood as number of (juvenile) individual nematodes in case of (entomo¬pathogenic) nematode biopesticides, such as Steinernema feltiae.

Herein, microbial pesticides may be supplied in any physiological state such as active or dormant. Such dormant active component may be supplied for example frozen, dried, or lyophilized or partly desiccated (procedures to produce these partly desiccated organisms are given in WO2008/002371) or in form of spores.

Microbial pesticides used as organism in an active state can be delivered in a growth medium without any additional additives or materials or in combination with suitable nutrient mixtures. According to a further embodiment, microbial pesticides are delivered and formulated in a dormant stage, more preferably in form of spores.

The total weight ratios of compositions, which comprise a microbial pesticide as component 2, can be determined based on the total weight of the solid material (dry matter) of component 1) and using the amount of CFU of component 2) to calclulate the total weight of component 2) with the following equation that 1 x 10^9 CFU equals one gram of total weight of component 2).

According to one embodiment, the compositions, which comprise a microbial pesticide, comprise between 0.01 and 90% (w/w) of dry matter (solid material) of component 1) and from 1 x 10^5 CFU to 1 x 10^{12} CFU of component 2) per gram total weight of the composition.

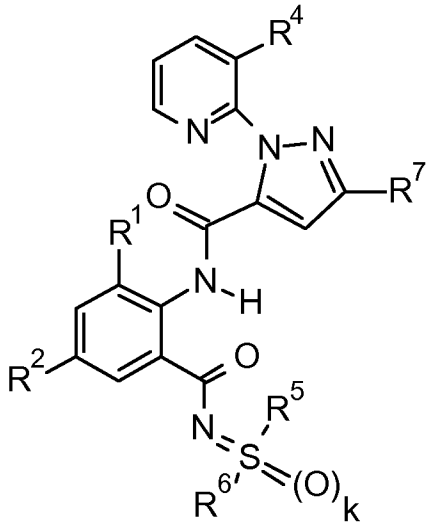
According to another embodiment, the compositions, which comprise a microbial pesticide, comprise between 5 and 70% (w/w) of dry matter (solid material) of component 1) and from 1 x 10^6 CFU to 1 x 10^{10} CFU of component 2) per gram total weight of the composition.

According to another embodiment, the compositions, wherein one component is a microbial pesticide, comprise between 25 and 70% (w/w) of dry matter (solid material) of component 1) and from 1 x 10^7 CFU to 1 x 10^9 CFU of component 2) per gram total weight of the composition.
In the case of mixtures comprising a microbial pesticide, the application rates preferably range from about 1 x 10^6 to 5 x 10^{15} (or more) CFU/ha. Preferably, the spore concentration is about 1 x 107 to about 1 x 1011 CFU/ha. In the case of (entomopathogenic) nematodes as microbial pesticides (e.g. Steinernema feltiae), the application rates preferably range inform about 1 x 10^5 to 1 x 10^{12} (or more), more preferably from 1 x 10^8 to 1 x 10^{11}, even more preferably from 5 x 10^8 to 1 x 10^{10} individuals (e.g. in the form of eggs, juvenile or any other live stages, preferably in an infetive juvenile stage) per ha.
the case of mixtures comprising microbial pesticides, the application rates with respect to plant propagation material preferably range from about 1 x 10^6 to 1 x 10^{12} (or more) CFU/seed. Preferably, the concentration is about 1 x 10^6 to about 1 x 10^{11} CFU/seed. In the case of microbial pesticides, the application rates with respect to plant propagation material also preferably range from about 1 x 10^7 to 1 x 10^{14} (or more) CFU per 100 kg of seed, preferably from 1 x 10^9 to about 1 x 10^{11} CFU per 100 kg of seed.

Preferences

The remarks made below as to preferred embodiments of the variables (substituents) of the compounds of formulae (I) are valid on their own as well as preferably in combination with each other, as well as in combination with the stereoisomers, tautomers, N-oxides or salts thereof, and, where applicable, as well as concerning the uses and methods according to the invention and the compositions according to the invention.
Preferred compounds according to the invention are compounds of formulae (I) or a stereoisomer, N-oxide or salt thereof, wherein the salt is an agriculturally or veterinarily acceptable salt.
The compounds I of formula (I) and their examples include their tautomers, racemic mixtures, individual pure enantiomers and diasteroemers and their optically active mixtures.
The term compounds, stereoisomers, tautomers, N-oxides or salts thereof may also include a polymorphic crystalline form, a co-crystal or a solvate of a compound or a stereoisomer, salt, tautomer or N-oxide.

Preferred are mixtures of compounds of formula (I), wherein the compound of formula I is a compound of formula IA:



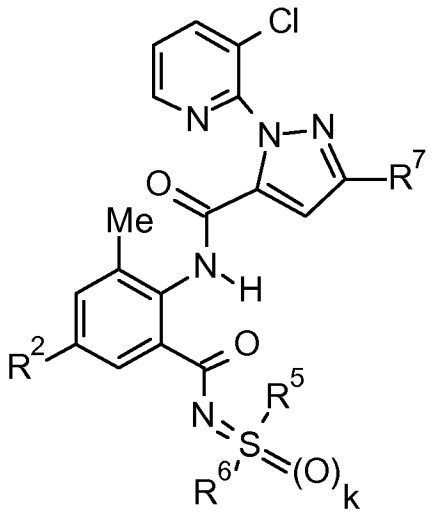
(IA)

wherein

R^4 is halogen, and

wherein the variables R^1, R^2, R^7, R^5, R^6 and k are as defined herein.

Preferred are mixtures of compounds of formula (I), in which the compound of formula I is a compound of formula IB:



(IB)

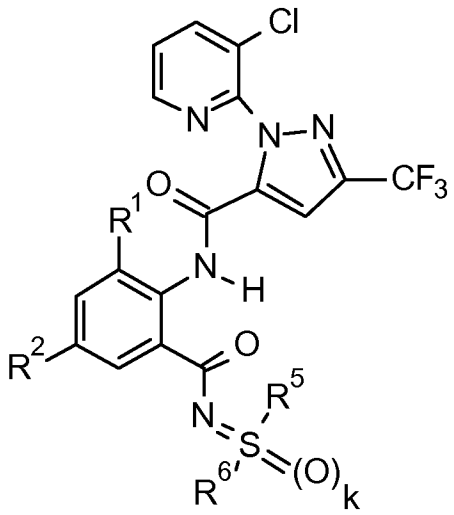
wherein

R^2 is selected from the group consisting of bromo, chloro, cyano;

R^7 is selected from the group consisting of bromo, chloro, trifluoromethyl, $OCHF_2$, and

wherein the variables R^2, R^7, R^5, R^6 and k are as defined herein.

Preferred are mixtures of compounds of formula (I), in which the compound of formula I is a compound of formula IC:



(IC)

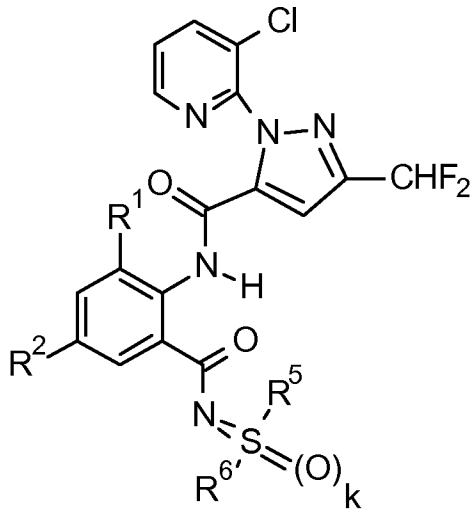
wherein

R^1 is selected from the group consisting of halogen and halomethyl;

R^2 is selected from the group consisting of bromo, chloro and cyano, and

wherein the variables R^5, R^6 and k are as defined herein.

Preferred are mixtures of compounds of formula (I), in which the compound of formula I is a compound of formula ID:



(ID)

wherein

R^1 is selected from the group consisting of halogen, methyl and halomethyl;

R^2 is selected from the group consisting of bromo, chloro and cyano, and

wherein the variables R^5, R^6 and k are as defined herein.

Preferred are mixtures of compounds of formula (I), in which R^5, R^6 are selected independently of one another from the group consisting of hydrogen, C_1-C_{10}-alkyl, C_3-C_8-cycloalkyl, wherein the aforementioned aliphatic and cycloaliphatic radicals may be substituted with 1 to 10 substituents R^e; or

R^5 and R^6 together represent a C_2-C_7-alkylene chain forming together with the sulfur atom to which they are attached a 3-, 4-, 5-, 6-, 7- or 8- membered saturated, partially unsaturated or fully unsaturated ring, wherein 1 to 4 of the CH_2 groups in the C_2-C_7-alkylene chain may be

replaced by 1 to 4 groups independently selected from the group consisting of C=O, C=S, O, S, N, NO, SO, SO_2 and NH, and wherein the carbon and/or nitrogen atoms in the C_2-C_7-alkylene chain may be substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, C_1-C_6-alkyl, C_1-C_6-haloalkyl, C_1-C_6-alkoxy, C_1-C_6-haloalkoxy, C_1-C_6-alkylthio, C_1-C_6-haloalkylthio, C_3-C_8-cycloalkyl, C_3-C_8-halocycloalkyl, C_2-C_6-alkenyl, C_2-C_6-haloalkenyl, C_2-C_6-alkynyl and C_2-C_6-haloalkynyl; said substituents being identical or different from one another if more than one substituent is present.

Preferred are mixtures of compounds of formula (I), in which R^5, R^6 are selected independently of one another from the group consisting of hydrogen, C_1-C_{10}-alkyl, C_3-C_8-cycloalkyl, wherein the aforementioned aliphatic and cycloaliphatic radicals may be substituted with 1 to 10 substituents R^e.

Preferred are mixtures of compounds of formula (I), in which R^7 is selected from the group consisting of bromo, difluoromethyl, trifluoromethyl, cyano, $OCHF_2$, OCH_2F and OCH_2CF_3,

Preferred are mixtures of compounds of formula (I), in which R^7 is selected from the group consisting of bromo, difluoromethyl, trifluoromethyl and $OCHF_2$.

Preferred are mixtures of compounds of formula (I), in which R^e is independently selected from the group consisting of halogen, cyano, -OH, -SH, -SCN, C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkinyl, C_3-C_8-cycloalkyl, wherein one or more CH_2 groups of the aforementioned radicals may be replaced by a C=O group, and/or the aliphatic and cycloaliphatic moieties of the aforementioned radicals may be unsubstituted, partially or fully halogenated and/or may carry 1 or 2 radicals selected from C_1-C_6-alkoxy, C_1-C_6-haloalkoxy, C_1-C_6-alkylthio, C_1-C_6-alkylsulfinyl, C_1-C_6-alkylsulfonyl, C_1-C_6-haloalkylthio, $-OR^a$, $-NR^cR^d$, $-S(O)_nR^a$, $-S(O)_nNR^cR^d$, $-C(=O)R^a$, $-C(=O)NR^cR^d$, $-C(=O)OR^b$, $-C(=S)R^a$, $-C(=S)NR^cR^d$, $-C(=S)OR^b$, $-C(=S)SR^b$, $-C(=NR^c)R^b$, $-C(=NR^c)NR^cR^d$, phenyl, benzyl, pyridyl and phenoxy, wherein the last four radicals may be unsubstituted, partially or fully halogenated and/or carry 1, 2 or 3 substituents selected from C_1-C_6-alkyl, C_1-C_6-haloalkyl, C_1-C_6-alkoxy and C_1-C_6-haloalkoxy.

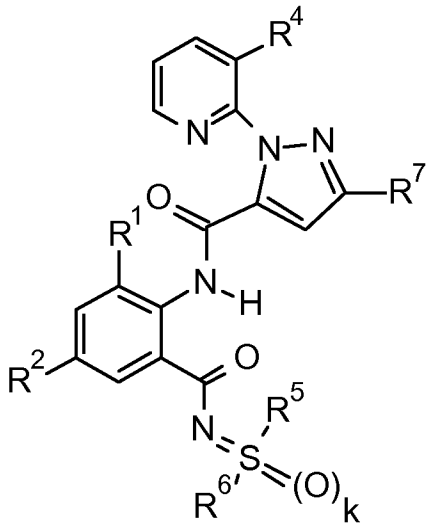
Preferred are mixtures of compounds of formula (I), in which R^e is independently selected from the group consisting of halogen, cyano, -OH, -SH, -SCN, C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkinyl, C_3-C_8-cycloalkyl, wherein one or more CH_2 groups of the aforementioned radicals may be replaced by a C=O group, and/or the aliphatic and cycloaliphatic moieties of the aforementioned radicals may be unsubstituted, partially or fully halogenated.

Preferred are mixtures of compounds of formula (I) as described herein, in which in the compound of formula I
R^5 and R^6 are selected from methyl, ethyl, isopropyl, n-propyl, n-butyl, isobutyl, tert-butyl, cyclopropyl, cyclopropylmethyl.

Preferred are mixtures of compounds of formula (I) as described herein, in which in the compound of formula I

R^5 and R^6 are identical.

In a particularly preferred embodiment, the mixtures according to the invention comprise at least one compound of formula (IA)



(IA)

wherein

R^4 is Cl,

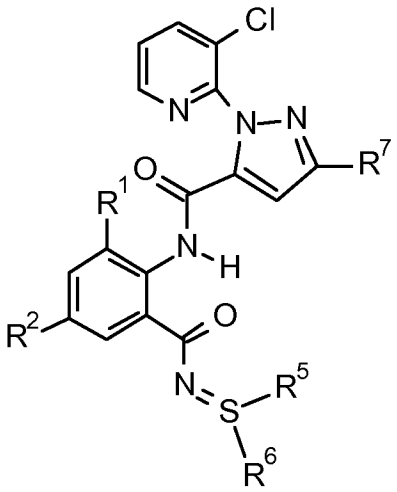
R^1 is selected from the group consisting of Cl, Br, and methyl;

R^2 is selected from the group consisting of bromo and chloro;

R^5, R^6 are selected independently of one another from the group consisting of methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, tert-butyl.

R^7 is selected from the group consisting of difluoromethyl, trifluoromethyl.

Examples of especially preferred anthranilamide compounds I of the present invention are of formula (IA-1)



(IA-1)

wherein R^1, R^2, R^7, R^5, R^6 are as defined herein.

Examples of preferred compounds of formula I in the mixtures according to the invention are compiled in tables 1 to 60 below. Moreover, the meanings mentioned below for the individual

variables in the tables are per se, independently of the combination in which they are mentioned, a particularly preferred embodiment of the substituents in question.

Table 1 Compounds of the formula (IA-1) in which R^1 is F, R^2 is Cl, R^7 is CF_3 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 2 Compounds of the formula (IA-1) in which R^1 is Br, R^2 is Cl, R^7 is CF_3 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 3 Compounds of the formula (IA-1) in which R^1 is Cl, R^2 is Cl, R^7 is CF_3 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 4 Compounds of the formula (IA-1) in which R^1 is methyl, R^2 is Cl, R^7 is CF_3 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 5 Compounds of the formula (IA-1) in which R^1 is F, R^2 is Br, R^7 is CF_3 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 6 Compounds of the formula (IA-1) in which R^1 is Br, R^2 is Br, R^7 is CF_3 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 7 Compounds of the formula (IA-1) in which R^1 is Cl, R^2 is Br, R^7 is CF_3 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 8 Compounds of the formula (IA-1) in which R^1 is methyl, R^2 is Br, R^7 is CF_3 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 9 Compounds of the formula (IA-1) in which R^1 is F, R^2 is cyano, R^7 is CF_3 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 10 Compounds of the formula (IA-1) in which R^1 is Br, R^2 is cyano, R^7 is CF_3 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 11 Compounds of the formula (IA-1) in which R^1 is Cl, R^2 is cyano, R^7 is CF_3 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 12 Compounds of the formula (IA-1) in which R^1 is methyl, R^2 is cyano, R^7 is CF_3 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 13 Compounds of the formula (IA-1) in which R^1 is F, R^2 is Cl, R^7 is CHF_2 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 14 Compounds of the formula (IA-1) in which R^1 is Br, R^2 is Cl, R^7 is CHF_2 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 15 Compounds of the formula (IA-1) in which R^1 is Cl, R^2 is Cl, R^7 is CHF_2 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 16 Compounds of the formula (IA-1) in which R^1 is methyl, R^2 is Cl, R^7 is CHF_2 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 17 Compounds of the formula (IA-1) in which R^1 is F, R^2 is Br, R^7 is CHF_2 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 18 Compounds of the formula (IA-1) in which R^1 is Br, R^2 is Br, R^7 is CHF_2 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 19 Compounds of the formula (IA-1) in which R^1 is Cl, R^2 is Br, R^7 is CHF_2 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 20 Compounds of the formula (IA-1) in which R^1 is methyl, R^2 is Br, R^7 is CHF_2 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 21 Compounds of the formula (IA-1) in which R^1 is F, R^2 is cyano, R^7 is CHF_2 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 22 Compounds of the formula (IA-1) in which R^1 is Br, R^2 is cyano, R^7 is CHF_2 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 23 Compounds of the formula (IA-1) in which R^1 is Cl, R^2 is cyano, R^7 is CHF_2 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 24 Compounds of the formula (IA-1) in which R^1 is methyl, R^2 is cyano, R^7 is CHF_2 and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 25 Compounds of the formula (IA-1) in which R^1 is F, R^2 is Cl, R^7 is Br and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 26 Compounds of the formula (IA-1) in which R^1 is Br, R^2 is Cl, R^7 is Br and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 27 Compounds of the formula (IA-1) in which R^1 is Cl, R^2 is Cl, R^7 is Br and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 28 Compounds of the formula (IA-1) in which R^1 is methyl, R^2 is Cl, R^7 is Br and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 29 Compounds of the formula (IA-1) in which R^1 is F, R^2 is Br, R^7 is Br and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 30 Compounds of the formula (IA-1) in which R^1 is Br, R^2 is Br, R^7 is Br and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 31 Compounds of the formula (IA-1) in which R^1 is Cl, R^2 is Br, R^7 is Br and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 32 Compounds of the formula (IA-1) in which R^1 is methyl, R^2 is Br, R^7 is Br and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 33 Compounds of the formula (IA-1) in which R^1 is F, R^2 is cyano, R^7 is Br and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 34 Compounds of the formula (IA-1) in which R^1 is Br, R^2 is cyano, R^7 is Br and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 35 Compounds of the formula (IA-1) in which R^1 is Cl, R^2 is cyano, R^7 is Br and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 36 Compounds of the formula (IA-1) in which R^1 is methyl, R^2 is cyano, R^7 is Br and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 37 Compounds of the formula (IA-1) in which R^1 is F, R^2 is Cl, R^7 is Cl and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 38 Compounds of the formula (IA-1) in which R^1 is Br, R^2 is Cl, R^7 is Cl and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 39 Compounds of the formula (IA-1) in which R^1 is Cl, R^2 is Cl, R^7 is Cl and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 40 Compounds of the formula (IA-1) in which R^1 is methyl, R^2 is Cl, R^7 is Cl and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 41 Compounds of the formula (IA-1) in which R^1 is F, R^2 is Br, R^7 is Cl and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 42 Compounds of the formula (IA-1) in which R^1 is Br, R^2 is Br, R^7 is Cl and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 43 Compounds of the formula (IA-1) in which R^1 is Cl, R^2 is Br, R^7 is Cl and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 44 Compounds of the formula (IA-1) in which R^1 is methyl, R^2 is Br, R^7 is Cl and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 45 Compounds of the formula (IA-1) in which R^1 is F, R^2 is cyano, R^7 is Cl and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 46 Compounds of the formula (IA-1) in which R^1 is Br, R^2 is cyano, R^7 is Cl and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 47 Compounds of the formula (IA-1) in which R^1 is Cl, R^2 is cyano, R^7 is Cl and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 48 Compounds of the formula (IA-1) in which R^1 is methyl, R^2 is cyano, R^7 is Cl and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 49 Compounds of the formula (IA-1) in which R^1 is F, R^2 is Cl, R^7 is $OCHF_2$ and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 50 Compounds of the formula (IA-1) in which R^1 is Br, R^2 is Cl, R^7 is $OCHF_2$ and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 51 Compounds of the formula (IA-1) in which R^1 is Cl, R^2 is Cl, R^7 is $OCHF_2$ and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 52 Compounds of the formula (IA-1) in which R^1 is methyl, R^2 is Cl, R^7 is $OCHF_2$ and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 53 Compounds of the formula (IA-1) in which R^1 is F, R^2 is Br, R^7 is $OCHF_2$ and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 54 Compounds of the formula (IA-1) in which R^1 is Br, R^2 is Br, R^7 is $OCHF_2$ and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 55 Compounds of the formula (IA-1) in which R^1 is Cl, R^2 is Br, R^7 is $OCHF_2$ and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 56 Compounds of the formula (IA-1) in which R^1 is methyl, R^2 is Br, R^7 is $OCHF_2$ and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 57 Compounds of the formula (IA-1) in which R^1 is F, R^2 is cyano, R^7 is $OCHF_2$ and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 58 Compounds of the formula (IA-1) in which R^1 is Br, R^2 is cyano, R^7 is $OCHF_2$ and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 59 Compounds of the formula (IA-1) in which R^1 is Cl, R^2 is cyano, R^7 is $OCHF_2$ and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A;

Table 60 Compounds of the formula (IA-1) in which R^1 is methyl, R^2 is cyano, R^7 is $OCHF_2$ and the combination of R^5 and R^6 for a compound corresponds in each case to one row of Table A.

Table A

	R^5	R^6
A-1	CH_3	CH_3
A-2	C_2H_5	CH_3

	R^5	R^6
A-3	$CH=CH_2$	CH_3
A-4	$CH_2CH_2CH_3$	CH_3

	R^5	R^6
A-5	$CH(CH_3)_2$	CH_3
A-6	$CH_2CH_2CH_2CH_3$	CH_3
A-7	$C(CH_3)_3$	CH_3
A-8	$CH_2CH(CH_3)_2$	CH_3
A-9	$CH(CH_3)CH_2CH_3$	CH_3
A-10	$CH_2CH=CH_2$	CH_3
A-11	$CH_2C\equiv CH$	CH_3
A-12	$CH(CH_3)CH=CH_2$	CH_3
A-13	CHF_2	CH_3
A-14	CH_2Cl	CH_3
A-15	CH_2CH_2CN	CH_3
A-16	CH_2CH_2Cl	CH_3
A-17	c-C_3H_5	CH_3
A-18	c-C_4H_7	CH_3
A-19	c-C_5H_9	CH_3
A-20	c-C_6H_{11}	CH_3
A-21	CH_2-c-C_3H_5	CH_3
A-22	$CH(CH_3)$-c-C_3H_5	CH_3
A-23	CH_2-c-C_5H_9	CH_3
A-24	CH_2-c-C_6H_{11}	CH_3
A-25	C_6H_5	CH_3
A-26	CH_3	C_2H_5
A-27	C_2H_5	C_2H_5
A-28	$CH=CH_2$	C_2H_5
A-29	$CH_2CH_2CH_3$	C_2H_5
A-30	$CH(CH_3)_2$	C_2H_5
A-31	$CH_2CH_2CH_2CH_3$	C_2H_5
A-32	$C(CH_3)_3$	C_2H_5
A-33	$CH_2CH(CH_3)_2$	C_2H_5
A-34	$CH(CH_3)CH_2CH_3$	C_2H_5
A-35	$CH_2CH=CH_2$	C_2H_5
A-36	$CH_2C\equiv CH$	C_2H_5
A-37	$CH(CH_3)CH=CH_2$	C_2H_5
A-38	CHF_2	C_2H_5
A-39	CH_2Cl	C_2H_5
A-40	CH_2CH_2CN	C_2H_5
A-41	CH_2CH_2Cl	C_2H_5
A-42	c-C_3H_5	C_2H_5
A-43	c-C_4H_7	C_2H_5
A-44	c-C_5H_9	C_2H_5
A-45	c-C_6H_{11}	C_2H_5
A-46	CH_2-c-C_3H_5	C_2H_5
A-47	$CH(CH_3)$-c-C_3H_5	C_2H_5
A-48	CH_2-c-C_5H_9	C_2H_5
A-49	CH_2-c-C_6H_{11}	C_2H_5
A-50	C_6H_5	C_2H_5
A-51	CH_3	$CH=CH_2$
A-52	C_2H_5	$CH=CH_2$
A-53	$CH=CH_2$	$CH=CH_2$
A-54	$CH_2CH_2CH_3$	$CH=CH_2$
A-55	$CH(CH_3)_2$	$CH=CH_2$
A-56	$CH_2CH_2CH_2CH_3$	$CH=CH_2$
A-57	$C(CH_3)_3$	$CH=CH_2$
A-58	$CH_2CH(CH_3)_2$	$CH=CH_2$
A-59	$CH(CH_3)CH_2CH_3$	$CH=CH_2$
A-60	$CH_2CH=CH_2$	$CH=CH_2$
A-61	$CH_2C\equiv CH$	$CH=CH_2$
A-62	$CH(CH_3)CH=CH_2$	$CH=CH_2$
A-63	CHF_2	$CH=CH_2$
A-64	CH_2Cl	$CH=CH_2$
A-65	CH_2CH_2CN	$CH=CH_2$
A-66	CH_2CH_2Cl	$CH=CH_2$
A-67	c-C_3H_5	$CH=CH_2$
A-68	c-C_4H_7	$CH=CH_2$
A-69	c-C_5H_9	$CH=CH_2$
A-70	c-C_6H_{11}	$CH=CH_2$
A-71	CH_2-c-C_3H_5	$CH=CH_2$
A-72	$CH(CH_3)$-c-C_3H_5	$CH=CH_2$
A-73	CH_2-c-C_5H_9	$CH=CH_2$
A-74	CH_2-c-C_6H_{11}	$CH=CH_2$
A-75	C_6H_5	$CH=CH_2$
A-76	CH_3	$CH_2CH_2CH_3$
A-77	C_2H_5	$CH_2CH_2CH_3$
A-78	$CH=CH_2$	$CH_2CH_2CH_3$
A-79	$CH_2CH_2CH_3$	$CH_2CH_2CH_3$
A-80	$CH(CH_3)_2$	$CH_2CH_2CH_3$
A-81	$CH_2CH_2CH_2CH_3$	$CH_2CH_2CH_3$
A-82	$C(CH_3)_3$	$CH_2CH_2CH_3$
A-83	$CH_2CH(CH_3)_2$	$CH_2CH_2CH_3$
A-84	$CH(CH_3)CH_2CH_3$	$CH_2CH_2CH_3$
A-85	$CH_2CH=CH_2$	$CH_2CH_2CH_3$
A-86	$CH_2C\equiv CH$	$CH_2CH_2CH_3$
A-87	$CH(CH_3)CH=CH_2$	$CH_2CH_2CH_3$
A-88	CHF_2	$CH_2CH_2CH_3$

	R^5	R^6
A-89	CH_2Cl	$CH_2CH_2CH_3$
A-90	CH_2CH_2CN	$CH_2CH_2CH_3$
A-91	CH_2CH_2Cl	$CH_2CH_2CH_3$
A-92	c-C_3H_5	$CH_2CH_2CH_3$
A-93	c-C_4H_7	$CH_2CH_2CH_3$
A-94	c-C_5H_9	$CH_2CH_2CH_3$
A-95	c-C_6H_{11}	$CH_2CH_2CH_3$
A-96	CH_2-c-C_3H_5	$CH_2CH_2CH_3$
A-97	$CH(CH_3)$-c-C_3H_5	$CH_2CH_2CH_3$
A-98	CH_2-c-C_5H_9	$CH_2CH_2CH_3$
A-99	CH_2-c-C_6H_{11}	$CH_2CH_2CH_3$
A-100	C_6H_5	$CH_2CH_2CH_3$
A-101	CH_3	$CH(CH_3)_2$
A-102	C_2H_5	$CH(CH_3)_2$
A-103	$CH=CH_2$	$CH(CH_3)_2$
A-104	$CH_2CH_2CH_3$	$CH(CH_3)_2$
A-105	$CH(CH_3)_2$	$CH(CH_3)_2$
A-106	$CH_2CH_2CH_2CH_3$	$CH(CH_3)_2$
A-107	$C(CH_3)_3$	$CH(CH_3)_2$
A-108	$CH_2CH(CH_3)_2$	$CH(CH_3)_2$
A-109	$CH(CH_3)CH_2CH_3$	$CH(CH_3)_2$
A-110	$CH_2CH=CH_2$	$CH(CH_3)_2$
A-111	$CH_2C\equiv CH$	$CH(CH_3)_2$
A-112	$CH(CH_3)CH=CH_2$	$CH(CH_3)_2$
A-113	CHF_2	$CH(CH_3)_2$
A-114	CH_2Cl	$CH(CH_3)_2$
A-115	CH_2CH_2CN	$CH(CH_3)_2$
A-116	CH_2CH_2Cl	$CH(CH_3)_2$
A-117	c-C_3H_5	$CH(CH_3)_2$
A-118	c-C_4H_7	$CH(CH_3)_2$
A-119	c-C_5H_9	$CH(CH_3)_2$
A-120	c-C_6H_{11}	$CH(CH_3)_2$
A-121	CH_2-c-C_3H_5	$CH(CH_3)_2$
A-122	$CH(CH_3)$-c-C_3H_5	$CH(CH_3)_2$
A-123	CH_2-c-C_5H_9	$CH(CH_3)_2$
A-124	CH_2-c-C_6H_{11}	$CH(CH_3)_2$
A-125	C_6H_5	$CH(CH_3)_2$
A-126	CH_3	$CH_2CH_2CH_2CH_3$
A-127	C_2H_5	$CH_2CH_2CH_2CH_3$
A-128	$CH=CH_2$	$CH_2CH_2CH_2CH_3$
A-129	$CH_2CH_2CH_3$	$CH_2CH_2CH_2CH_3$
A-130	$CH(CH_3)_2$	$CH_2CH_2CH_2CH_3$
A-131	$CH_2CH_2CH_2CH_3$	$CH_2CH_2CH_2CH_3$
A-132	$C(CH_3)_3$	$CH_2CH_2CH_2CH_3$
A-133	$CH_2CH(CH_3)_2$	$CH_2CH_2CH_2CH_3$
A-134	$CH(CH_3)CH_2CH_3$	$CH_2CH_2CH_2CH_3$
A-135	$CH_2CH=CH_2$	$CH_2CH_2CH_2CH_3$
A-136	$CH_2C\equiv CH$	$CH_2CH_2CH_2CH_3$
A-137	$CH(CH_3)CH=CH_2$	$CH_2CH_2CH_2CH_3$
A-138	CHF_2	$CH_2CH_2CH_2CH_3$
A-139	CH_2Cl	$CH_2CH_2CH_2CH_3$
A-140	CH_2CH_2CN	$CH_2CH_2CH_2CH_3$
A-141	CH_2CH_2Cl	$CH_2CH_2CH_2CH_3$
A-142	c-C_3H_5	$CH_2CH_2CH_2CH_3$
A-143	c-C_4H_7	$CH_2CH_2CH_2CH_3$
A-144	c-C_5H_9	$CH_2CH_2CH_2CH_3$
A-145	c-C_6H_{11}	$CH_2CH_2CH_2CH_3$
A-146	CH_2-c-C_3H_5	$CH_2CH_2CH_2CH_3$
A-147	$CH(CH_3)$-c-C_3H_5	$CH_2CH_2CH_2CH_3$
A-148	CH_2-c-C_5H_9	$CH_2CH_2CH_2CH_3$
A-149	CH_2-c-C_6H_{11}	$CH_2CH_2CH_2CH_3$
A-150	C_6H_5	$CH_2CH_2CH_2CH_3$
A-151	CH_3	$C(CH_3)_3$
A-152	C_2H_5	$C(CH_3)_3$
A-153	$CH=CH_2$	$C(CH_3)_3$
A-154	$CH_2CH_2CH_3$	$C(CH_3)_3$
A-155	$CH(CH_3)_2$	$C(CH_3)_3$
A-156	$CH_2CH_2CH_2CH_3$	$C(CH_3)_3$
A-157	$C(CH_3)_3$	$C(CH_3)_3$
A-158	$CH_2CH(CH_3)_2$	$C(CH_3)_3$
A-159	$CH(CH_3)CH_2CH_3$	$C(CH_3)_3$
A-160	$CH_2CH=CH_2$	$C(CH_3)_3$
A-161	$CH_2C\equiv CH$	$C(CH_3)_3$
A-162	$CH(CH_3)CH=CH_2$	$C(CH_3)_3$
A-163	CHF_2	$C(CH_3)_3$
A-164	CH_2Cl	$C(CH_3)_3$
A-165	CH_2CH_2CN	$C(CH_3)_3$
A-166	CH_2CH_2Cl	$C(CH_3)_3$
A-167	c-C_3H_5	$C(CH_3)_3$
A-168	c-C_4H_7	$C(CH_3)_3$
A-169	c-C_5H_9	$C(CH_3)_3$
A-170	c-C_6H_{11}	$C(CH_3)_3$
A-171	CH_2-c-C_3H_5	$C(CH_3)_3$
A-172	$CH(CH_3)$-c-C_3H_5	$C(CH_3)_3$

	R^5	R^6
A-173	CH_2-c-C_5H_9	$C(CH_3)_3$
A-174	CH_2-c-C_6H_{11}	$C(CH_3)_3$
A-175	C_6H_5	$C(CH_3)_3$
A-176	CH_3	$CH_2CH(CH_3)_2$
A-177	C_2H_5	$CH_2CH(CH_3)_2$
A-178	$CH=CH_2$	$CH_2CH(CH_3)_2$
A-179	$CH_2CH_2CH_3$	$CH_2CH(CH_3)_2$
A-180	$CH(CH_3)_2$	$CH_2CH(CH_3)_2$
A-181	$CH_2CH_2CH_2CH_3$	$CH_2CH(CH_3)_2$
A-182	$C(CH_3)_3$	$CH_2CH(CH_3)_2$
A-183	$CH_2CH(CH_3)_2$	$CH_2CH(CH_3)_2$
A-184	$CH(CH_3)CH_2CH_3$	$CH_2CH(CH_3)_2$
A-185	$CH_2CH=CH_2$	$CH_2CH(CH_3)_2$
A-186	$CH_2C\equiv CH$	$CH_2CH(CH_3)_2$
A-187	$CH(CH_3)CH=CH_2$	$CH_2CH(CH_3)_2$
A-188	CHF_2	$CH_2CH(CH_3)_2$
A-189	CH_2Cl	$CH_2CH(CH_3)_2$
A-190	CH_2CH_2CN	$CH_2CH(CH_3)_2$
A-191	CH_2CH_2Cl	$CH_2CH(CH_3)_2$
A-192	c-C_3H_5	$CH_2CH(CH_3)_2$
A-193	c-C_4H_7	$CH_2CH(CH_3)_2$
A-194	c-C_5H_9	$CH_2CH(CH_3)_2$
A-195	c-C_6H_{11}	$CH_2CH(CH_3)_2$
A-196	CH_2-c-C_3H_5	$CH_2CH(CH_3)_2$
A-197	$CH(CH_3)$-c-C_3H_5	$CH_2CH(CH_3)_2$
A-198	CH_2-c-C_5H_9	$CH_2CH(CH_3)_2$
A-199	CH_2-c-C_6H_{11}	$CH_2CH(CH_3)_2$
A-200	C_6H_5	$CH_2CH(CH_3)_2$
A-201	CH_3	$CH(CH_3)CH_2CH_3$
A-202	C_2H_5	$CH(CH_3)CH_2CH_3$
A-203	$CH=CH_2$	$CH(CH_3)CH_2CH_3$
A-204	$CH_2CH_2CH_3$	$CH(CH_3)CH_2CH_3$
A-205	$CH(CH_3)_2$	$CH(CH_3)CH_2CH_3$
A-206	$CH_2CH_2CH_2CH_3$	$CH(CH_3)CH_2CH_3$
A-207	$C(CH_3)_3$	$CH(CH_3)CH_2CH_3$
A-208	$CH_2CH(CH_3)_2$	$CH(CH_3)CH_2CH_3$
A-209	$CH(CH_3)CH_2CH_3$	$CH(CH_3)CH_2CH_3$
A-210	$CH_2CH=CH_2$	$CH(CH_3)CH_2CH_3$
A-211	$CH_2C\equiv CH$	$CH(CH_3)CH_2CH_3$
A-212	$CH(CH_3)CH=CH_2$	$CH(CH_3)CH_2CH_3$
A-213	CHF_2	$CH(CH_3)CH_2CH_3$
A-214	CH_2Cl	$CH(CH_3)CH_2CH_3$

	R^5	R^6
A-215	CH_2CH_2CN	$CH(CH_3)CH_2CH_3$
A-216	CH_2CH_2Cl	$CH(CH_3)CH_2CH_3$
A-217	c-C_3H_5	$CH(CH_3)CH_2CH_3$
A-218	c-C_4H_7	$CH(CH_3)CH_2CH_3$
A-219	c-C_5H_9	$CH(CH_3)CH_2CH_3$
A-220	c-C_6H_{11}	$CH(CH_3)CH_2CH_3$
A-221	CH_2-c-C_3H_5	$CH(CH_3)CH_2CH_3$
A-222	$CH(CH_3)$-c-C_3H_5	$CH(CH_3)CH_2CH_3$
A-223	CH_2-c-C_5H_9	$CH(CH_3)CH_2CH_3$
A-224	CH_2-c-C_6H_{11}	$CH(CH_3)CH_2CH_3$
A-225	C_6H_5	$CH(CH_3)CH_2CH_3$
A-226	CH_3	$CH_2CH=CH_2$
A-227	C_2H_5	$CH_2CH=CH_2$
A-228	$CH=CH_2$	$CH_2CH=CH_2$
A-229	$CH_2CH_2CH_3$	$CH_2CH=CH_2$
A-230	$CH(CH_3)_2$	$CH_2CH=CH_2$
A-231	$CH_2CH_2CH_2CH_3$	$CH_2CH=CH_2$
A-232	$C(CH_3)_3$	$CH_2CH=CH_2$
A-233	$CH_2CH(CH_3)_2$	$CH_2CH=CH_2$
A-234	$CH(CH_3)CH_2CH_3$	$CH_2CH=CH_2$
A-235	$CH_2CH=CH_2$	$CH_2CH=CH_2$
A-236	$CH_2C\equiv CH$	$CH_2CH=CH_2$
A-237	$CH(CH_3)CH=CH_2$	$CH_2CH=CH_2$
A-238	CHF_2	$CH_2CH=CH_2$
A-239	CH_2Cl	$CH_2CH=CH_2$
A-240	CH_2CH_2CN	$CH_2CH=CH_2$
A-241	CH_2CH_2Cl	$CH_2CH=CH_2$
A-242	c-C_3H_5	$CH_2CH=CH_2$
A-243	c-C_4H_7	$CH_2CH=CH_2$
A-244	c-C_5H_9	$CH_2CH=CH_2$
A-245	c-C_6H_{11}	$CH_2CH=CH_2$
A-246	CH_2-c-C_3H_5	$CH_2CH=CH_2$
A-247	$CH(CH_3)$-c-C_3H_5	$CH_2CH=CH_2$
A-248	CH_2-c-C_5H_9	$CH_2CH=CH_2$
A-249	CH_2-c-C_6H_{11}	$CH_2CH=CH_2$
A-250	C_6H_5	$CH_2CH=CH_2$
A-251	CH_3	$CH_2C\equiv CH$
A-252	C_2H_5	$CH_2C\equiv CH$
A-253	$CH=CH_2$	$CH_2C\equiv CH$
A-254	$CH_2CH_2CH_3$	$CH_2C\equiv CH$
A-255	$CH(CH_3)_2$	$CH_2C\equiv CH$
A-256	$CH_2CH_2CH_2CH_3$	$CH_2C\equiv CH$

	R^5	R^6
A-257	$C(CH_3)_3$	$CH_2C{\equiv}CH$
A-258	$CH_2CH(CH_3)_2$	$CH_2C{\equiv}CH$
A-259	$CH(CH_3)CH_2CH_3$	$CH_2C{\equiv}CH$
A-260	$CH_2CH{=}CH_2$	$CH_2C{\equiv}CH$
A-261	CH2C≡CH	$CH_2C{\equiv}CH$
A-262	$CH(CH_3)CH{=}CH_2$	$CH_2C{\equiv}CH$
A-263	CHF_2	$CH_2C{\equiv}CH$
A-264	CH_2Cl	$CH_2C{\equiv}CH$
A-265	CH_2CH_2CN	$CH_2C{\equiv}CH$
A-266	CH_2CH_2Cl	$CH_2C{\equiv}CH$
A-267	c-C_3H_5	$CH_2C{\equiv}CH$
A-268	c-C_4H_7	$CH_2C{\equiv}CH$
A-269	c-C_5H_9	$CH_2C{\equiv}CH$
A-270	c-C_6H_{11}	$CH_2C{\equiv}CH$
A-271	CH_2-c-C_3H_5	$CH_2C{\equiv}CH$
A-272	$CH(CH_3)$-c-C_3H_5	$CH_2C{\equiv}CH$
A-273	CH_2-c-C_5H_9	$CH_2C{\equiv}CH$
A-274	CH_2-c-C_6H_{11}	$CH_2C{\equiv}CH$
A-275	C_6H_5	$CH_2C{\equiv}CH$
A-276	CH_3	$CH(CH_3)CH{=}CH_2$
A-277	C_2H_5	$CH(CH_3)CH{=}CH_2$
A-278	$CH{=}CH_2$	$CH(CH_3)CH{=}CH_2$
A-279	$CH_2CH_2CH_3$	$CH(CH_3)CH{=}CH_2$
A-280	$CH(CH_3)_2$	$CH(CH_3)CH{=}CH_2$
A-281	$CH_2CH_2CH_2CH_3$	$CH(CH_3)CH{=}CH_2$
A-282	$C(CH_3)_3$	$CH(CH_3)CH{=}CH_2$
A-283	$CH_2CH(CH_3)_2$	$CH(CH_3)CH{=}CH_2$
A-284	$CH(CH_3)CH_2CH_3$	$CH(CH_3)CH{=}CH_2$
A-285	$CH_2CH{=}CH_2$	$CH(CH_3)CH{=}CH_2$
A-286	$CH_2C{\equiv}CH$	$CH(CH_3)CH{=}CH_2$
A-287	$CH(CH_3)CH{=}CH_2$	$CH(CH_3)CH{=}CH_2$
A-288	CHF_2	$CH(CH_3)CH{=}CH_2$
A-289	CH_2Cl	$CH(CH_3)CH{=}CH_2$
A-290	CH_2CH_2CN	$CH(CH_3)CH{=}CH_2$
A-291	CH_2CH_2Cl	$CH(CH_3)CH{=}CH_2$
A-292	c-C_3H_5	$CH(CH_3)CH{=}CH_2$
A-293	c-C_4H_7	$CH(CH_3)CH{=}CH_2$
A-294	c-C_5H_9	$CH(CH_3)CH{=}CH_2$
A-295	c-C_6H_{11}	$CH(CH_3)CH{=}CH_2$
A-296	CH_2-c-C_3H_5	$CH(CH_3)CH{=}CH_2$
A-297	$CH(CH_3)$-c-C_3H_5	$CH(CH_3)CH{=}CH_2$
A-298	CH_2-c-C_5H_9	$CH(CH_3)CH{=}CH_2$
A-299	CH_2-c-C_5H_9	$CH(CH_3)CH{=}CH_2$
A-300	C_6H_5	$CH(CH_3)CH{=}CH_2$
A-301	CH_3	CHF_2
A-302	C_2H_5	CHF_2
A-303	$CH{=}CH_2$	CHF_2
A-304	$CH_2CH_2CH_3$	CHF_2
A-305	$CH(CH_3)_2$	CHF_2
A-306	$CH_2CH_2CH_2CH_3$	CHF_2
A-307	$C(CH_3)_3$	CHF_2
A-308	$CH_2CH(CH_3)_2$	CHF_2
A-309	$CH(CH_3)CH_2CH_3$	CHF_2
A-310	$CH_2CH{=}CH_2$	CHF_2
A-311	$CH_2C{\equiv}CH$	CHF_2
A-312	$CH(CH_3)CH{=}CH_2$	CHF_2
A-313	CHF_2	CHF_2
A-314	CH_2Cl	CHF_2
A-315	CH_2CH_2CN	CHF_2
A-316	CH_2CH_2Cl	CHF_2
A-317	c-C_3H_5	CHF_2
A-318	c-C_4H_7	CHF_2
A-319	c-C_5H_9	CHF_2
A-320	c-C_6H_{11}	CHF_2
A-321	CH_2-c-C_3H_5	CHF_2
A-322	$CH(CH_3)$-c-C_3H_5	CHF_2
A-323	CH_2-c-C_5H_9	CHF_2
A-324	CH_2-c-C_6H_{11}	CHF_2
A-325	C_6H_5	CHF_2
A-326	CH_3	CH_2Cl
A-327	C_2H_5	CH_2Cl
A-328	$CH{=}CH_2$	CH_2Cl
A-329	$CH_2CH_2CH_3$	CH_2Cl
A-330	$CH(CH_3)_2$	CH_2Cl
A-331	$CH_2CH_2CH_2CH_3$	CH_2Cl
A-332	$C(CH_3)_3$	CH_2Cl
A-333	$CH_2CH(CH_3)_2$	CH_2Cl
A-334	$CH(CH_3)CH_2CH_3$	CH_2Cl
A-335	$CH_2CH{=}CH_2$	CH_2Cl
A-336	$CH_2C{\equiv}CH$	CH_2Cl
A-337	$CH(CH_3)CH{=}CH_2$	CH_2Cl
A-338	CHF_2	CH_2Cl
A-339	CH_2Cl	CH_2Cl
A-340	CH_2CH_2CN	CH_2Cl

	R^5	R^6
A-341	CH_2CH_2Cl	CH_2Cl
A-342	c-C_3H_5	CH_2Cl
A-343	c-C_4H_7	CH_2Cl
A-344	c-C_5H_9	CH_2Cl
A-345	c-C_6H_{11}	CH_2Cl
A-346	CH_2-c-C_3H_5	CH_2Cl
A-347	$CH(CH_3)$-c-C_3H_5	CH_2Cl
A-348	CH_2-c-C_5H_9	CH_2Cl
A-349	CH_2-c-C_6H_{11}	CH_2Cl
A-350	C_6H_5	CH_2Cl
A-351	CH_3	CH_2CH_2CN
A-352	C_2H_5	CH_2CH_2CN
A-353	$CH=CH_2$	CH_2CH_2CN
A-354	$CH_2CH_2CH_3$	CH_2CH_2CN
A-355	$CH(CH_3)_2$	CH_2CH_2CN
A-356	$CH_2CH_2CH_2CH_3$	CH_2CH_2CN
A-357	$C(CH_3)_3$	CH_2CH_2CN
A-358	$CH_2CH(CH_3)_2$	CH_2CH_2CN
A-359	$CH(CH_3)CH_2CH_3$	CH_2CH_2CN
A-360	$CH_2CH=CH_2$	CH_2CH_2CN
A-361	$CH_2C\equiv CH$	CH_2CH_2CN
A-362	$CH(CH_3)CH=CH_2$	CH_2CH_2CN
A-363	CHF_2	CH_2CH_2CN
A-364	CH_2Cl	CH_2CH_2CN
A-365	CH_2CH_2CN	CH_2CH_2CN
A-366	CH_2CH_2Cl	CH_2CH_2CN
A-367	c-C_3H_5	CH_2CH_2CN
A-368	c-C_4H_7	CH_2CH_2CN
A-369	c-C_5H_9	CH_2CH_2CN
A-370	c-C_6H_{11}	CH_2CH_2CN
A-371	CH_2-c-C_3H_5	CH_2CH_2CN
A-372	$CH(CH_3)$-c-C_3H_5	CH_2CH_2CN
A-373	CH_2-c-C_5H_9	CH_2CH_2CN
A-374	CH_2-c-C_5H_9	CH_2CH_2CN
A-375	C_6H_5	CH_2CH_2CN
A-376	CH_3	CH_2CH_2Cl
A-377	C_2H_5	CH_2CH_2Cl
A-378	$CH=CH_2$	CH_2CH_2Cl
A-379	$CH_2CH_2CH_3$	CH_2CH_2Cl
A-380	$CH(CH_3)_2$	CH_2CH_2Cl
A-381	$CH_2CH_2CH_2CH_3$	CH_2CH_2Cl
A-382	$C(CH_3)_3$	CH_2CH_2Cl

	R^5	R^6
A-383	$CH_2CH(CH_3)_2$	CH_2CH_2Cl
A-384	$CH(CH_3)CH_2CH_3$	CH_2CH_2Cl
A-385	$CH_2CH=CH_2$	CH_2CH_2Cl
A-386	$CH_2C\equiv CH$	CH_2CH_2Cl
A-387	$CH(CH_3)CH=CH_2$	CH_2CH_2Cl
A-388	CHF_2	CH_2CH_2Cl
A-389	CH_2Cl	CH_2CH_2Cl
A-390	CH_2CH_2CN	CH_2CH_2Cl
A-391	CH_2CH_2Cl	CH_2CH_2Cl
A-392	c-C_3H_5	CH_2CH_2Cl
A-393	c-C_4H_7	CH_2CH_2Cl
A-394	c-C_5H_9	CH_2CH_2Cl
A-395	c-C_6H_{11}	CH_2CH_2Cl
A-396	CH_2-c-C_3H_5	CH_2CH_2Cl
A-397	$CH(CH_3)$-c-C_3H_5	CH_2CH_2Cl
A-398	CH_2-c-C_5H_9	CH_2CH_2Cl
A-399	CH_2-c-C_6H_{11}	CH_2CH_2Cl
A-400	C_6H_5	CH_2CH_2Cl
A-401	CH_3	c-C_3H_5
A-402	C_2H_5	c-C_3H_5
A-403	$CH=CH_2$	c-C_3H_5
A-404	$CH_2CH_2CH_3$	c-C_3H_5
A-405	$CH(CH_3)_2$	c-C_3H_5
A-406	$CH_2CH_2CH_2CH_3$	c-C_3H_5
A-407	$C(CH_3)_3$	c-C_3H_5
A-408	$CH_2CH(CH_3)_2$	c-C_3H_5
A-409	$CH(CH_3)CH_2CH_3$	c-C_3H_5
A-410	$CH_2CH=CH_2$	c-C_3H_5
A-411	$CH_2C\equiv CH$	c-C_3H_5
A-412	$CH(CH_3)CH=CH_2$	c-C_3H_5
A-413	CHF_2	c-C_3H_5
A-414	CH_2Cl	c-C_3H_5
A-415	CH_2CH_2CN	c-C_3H_5
A-416	CH_2CH_2Cl	c-C_3H_5
A-417	c-C_3H_5	c-C_3H_5
A-418	c-C_4H_7	c-C_3H_5
A-419	c-C_5H_9	c-C_3H_5
A-420	c-C_6H_{11}	c-C_3H_5
A-421	CH_2-c-C_3H_5	c-C_3H_5
A-422	$CH(CH_3)$-c-C_3H_5	c-C_3H_5
A-423	CH_2-c-C_5H_9	c-C_3H_5
A-424	CH_2-c-C_6H_{11}	c-C_3H_5

	R^5	R^6
A-425	C_6H_5	c-C_3H_5
A-426	CH_3	c-C_4H_7
A-427	C_2H_5	c-C_4H_7
A-428	$CH=CH_2$	c-C_4H_7
A-429	$CH_2CH_2CH_3$	c-C_4H_7
A-430	$CH(CH_3)_2$	c-C_4H_7
A-431	$CH_2CH_2CH_2CH_3$	c-C_4H_7
A-432	$C(CH_3)_3$	c-C_4H_7
A-433	$CH_2CH(CH_3)_2$	c-C_4H_7
A-434	$CH(CH_3)CH_2CH_3$	c-C_4H_7
A-435	$CH_2CH=CH_2$	c-C_4H_7
A-436	$CH_2C\equiv CH$	c-C_4H_7
A-437	$CH(CH_3)CH=CH_2$	c-C_4H_7
A-438	CHF_2	c-C_4H_7
A-439	CH_2Cl	c-C_4H_7
A-440	CH_2CH_2CN	c-C_4H_7
A-441	CH_2CH_2Cl	c-C_4H_7
A-442	c-C_3H_5	c-C_4H_7
A-443	c-C_4H_7	c-C_4H_7
A-444	c-C_5H_9	c-C_4H_7
A-445	c-C_6H_{11}	c-C_4H_7
A-446	CH_2-c-C_3H_5	c-C_4H_7
A-447	$CH(CH_3)$-c-C_3H_5	c-C_4H_7
A-448	CH_2-c-C_5H_9	c-C_4H_7
A-449	CH_2-c-C_6H_{11}	c-C_4H_7
A-450	C_6H_5	c-C_4H_7
A-451	CH_3	c-C_5H_9
A-452	C_2H_5	c-C_5H_9
A-453	$CH=CH_2$	c-C_5H_9
A-454	$CH_2CH_2CH_3$	c-C_5H_9
A-455	$CH(CH_3)_2$	c-C_5H_9
A-456	$CH_2CH_2CH_2CH_3$	c-C_5H_9
A-457	$C(CH_3)_3$	c-C_5H_9
A-458	$CH_2CH(CH_3)_2$	c-C_5H_9
A-459	$CH(CH_3)CH_2CH_3$	c-C_5H_9
A-460	$CH_2CH=CH_2$	c-C_5H_9
A-461	$CH_2C\equiv CH$	c-C_5H_9
A-462	$CH(CH_3)CH=CH_2$	c-C_5H_9
A-463	CHF_2	c-C_5H_9
A-464	CH_2Cl	c-C_5H_9
A-465	CH_2CH_2CN	c-C_5H_9
A-466	CH_2CH_2Cl	c-C_5H_9

	R^5	R^6
A-467	c-C_3H_5	c-C_5H_9
A-468	c-C_4H_7	c-C_5H_9
A-469	c-C_5H_9	c-C_5H_9
A-470	c-C_6H_{11}	c-C_5H_9
A-471	CH_2-c-C_3H_5	c-C_5H_9
A-472	$CH(CH_3)$-c-C_3H_5	c-C_5H_9
A-473	CH_2-c-C_5H_9	c-C_5H_9
A-474	CH_2-c-C_6H_{11}	c-C_5H_9
A-475	C_6H_5	c-C_5H_9
A-476	CH_3	c-C_6H_{11}
A-477	C_2H_5	c-C_6H_{11}
A-478	$CH=CH_2$	c-C_6H_{11}
A-479	$CH_2CH_2CH_3$	c-C_6H_{11}
A-480	$CH(CH_3)_2$	c-C_6H_{11}
A-481	$CH_2CH_2CH_2CH_3$	c-C_6H_{11}
A-482	$C(CH_3)_3$	c-C_6H_{11}
A-483	$CH_2CH(CH_3)_2$	c-C_6H_{11}
A-484	$CH(CH_3)CH_2CH_3$	c-C_6H_{11}
A-485	$CH_2CH=CH_2$	c-C_6H_{11}
A-486	$CH_2C\equiv CH$	c-C_6H_{11}
A-487	$CH(CH_3)CH=CH_2$	c-C_6H_{11}
A-488	CHF_2	c-C_6H_{11}
A-489	CH_2Cl	c-C_6H_{11}
A-490	CH_2CH_2CN	c-C_6H_{11}
A-491	CH_2CH_2Cl	c-C_6H_{11}
A-492	c-C_3H_5	c-C_6H_{11}
A-493	c-C_4H_7	c-C_6H_{11}
A-494	c-C_5H_9	c-C_6H_{11}
A-495	c-C_6H_{11}	c-C_6H_{11}
A-496	CH_2-c-C_3H_5	c-C_6H_{11}
A-497	$CH(CH_3)$-c-C_3H_5	c-C_6H_{11}
A-498	CH_2-c-C_5H_9	c-C_6H_{11}
A-499	CH_2-c-C_6H_{11}	c-C_6H_{11}
A-500	C_6H_5	c-C_6H_{11}
A-501	CH_3	CH_2-c-C_3H_5
A-502	C_2H_5	CH_2-c-C_3H_5
A-503	$CH=CH_2$	CH_2-c-C_3H_5
A-504	$CH_2CH_2CH_3$	CH_2-c-C_3H_5
A-505	$CH(CH_3)_2$	CH_2-c-C_3H_5
A-506	$CH_2CH_2CH_2CH_3$	CH_2-c-C_3H_5
A-507	$C(CH_3)_3$	CH_2-c-C_3H_5
A-508	$CH_2CH(CH_3)_2$	CH_2-c-C_3H_5

	R^5	R^6
A-509	$CH(CH_3)CH_2CH_3$	CH_2-c-C_3H_5
A-510	$CH_2CH=CH_2$	CH_2-c-C_3H_5
A-511	$CH_2C\equiv CH$	CH_2-c-C_3H_5
A-512	$CH(CH_3)CH=CH_2$	CH_2-c-C_3H_5
A-513	CHF_2	CH_2-c-C_3H_5
A-514	CH_2Cl	CH_2-c-C_3H_5
A-515	CH_2CH_2CN	CH_2-c-C_3H_5
A-516	CH_2CH_2Cl	CH_2-c-C_3H_5
A-517	c-C_3H_5	CH_2-c-C_3H_5
A-518	c-C_4H_7	CH_2-c-C_3H_5
A-519	c-C_5H_9	CH_2-c-C_3H_5
A-520	c-C_6H_{11}	CH_2-c-C_3H_5
A-521	CH_2-c-C_3H_5	CH_2-c-C_3H_5
A-522	$CH(CH_3)$-c-C_3H_5	CH_2-c-C_3H_5
A-523	CH_2-c-C_5H_9	CH_2-c-C_3H_5
A-524	CH_2-c-C_6H_{11}	CH_2-c-C_3H_5
A-525	C_6H_5	CH_2-c-C_3H_5
A-526	CH_3	$CH(CH_3)$-c-C_3H_5
A-527	C_2H_5	$CH(CH_3)$-c-C_3H_5
A-528	$CH=CH_2$	$CH(CH_3)$-c-C_3H_5
A-529	$CH_2CH_2CH_3$	$CH(CH_3)$-c-C_3H_5
A-530	$CH(CH_3)_2$	$CH(CH_3)$-c-C_3H_5
A-531	$CH_2CH_2CH_2CH_3$	$CH(CH_3)$-c-C_3H_5
A-532	$C(CH_3)_3$	$CH(CH_3)$-c-C_3H_5
A-533	$CH_2CH(CH_3)_2$	$CH(CH_3)$-c-C_3H_5
A-534	$CH(CH_3)CH_2CH_3$	$CH(CH_3)$-c-C_3H_5
A-535	$CH_2CH=CH_2$	$CH(CH_3)$-c-C_3H_5
A-536	$CH_2C\equiv CH$	$CH(CH_3)$-c-C_3H_5
A-537	$CH(CH_3)CH=CH_2$	$CH(CH_3)$-c-C_3H_5
A-538	CHF_2	$CH(CH_3)$-c-C_3H_5
A-539	CH_2Cl	$CH(CH_3)$-c-C_3H_5
A-540	CH_2CH_2CN	$CH(CH_3)$-c-C_3H_5
A-541	CH_2CH_2Cl	$CH(CH_3)$-c-C_3H_5
A-542	c-C_3H_5	$CH(CH_3)$-c-C_3H_5
A-543	c-C_4H_7	$CH(CH_3)$-c-C_3H_5
A-544	c-C_5H_9	$CH(CH_3)$-c-C_3H_5
A-545	c-C_6H_{11}	$CH(CH_3)$-c-C_3H_5
A-546	CH_2-c-C_3H_5	$CH(CH_3)$-c-C_3H_5
A-547	$CH(CH_3)$-c-C_3H_5	$CH(CH_3)$-c-C_3H_5
A-548	CH_2-c-C_5H_9	$CH(CH_3)$-c-C_3H_5
A-549	CH_2-c-C_6H_{11}	$CH(CH_3)$-c-C_3H_5
A-550	C_6H_5	$CH(CH_3)$-c-C_3H_5

	R^5	R^6
A-551	CH_3	CH_2-c-C_5H_9
A-552	C_2H_5	CH_2-c-C_5H_9
A-553	$CH=CH_2$	CH_2-c-C_5H_9
A-554	$CH_2CH_2CH_3$	CH_2-c-C_5H_9
A-555	$CH(CH_3)_2$	CH_2-c-C_5H_9
A-556	$CH_2CH_2CH_2CH_3$	CH_2-c-C_5H_9
A-557	$C(CH_3)_3$	CH_2-c-C_5H_9
A-558	$CH_2CH(CH_3)_2$	CH_2-c-C_5H_9
A-559	$CH(CH_3)CH_2CH_3$	CH_2-c-C_5H_9
A-560	$CH_2CH=CH_2$	CH_2-c-C_5H_9
A-561	$CH_2C\equiv CH$	CH_2-c-C_5H_9
A-562	$CH(CH_3)CH=CH_2$	CH_2-c-C_5H_9
A-563	CHF_2	CH_2-c-C_5H_9
A-564	CH_2Cl	CH_2-c-C_5H_9
A-565	CH_2CH_2CN	CH_2-c-C_5H_9
A-566	CH_2CH_2Cl	CH_2-c-C_5H_9
A-567	c-C_3H_5	CH_2-c-C_5H_9
A-568	c-C_4H_7	CH_2-c-C_5H_9
A-569	c-C_5H_9	CH_2-c-C_5H_9
A-570	c-C_6H_{11}	CH_2-c-C_5H_9
A-571	CH_2-c-C_3H_5	CH_2-c-C_5H_9
A-572	$CH(CH_3)$-c-C_3H_5	CH_2-c-C_5H_9
A-573	CH_2-c-C_5H_9	CH_2-c-C_5H_9
A-574	CH_2-c-C_6H_{11}	CH_2-c-C_5H_9
A-575	C_6H_5	CH_2-c-C_5H_9
A-576	CH_3	CH_2-c-C_6H_{11}
A-577	C_2H_5	CH_2-c-C_6H_{11}
A-578	$CH=CH_2$	CH_2-c-C_6H_{11}
A-579	$CH_2CH_2CH_3$	CH_2-c-C_6H_{11}
A-580	$CH(CH_3)_2$	CH_2-c-C_6H_{11}
A-581	$CH_2CH_2CH_2CH_3$	CH_2-c-C_6H_{11}
A-582	$C(CH_3)_3$	CH_2-c-C_6H_{11}
A-583	$CH_2CH(CH_3)_2$	CH_2-c-C_6H_{11}
A-584	$CH(CH_3)CH_2CH_3$	CH_2-c-C_6H_{11}
A-585	$CH_2CH=CH_2$	CH_2-c-C_6H_{11}
A-586	$CH_2C\equiv CH$	CH_2-c-C_6H_{11}
A-587	$CH(CH_3)CH=CH_2$	CH_2-c-C_6H_{11}
A-588	CHF_2	CH_2-c-C_6H_{11}
A-589	CH_2Cl	CH_2-c-C_6H_{11}
A-590	CH_2CH_2CN	CH_2-c-C_6H_{11}
A-591	CH_2CH_2Cl	CH_2-c-C_6H_{11}
A-592	c-C_3H_5	CH_2-c-C_6H_{11}

	R^5	R^6
A-593	c-C_4H_7	CH_2-c-C_6H_{11}
A-594	c-C_5H_9	CH_2-c-C_6H_{11}
A-595	c-C_6H_{11}	CH_2-c-C_6H_{11}
A-596	CH_2-c-C_3H_5	CH_2-c-C_6H_{11}
A-597	$CH(CH_3)$-c-C_3H_5	CH_2-c-C_6H_{11}
A-598	CH_2-c-C_5H_9	CH_2-c-C_6H_{11}
A-599	CH_2-c-C_6H_{11}	CH_2-c-C_6H_{11}
A-600	C_6H_5	CH_2-c-C_6H_{11}
A-601	CH_3	C_6H_5
A-602	C_2H_5	C_6H_5
A-603	$CH=CH_2$	C_6H_5
A-604	$CH_2CH_2CH_3$	C_6H_5
A-605	$CH(CH_3)_2$	C_6H_5
A-606	$CH_2CH_2CH_2CH_3$	C_6H_5
A-607	$C(CH_3)_3$	C_6H_5
A-608	$CH_2CH(CH_3)_2$	C_6H_5
A-609	$CH(CH_3)CH_2CH_3$	C_6H_5
A-610	$CH_2CH=CH_2$	C_6H_5
A-611	$CH_2C\equiv CH$	C_6H_5
A-612	$CH(CH_3)CH=CH_2$	C_6H_5
A-613	CHF_2	C_6H_5
A-614	CH_2Cl	C_6H_5
A-615	CH_2CH_2CN	C_6H_5
A-616	CH_2CH_2Cl	C_6H_5
A-617	c-C_3H_5	C_6H_5
A-618	c-C_4H_7	C_6H_5
A-619	c-C_5H_9	C_6H_5
A-620	c-C_6H_{11}	C_6H_5
A-621	CH_2-c-C_3H_5	C_6H_5
A-622	$CH(CH_3)$-c-C_3H_5	C_6H_5
A-623	CH_2-c-C_5H_9	C_6H_5
A-624	CH_2-c-C_5H_9	C_6H_5
A-625	C_6H_5	C_6H_5
A-626	CH_3	CH_2-c-C_4H_7
A-627	C_2H_5	CH_2-c-C_4H_7
A-628	$CH=CH_2$	CH_2-c-C_4H_7
A-629	$CH_2CH_2CH_3$	CH_2-c-C_4H_7
A-630	$CH(CH_3)_2$	CH_2-c-C_4H_7
A-631	$CH_2CH_2CH_2CH_3$	CH_2-c-C_4H_7
A-632	$C(CH_3)_3$	CH_2-c-C_4H_7
A-633	$CH_2CH(CH_3)_2$	CH_2-c-C_4H_7
A-634	$CH(CH_3)CH_2CH_3$	CH_2-c-C_4H_7

	R^5	R^6
A-635	$CH_2CH=CH_2$	CH_2-c-C_4H_7
A-636	$CH_2C\equiv CH$	CH_2-c-C_4H_7
A-637	$CH(CH_3)CH=CH_2$	CH_2-c-C_4H_7
A-638	CHF_2	CH_2-c-C_4H_7
A-639	CH_2Cl	CH_2-c-C_4H_7
A-640	CH_2CH_2CN	CH_2-c-C_4H_7
A-641	CH_2CH_2Cl	CH_2-c-C_4H_7
A-642	c-C_3H_5	CH_2-c-C_4H_7
A-643	c-C_4H_7	CH_2-c-C_4H_7
A-644	c-C_5H_9	CH_2-c-C_4H_7
A-645	c-C_6H_{11}	CH_2-c-C_4H_7
A-646	CH_2-c-C_3H_5	CH_2-c-C_4H_7
A-647	$CH(CH_3)$-c-C_3H_5	CH_2-c-C_4H_7
A-648	CH_2-c-C_5H_9	CH_2-c-C_4H_7
A-649	CH_2-c-C_6H_{11}	CH_2-c-C_4H_7
A-650	C_6H_5	CH_2-c-C_4H_7
A-651	CH_3	CH_2CH_2-c-C_3H_5
A-652	C_2H_5	CH_2CH_2-c-C_3H_5
A-653	$CH=CH_2$	CH_2CH_2-c-C_3H_5
A-654	$CH_2CH_2CH_3$	CH_2CH_2-c-C_3H_5
A-655	$CH(CH_3)_2$	CH_2CH_2-c-C_3H_5
A-656	$CH_2CH_2CH_2CH_3$	CH_2CH_2-c-C_3H_5
A-657	$C(CH_3)_3$	CH_2CH_2-c-C_3H_5
A-658	$CH_2CH(CH_3)_2$	CH_2CH_2-c-C_3H_5
A-659	$CH(CH_3)CH_2CH_3$	CH_2CH_2-c-C_3H_5
A-660	$CH_2CH=CH_2$	CH_2CH_2-c-C_3H_5
A-661	$CH_2C\equiv CH$	CH_2CH_2-c-C_3H_5
A-662	$CH(CH_3)CH=CH_2$	CH_2CH_2-c-C_3H_5
A-663	CHF_2	CH_2CH_2-c-C_3H_5
A-664	CH_2Cl	CH_2CH_2-c-C_3H_5
A-665	CH_2CH_2CN	CH_2CH_2-c-C_3H_5
A-666	CH_2CH_2Cl	CH_2CH_2-c-C_3H_5
A-667	c-C_3H_5	CH_2CH_2-c-C_3H_5
A-668	c-C_4H_7	CH_2CH_2-c-C_3H_5
A-669	c-C_5H_9	CH_2CH_2-c-C_3H_5
A-670	c-C_6H_{11}	CH_2CH_2-c-C_3H_5
A-671	CH_2-c-C_3H_5	CH_2CH_2-c-C_3H_5
A-672	$CH(CH_3)$-c-C_3H_5	CH_2CH_2-c-C_3H_5
A-673	CH_2-c-C_5H_9	CH_2CH_2-c-C_3H_5
A-674	CH_2-c-C_6H_{11}	CH_2CH_2-c-C_3H_5
A-675	C_6H_5	CH_2CH_2-c-C_3H_5
A-676	CH_3	$CH_2(CH_2)_3CH_3$

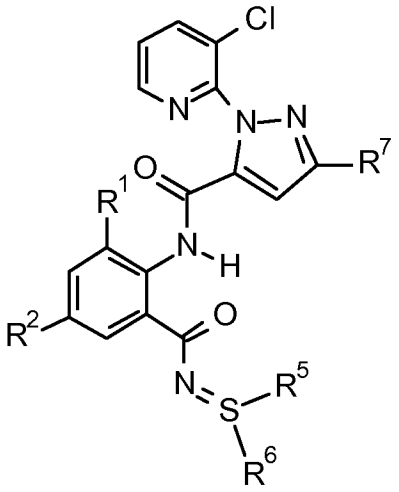
	R^5	R^6
A-677	C_2H_5	$CH_2(CH_2)_3CH_3$
A-678	$CH=CH_2$	$CH_2(CH_2)_3CH_3$
A-679	$CH_2CH_2CH_3$	$CH_2(CH_2)_3CH_3$
A-680	$CH(CH_3)_2$	$CH_2(CH_2)_3CH_3$
A-681	$CH_2CH_2CH_2CH_3$	$CH_2(CH_2)_3CH_3$
A-682	$C(CH_3)_3$	$CH_2(CH_2)_3CH_3$
A-683	$CH_2CH(CH_3)_2$	$CH_2(CH_2)_3CH_3$
A-684	$CH(CH_3)CH_2CH_3$	$CH_2(CH_2)_3CH_3$
A-685	$CH_2CH=CH_2$	$CH_2(CH_2)_3CH_3$
A-686	$CH_2C\equiv CH$	$CH_2(CH_2)_3CH_3$
A-687	$CH(CH_3)CH=CH_2$	$CH_2(CH_2)_3CH_3$
A-688	CHF_2	$CH_2(CH_2)_3CH_3$
A-689	CH_2Cl	$CH_2(CH_2)_3CH_3$
A-690	CH_2CH_2CN	$CH_2(CH_2)_3CH_3$
A-691	CH_2CH_2Cl	$CH_2(CH_2)_3CH_3$
A-692	$c\text{-}C_3H_5$	$CH_2(CH_2)_3CH_3$
A-693	$c\text{-}C_4H_7$	$CH_2(CH_2)_3CH_3$
A-694	$c\text{-}C_5H_9$	$CH_2(CH_2)_3CH_3$
A-695	$c\text{-}C_6H_{11}$	$CH_2(CH_2)_3CH_3$
A-696	$CH_2\text{-}c\text{-}C_3H_5$	$CH_2(CH_2)_3CH_3$
A-697	$CH(CH_3)\text{-}c\text{-}C_3H_5$	$CH_2(CH_2)_3CH_3$
A-698	$CH_2\text{-}c\text{-}C_5H_9$	$CH_2(CH_2)_3CH_3$
A-699	$CH_2\text{-}c\text{-}C_6H_{11}$	$CH_2(CH_2)_3CH_3$
A-700	C_6H_5	$CH_2(CH_2)_3CH_3$
A-701	CH_3	$CH(CH_3)CH(CH_3)_2$
A-702	C_2H_5	$CH(CH_3)CH(CH_3)_2$
A-703	$CH=CH_2$	$CH(CH_3)CH(CH_3)_2$
A-704	$CH_2CH_2CH_3$	$CH(CH_3)CH(CH_3)_2$
A-705	$CH(CH_3)_2$	$CH(CH_3)CH(CH_3)_2$
A-706	$CH_2CH_2CH_2CH_3$	$CH(CH_3)CH(CH_3)_2$
A-707	$C(CH_3)_3$	$CH(CH_3)CH(CH_3)_2$
A-708	$CH_2CH(CH_3)_2$	$CH(CH_3)CH(CH_3)_2$
A-709	$CH(CH_3)CH_2CH_3$	$CH(CH_3)CH(CH_3)_2$
A-710	$CH_2CH=CH_2$	$CH(CH_3)CH(CH_3)_2$
A-711	$CH_2C\equiv CH$	$CH(CH_3)CH(CH_3)_2$
A-712	$CH(CH_3)CH=CH_2$	$CH(CH_3)CH(CH_3)_2$
A-713	CHF_2	$CH(CH_3)CH(CH_3)_2$
A-714	CH_2Cl	$CH(CH_3)CH(CH_3)_2$
A-715	CH_2CH_2CN	$CH(CH_3)CH(CH_3)_2$
A-716	CH_2CH_2Cl	$CH(CH_3)CH(CH_3)_2$
A-717	$c\text{-}C_3H_5$	$CH(CH_3)CH(CH_3)_2$
A-718	$c\text{-}C_4H_7$	$CH(CH_3)CH(CH_3)_2$
A-719	$c\text{-}C_5H_9$	$CH(CH_3)CH(CH_3)_2$
A-720	$c\text{-}C_6H_{11}$	$CH(CH_3)CH(CH_3)_2$
A-721	$CH_2\text{-}c\text{-}C_3H_5$	$CH(CH_3)CH(CH_3)_2$
A-722	$CH(CH_3)\text{-}c\text{-}C_3H_5$	$CH(CH_3)CH(CH_3)_2$
A-723	$CH_2\text{-}c\text{-}C_5H_9$	$CH(CH_3)CH(CH_3)_2$
A-724	$CH_2\text{-}c\text{-}C_6H_{11}$	$CH(CH_3)CH(CH_3)_2$
A-725	C_6H_5	$CH(CH_3)CH(CH_3)_2$
A-726	CH_3	$CH_2(CH_2)_4CH_3$
A-727	C_2H_5	$CH_2(CH_2)_4CH_3$
A-728	$C(CH_3)_3$	$CH_2(CH_2)_4CH_3$
A-729	$CH_2(CH_2)_4CH_3$	$CH_2(CH_2)_4CH_3$
A-730	CH_3	2-EtHex
A-731	C_2H_5	2-EtHex
A-732	$C(CH_3)_3$	2-EtHex
A-733	2-EtHex	2-EtHex
A-734	CH_3	CH_2CH_2OH
A-735	C_2H_5	CH_2CH_2OH
A-736	$C(CH_3)_3$	CH_2CH_2OH
A-737	$CH_2CH_2CH_2CH_3$	CH_2CH_2OH
A-738	$CH_2(CH_2)_3CH_3$	CH_2CH_2OH
A-739	CH_2CH_2OH	CH_2CH_2OH
A-740	$CH_2\text{-}c\text{-}C_4H_7$	$CH_2\text{-}c\text{-}C_4H_7$
A-741	$CH_2CH_2\text{-}c\text{-}C_3H_5$	$CH_2CH_2\text{-}c\text{-}C_3H_5$
A-742	$CH(CH_3)CH(CH_3)_2$	$CH(CH_3)CH(CH_3)_2$
A-743	$CH_2(CH_2)_3CH_3$	$CH_2(CH_2)_3CH_3$
A-744	$(CH_2)_4$	
A-745	$CH_2CH_2SCH_2$	

$c\text{-}C_3H_5$: cyclopropyl; $c\text{-}C_4H_7$: cyclobutyl; $c\text{-}C_5H_9$: cyclopentyl; $c\text{-}C_6H_{11}$: cyclohexyl; $CH_2\text{-}c\text{-}C_3H_5$: cyclopropylmethyl; $CH(CH_3)\text{-}c\text{-}C_3H_5$: 1-cyclopropylethyl; $CH_2\text{-}c\text{-}C_5H_9$: cyclopentylmethyl; $CH_2\text{-}c\text{-}C_5H_9$: cyclopentylmethyl; C_6H_5: phenyl; $CH_2CH_2\text{-}c\text{-}C_3H_5$: 2-cyclopropylethyl; $CH_2\text{-}c\text{-}C_4H_7$: 2-cyclobutylmethyl; 2-EtHex: $CH_2CH(C_2H_5)(CH_2)_3CH_3$

A group of especially preferred compounds of formula I are compounds I-1 to I-41 of formula IA-1 which are listed in the table C in the example section.

In one embodiment of the invention, the invention relates to mixtures of compounds I-1 to I-41 with active compounds II selected from group F.

In one embodiment, a compound selected from compounds I-11, I-16, I-21, I-26, I-31 is the compound I in the mixtures according to the invention, which are defined in accordance with Table C of the example section:



(IA-1)

Table C'

	R^1	R^2	R^7	R^5	R^6
I-11	Me	Cl	CF_3	C_2H_5	C_2H_5
I-16	Cl	Cl	CF_3	C_2H_5	C_2H_5
I-21	Me	Cl	CF_3	$CH(CH_3)_2$	$CH(CH_3)_2$
I-26	Cl	Cl	CF_3	$CH(CH_3)_2$	$CH(CH_3)_2$
I-31	Br	Br	CF_3	C_2H_5	C_2H_5

In one embodiment, I-11 is the compound I in the mixtures according to the invention.
In one embodiment, I-16 is the compound I in the mixtures according to the invention.
In one embodiment, I-21 is the compound I in the mixtures according to the invention.
In one embodiment, I-26 is the compound I in the mixtures according to the invention.
In one embodiment, I-31 is the compound I in the mixtures according to the invention.

Active compounds II selected from group F

With respect to their use in the pesticidal mixtures of the present invention, particular preference is given to the compounds II as listed in the paragraphs below. With regard to compounds I in the mixtures, the compounds I-1 to I-41 as defined in Table C in the Example Section at the end of the description, are preferred.

With regard to the use in a pesticidal mixture of the present invention, a compound II selected from the group of the azoles is preferred, especially prochloraz, prothioconazole, tebuconazole and triticonazole, especially prothioconazole and triticonazole.

Mixtures of compounds of formula I as individualized herein, e.g. in Table C,with triticonazole as compound II are particularly preferred. Mixtures of compounds of formula I as individualized herein, e.g. in Table C, with prothioconazole as compound II are particularly preferred.

With regard to the use in a pesticidal mixture of the present invention, preferred is a compound II selected from the group of benomyl, carbendazim, epoxiconazole, fluquinconazole, flutriafol, flusilazole, metconazole, prochloraz, prothioconazole, tebuconazole, triticonazole, pyraclostrobin, trifloxystrobin, boscalid, dimethomorph, penthiopyrad, dodemorph, famoxadone, fenpropimorph, proquinazid, pyrimethanil, tridemorph, compound II-TFPTAP (5-chloro-7-(4-methylpiperidin-1-yl)-6-(2,4,6-trifluorophenyl)-[1,2,4]triazolo[1,5-a]pyrimidine), maneb, mancozeb, metiram, thiram, chlorothalonil, dithianon, flusulfamide,metrafenone, fluxapyroxad (N-(3',4',5' trifluorobiphenyl-2 yl)-3-difluoromethyl-1-methyl-1H-pyrazole-4 carboxamide), bixafen, penflufen, sedaxane, isopyrazam. Especially preferred is pyraclostrobin and fluxapyroxad.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with a strobilurin, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with pyraclostrobin, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with kresoximmethyl, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with trifloxystrobin, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with a carboxamide, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound

of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with boscalid, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with fluopyram, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with penflufen, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with fluxapyroxad, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with bixafen, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with penthiopyrad, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with fluopyram, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined

in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with sedaxane, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with isopyrazam, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with benzovindiflupyr, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with isotianil, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with an azole, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with epoxiconazole, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with fluquinconazole, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined

in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with triticonazole, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with metconazole, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

In one embodiment, the mixture according to the invention is a mixture of the compounds of formula I with prothioconazole, more preferably a compound of formula IA, also preferably a compound of formula IB, also preferably a compound of formula IC, also preferably a compound of formula ID; more preferably a compound selected from the compounds I-1 to I-41 as defined in Table C; more preferably a compound selected from compounds I-11, I-16, I-21, I-26, I-31 according to Table C/C'.

The present invention relates to agrochemical compositions comprising a mixture of at least one compound I (component 1) and at least one further active substance useful for plant protection, e. g. selected from the group F. (component 2).

Especially preferred mixtures according to the invention are listed in the following table M, wherein the compounds I-1 to I-40 are as defined in Table C in the Example Section at the end of the description:

Table M

Mixture	Comp. I	Compound II
M.1	I-1	benomyl
M.2	I-2	benomyl
M.3	I-3	benomyl
M.4	I-4	benomyl
M.5	I-5	benomyl
M.6	I-6	benomyl
M.7	I-7	benomyl
M.8	I-8	benomyl
M.9	I-9	benomyl
M.10	I-10	benomyl
M.11	I-11	benomyl
M.12	I-12	benomyl

Mixture	Comp. I	Compound II
M.13	I-13	benomyl
M.14	I-14	benomyl
M.15	I-15	benomyl
M.16	I-16	benomyl
M.17	I-17	benomyl
M.18	I-18	benomyl
M.19	I-19	benomyl
M.20	I-20	benomyl
M.21	I-21	benomyl
M.22	I-22	benomyl
M.23	I-23	benomyl
M.24	I-24	benomyl

Mixture	Comp. I	Compound II
M.25	I-25	benomyl
M.26	I-26	benomyl
M.27	I-27	benomyl
M.28	I-28	benomyl
M.29	I-29	benomyl
M.30	I-30	benomyl
M.31	I-31	benomyl
M.32	I-32	benomyl
M.33	I-33	benomyl
M.34	I-34	benomyl
M.35	I-35	benomyl
M.36	I-36	benomyl
M.37	I-37	benomyl
M.38	I-38	benomyl
M.39	I-39	benomyl
M.40	I-40	benomyl
M.41	I-1	carbendazim
M.42	I-2	carbendazim
M.43	I-3	carbendazim
M.44	I-4	carbendazim
M.45	I-5	carbendazim
M.46	I-6	carbendazim
M.47	I-7	carbendazim
M.48	I-8	carbendazim
M.49	I-9	carbendazim
M.50	I-10	carbendazim
M.51	I-11	carbendazim
M.52	I-12	carbendazim
M.53	I-13	carbendazim
M.54	I-14	carbendazim
M.55	I-15	carbendazim
M.56	I-16	carbendazim
M.57	I-17	carbendazim
M.58	I-18	carbendazim
M.59	I-19	carbendazim
M.60	I-20	carbendazim
M.61	I-21	carbendazim
M.62	I-22	carbendazim
M.63	I-23	carbendazim
M.64	I-24	carbendazim

Mixture	Comp. I	Compound II
M.65	I-25	carbendazim
M.66	I-26	carbendazim
M.67	I-27	carbendazim
M.68	I-28	carbendazim
M.69	I-29	carbendazim
M.70	I-30	carbendazim
M.71	I-31	carbendazim
M.72	I-32	carbendazim
M.73	I-33	carbendazim
M.74	I-34	carbendazim
M.75	I-35	carbendazim
M.76	I-36	carbendazim
M.77	I-37	carbendazim
M.78	I-38	carbendazim
M.79	I-39	carbendazim
M.80	I-40	carbendazim
M.81	I-1	epoxiconazole
M.82	I-2	epoxiconazole
M.83	I-3	epoxiconazole
M.84	I-4	epoxiconazole
M.85	I-5	epoxiconazole
M.86	I-6	epoxiconazole
M.87	I-7	epoxiconazole
M.88	I-8	epoxiconazole
M.89	I-9	epoxiconazole
M.90	I-10	epoxiconazole
M.91	I-11	epoxiconazole
M.92	I-12	epoxiconazole
M.93	I-13	epoxiconazole
M.94	I-14	epoxiconazole
M.95	I-15	epoxiconazole
M.96	I-16	epoxiconazole
M.97	I-17	epoxiconazole
M.98	I-18	epoxiconazole
M.99	I-19	epoxiconazole
M.100	I-20	epoxiconazole
M.101	I-21	epoxiconazole
M.102	I-22	epoxiconazole
M.103	I-23	epoxiconazole
M.104	I-24	epoxiconazole

Mixture	Comp. I	Compound II
M.105	I-25	epoxiconazole
M.106	I-26	epoxiconazole
M.107	I-27	epoxiconazole
M.108	I-28	epoxiconazole
M.109	I-29	epoxiconazole
M.110	I-30	epoxiconazole
M.111	I-31	epoxiconazole
M.112	I-32	epoxiconazole
M.113	I-33	epoxiconazole
M.114	I-34	epoxiconazole
M.115	I-35	epoxiconazole
M.116	I-36	epoxiconazole
M.117	I-37	epoxiconazole
M.118	I-38	epoxiconazole
M.119	I-39	epoxiconazole
M.120	I-40	epoxiconazole
M.121	I-1	fluquinconazole
M.122	I-2	fluquinconazole
M.123	I-3	fluquinconazole
M.124	I-4	fluquinconazole
M.125	I-5	fluquinconazole
M.126	I-6	fluquinconazole
M.127	I-7	fluquinconazole
M.128	I-8	fluquinconazole
M.129	I-9	fluquinconazole
M.130	I-10	fluquinconazole
M.131	I-11	fluquinconazole
M.132	I-12	fluquinconazole
M.133	I-13	fluquinconazole
M.134	I-14	fluquinconazole
M.135	I-15	fluquinconazole
M.136	I-16	fluquinconazole
M.137	I-17	fluquinconazole
M.138	I-18	fluquinconazole
M.139	I-19	fluquinconazole
M.140	I-20	fluquinconazole
M.141	I-21	fluquinconazole
M.142	I-22	fluquinconazole
M.143	I-23	fluquinconazole
M.144	I-24	fluquinconazole
M.145	I-25	fluquinconazole
M.146	I-26	fluquinconazole
M.147	I-27	fluquinconazole
M.148	I-28	fluquinconazole
M.149	I-29	fluquinconazole
M.150	I-30	fluquinconazole
M.151	I-31	fluquinconazole
M.152	I-32	fluquinconazole
M.153	I-33	fluquinconazole
M.154	I-34	fluquinconazole
M.155	I-35	fluquinconazole
M.156	I-36	fluquinconazole
M.157	I-37	fluquinconazole
M.158	I-38	fluquinconazole
M.159	I-39	fluquinconazole
M.160	I-40	fluquinconazole
M.161	I-1	flutriafol
M.162	I-2	flutriafol
M.163	I-3	flutriafol
M.164	I-4	flutriafol
M.165	I-5	flutriafol
M.166	I-6	flutriafol
M.167	I-7	flutriafol
M.168	I-8	flutriafol
M.169	I-9	flutriafol
M.170	I-10	flutriafol
M.171	I-11	flutriafol
M.172	I-12	flutriafol
M.173	I-13	flutriafol
M.174	I-14	flutriafol
M.175	I-15	flutriafol
M.176	I-16	flutriafol
M.177	I-17	flutriafol
M.178	I-18	flutriafol
M.179	I-19	flutriafol
M.180	I-20	flutriafol
M.181	I-21	flutriafol
M.182	I-22	flutriafol
M.183	I-23	flutriafol
M.184	I-24	flutriafol

Mixture	Comp. I	Compound II
M.185	I-25	flutriafol
M.186	I-26	flutriafol
M.187	I-27	flutriafol
M.188	I-28	flutriafol
M.189	I-29	flutriafol
M.190	I-30	flutriafol
M.191	I-31	flutriafol
M.192	I-32	flutriafol
M.193	I-33	flutriafol
M.194	I-34	flutriafol
M.195	I-35	flutriafol
M.196	I-36	flutriafol
M.197	I-37	flutriafol
M.198	I-38	flutriafol
M.199	I-39	flutriafol
M.200	I-40	flutriafol
M.201	I-1	flusilazole
M.202	I-2	flusilazole
M.203	I-3	flusilazole
M.204	I-4	flusilazole
M.205	I-5	flusilazole
M.206	I-6	flusilazole
M.207	I-7	flusilazole
M.208	I-8	flusilazole
M.209	I-9	flusilazole
M.210	I-10	flusilazole
M.211	I-11	flusilazole
M.212	I-12	flusilazole
M.213	I-13	flusilazole
M.214	I-14	flusilazole
M.215	I-15	flusilazole
M.216	I-16	flusilazole
M.217	I-17	flusilazole
M.218	I-18	flusilazole
M.219	I-19	flusilazole
M.220	I-20	flusilazole
M.221	I-21	flusilazole
M.222	I-22	flusilazole
M.223	I-23	flusilazole
M.224	I-24	flusilazole

Mixture	Comp. I	Compound II
M.225	I-25	flusilazole
M.226	I-26	flusilazole
M.227	I-27	flusilazole
M.228	I-28	flusilazole
M.229	I-29	flusilazole
M.230	I-30	flusilazole
M.231	I-31	flusilazole
M.232	I-32	flusilazole
M.233	I-33	flusilazole
M.234	I-34	flusilazole
M.235	I-35	flusilazole
M.236	I-36	flusilazole
M.237	I-37	flusilazole
M.238	I-38	flusilazole
M.239	I-39	flusilazole
M.240	I-40	flusilazole
M.241	I-1	metconazole
M.242	I-2	metconazole
M.243	I-3	metconazole
M.244	I-4	metconazole
M.245	I-5	metconazole
M.246	I-6	metconazole
M.247	I-7	metconazole
M.248	I-8	metconazole
M.249	I-9	metconazole
M.250	I-10	metconazole
M.251	I-11	metconazole
M.252	I-12	metconazole
M.253	I-13	metconazole
M.254	I-14	metconazole
M.255	I-15	metconazole
M.256	I-16	metconazole
M.257	I-17	metconazole
M.258	I-18	metconazole
M.259	I-19	metconazole
M.260	I-20	metconazole
M.261	I-21	metconazole
M.262	I-22	metconazole
M.263	I-23	metconazole
M.264	I-24	metconazole

Mixture	Comp. I	Compound II
M.265	I-25	metconazole
M.266	I-26	metconazole
M.267	I-27	metconazole
M.268	I-28	metconazole
M.269	I-29	metconazole
M.270	I-30	metconazole
M.271	I-31	metconazole
M.272	I-32	metconazole
M.273	I-33	metconazole
M.274	I-34	metconazole
M.275	I-35	metconazole
M.276	I-36	metconazole
M.277	I-37	metconazole
M.278	I-38	metconazole
M.279	I-39	metconazole
M.280	I-40	metconazole
M.281	I-1	prochloraz
M.282	I-2	prochloraz
M.283	I-3	prochloraz
M.284	I-4	prochloraz
M.285	I-5	prochloraz
M.286	I-6	prochloraz
M.287	I-7	prochloraz
M.288	I-8	prochloraz
M.289	I-9	prochloraz
M.290	I-10	prochloraz
M.291	I-11	prochloraz
M.292	I-12	prochloraz
M.293	I-13	prochloraz
M.294	I-14	prochloraz
M.295	I-15	prochloraz
M.296	I-16	prochloraz
M.297	I-17	prochloraz
M.298	I-18	prochloraz
M.299	I-19	prochloraz
M.300	I-20	prochloraz
M.301	I-21	prochloraz
M.302	I-22	prochloraz
M.303	I-23	prochloraz
M.304	I-24	prochloraz

Mixture	Comp. I	Compound II
M.305	I-25	prochloraz
M.306	I-26	prochloraz
M.307	I-27	prochloraz
M.308	I-28	prochloraz
M.309	I-29	prochloraz
M.310	I-30	prochloraz
M.311	I-31	prochloraz
M.312	I-32	prochloraz
M.313	I-33	prochloraz
M.314	I-34	prochloraz
M.315	I-35	prochloraz
M.316	I-36	prochloraz
M.317	I-37	prochloraz
M.318	I-38	prochloraz
M.319	I-39	prochloraz
M.320	I-40	prochloraz
M.321	I-1	prothioconazole
M.322	I-2	prothioconazole
M.323	I-3	prothioconazole
M.324	I-4	prothioconazole
M.325	I-5	prothioconazole
M.326	I-6	prothioconazole
M.327	I-7	prothioconazole
M.328	I-8	prothioconazole
M.329	I-9	prothioconazole
M.330	I-10	prothioconazole
M.331	I-11	prothioconazole
M.332	I-12	prothioconazole
M.333	I-13	prothioconazole
M.334	I-14	prothioconazole
M.335	I-15	prothioconazole
M.336	I-16	prothioconazole
M.337	I-17	prothioconazole
M.338	I-18	prothioconazole
M.339	I-19	prothioconazole
M.340	I-20	prothioconazole
M.341	I-21	prothioconazole
M.342	I-22	prothioconazole
M.343	I-23	prothioconazole
M.344	I-24	prothioconazole

Mixture	Comp. I	Compound II
M.345	I-25	prothioconazole
M.346	I-26	prothioconazole
M.347	I-27	prothioconazole
M.348	I-28	prothioconazole
M.349	I-29	prothioconazole
M.350	I-30	prothioconazole
M.351	I-31	prothioconazole
M.352	I-32	prothioconazole
M.353	I-33	prothioconazole
M.354	I-34	prothioconazole
M.355	I-35	prothioconazole
M.356	I-36	prothioconazole
M.357	I-37	prothioconazole
M.358	I-38	prothioconazole
M.359	I-39	prothioconazole
M.360	I-40	prothioconazole
M.361	I-1	tebuconazole
M.362	I-2	tebuconazole
M.363	I-3	tebuconazole
M.364	I-4	tebuconazole
M.365	I-5	tebuconazole
M.366	I-6	tebuconazole
M.367	I-7	tebuconazole
M.368	I-8	tebuconazole
M.369	I-9	tebuconazole
M.370	I-10	tebuconazole
M.371	I-11	tebuconazole
M.372	I-12	tebuconazole
M.373	I-13	tebuconazole
M.374	I-14	tebuconazole
M.375	I-15	tebuconazole
M.376	I-16	tebuconazole
M.377	I-17	tebuconazole
M.378	I-18	tebuconazole
M.379	I-19	tebuconazole
M.380	I-20	tebuconazole
M.381	I-21	tebuconazole
M.382	I-22	tebuconazole
M.383	I-23	tebuconazole
M.384	I-24	tebuconazole

Mixture	Comp. I	Compound II
M.385	I-25	tebuconazole
M.386	I-26	tebuconazole
M.387	I-27	tebuconazole
M.388	I-28	tebuconazole
M.389	I-29	tebuconazole
M.390	I-30	tebuconazole
M.391	I-31	tebuconazole
M.392	I-32	tebuconazole
M.393	I-33	tebuconazole
M.394	I-34	tebuconazole
M.395	I-35	tebuconazole
M.396	I-36	tebuconazole
M.397	I-37	tebuconazole
M.398	I-38	tebuconazole
M.399	I-39	tebuconazole
M.400	I-40	tebuconazole
M.401	I-1	triticonazole
M.402	I-2	triticonazole
M.403	I-3	triticonazole
M.404	I-4	triticonazole
M.405	I-5	triticonazole
M.406	I-6	triticonazole
M.407	I-7	triticonazole
M.408	I-8	triticonazole
M.409	I-9	triticonazole
M.410	I-10	triticonazole
M.411	I-11	triticonazole
M.412	I-12	triticonazole
M.413	I-13	triticonazole
M.414	I-14	triticonazole
M.415	I-15	triticonazole
M.416	I-16	triticonazole
M.417	I-17	triticonazole
M.418	I-18	triticonazole
M.419	I-19	triticonazole
M.420	I-20	triticonazole
M.421	I-21	triticonazole
M.422	I-22	triticonazole
M.423	I-23	triticonazole
M.424	I-24	triticonazole

Mixture	Comp. I	Compound II
M.425	I-25	triticonazole
M.426	I-26	triticonazole
M.427	I-27	triticonazole
M.428	I-28	triticonazole
M.429	I-29	triticonazole
M.430	I-30	triticonazole
M.431	I-31	triticonazole
M.432	I-32	triticonazole
M.433	I-33	triticonazole
M.434	I-34	triticonazole
M.435	I-35	triticonazole
M.436	I-36	triticonazole
M.437	I-37	triticonazole
M.438	I-38	triticonazole
M.439	I-39	triticonazole
M.440	I-40	triticonazole
M.441	I-1	pyraclostrobin
M.442	I-2	pyraclostrobin
M.443	I-3	pyraclostrobin
M.444	I-4	pyraclostrobin
M.445	I-5	pyraclostrobin
M.446	I-6	pyraclostrobin
M.447	I-7	pyraclostrobin
M.448	I-8	pyraclostrobin
M.449	I-9	pyraclostrobin
M.450	I-10	pyraclostrobin
M.451	I-11	pyraclostrobin
M.452	I-12	pyraclostrobin
M.453	I-13	pyraclostrobin
M.454	I-14	pyraclostrobin
M.455	I-15	pyraclostrobin
M.456	I-16	pyraclostrobin
M.457	I-17	pyraclostrobin
M.458	I-18	pyraclostrobin
M.459	I-19	pyraclostrobin
M.460	I-20	pyraclostrobin
M.461	I-21	pyraclostrobin
M.462	I-22	pyraclostrobin
M.463	I-23	pyraclostrobin
M.464	I-24	pyraclostrobin

Mixture	Comp. I	Compound II
M.465	I-25	pyraclostrobin
M.466	I-26	pyraclostrobin
M.467	I-27	pyraclostrobin
M.468	I-28	pyraclostrobin
M.469	I-29	pyraclostrobin
M.470	I-30	pyraclostrobin
M.471	I-31	pyraclostrobin
M.472	I-32	pyraclostrobin
M.473	I-33	pyraclostrobin
M.474	I-34	pyraclostrobin
M.475	I-35	pyraclostrobin
M.476	I-36	pyraclostrobin
M.477	I-37	pyraclostrobin
M.478	I-38	pyraclostrobin
M.479	I-39	pyraclostrobin
M.480	I-40	pyraclostrobin
M.481	I-1	trifloxystrobin
M.482	I-2	trifloxystrobin
M.483	I-3	trifloxystrobin
M.484	I-4	trifloxystrobin
M.485	I-5	trifloxystrobin
M.486	I-6	trifloxystrobin
M.487	I-7	trifloxystrobin
M.488	I-8	trifloxystrobin
M.489	I-9	trifloxystrobin
M.490	I-10	trifloxystrobin
M.491	I-11	trifloxystrobin
M.492	I-12	trifloxystrobin
M.493	I-13	trifloxystrobin
M.494	I-14	trifloxystrobin
M.495	I-15	trifloxystrobin
M.496	I-16	trifloxystrobin
M.497	I-17	trifloxystrobin
M.498	I-18	trifloxystrobin
M.499	I-19	trifloxystrobin
M.500	I-20	trifloxystrobin
M.501	I-21	trifloxystrobin
M.502	I-22	trifloxystrobin
M.503	I-23	trifloxystrobin
M.504	I-24	trifloxystrobin

Mixture	Comp. I	Compound II
M.505	I-25	trifloxystrobin
M.506	I-26	trifloxystrobin
M.507	I-27	trifloxystrobin
M.508	I-28	trifloxystrobin
M.509	I-29	trifloxystrobin
M.510	I-30	trifloxystrobin
M.511	I-31	trifloxystrobin
M.512	I-32	trifloxystrobin
M.513	I-33	trifloxystrobin
M.514	I-34	trifloxystrobin
M.515	I-35	trifloxystrobin
M.516	I-36	trifloxystrobin
M.517	I-37	trifloxystrobin
M.518	I-38	trifloxystrobin
M.519	I-39	trifloxystrobin
M.520	I-40	trifloxystrobin
M.521	I-1	boscalid
M.522	I-2	boscalid
M.523	I-3	boscalid
M.524	I-4	boscalid
M.525	I-5	boscalid
M.526	I-6	boscalid
M.527	I-7	boscalid
M.528	I-8	boscalid
M.529	I-9	boscalid
M.530	I-10	boscalid
M.531	I-11	boscalid
M.532	I-12	boscalid
M.533	I-13	boscalid
M.534	I-14	boscalid
M.535	I-15	boscalid
M.536	I-16	boscalid
M.537	I-17	boscalid
M.538	I-18	boscalid
M.539	I-19	boscalid
M.540	I-20	boscalid
M.541	I-21	boscalid
M.542	I-22	boscalid
M.543	I-23	boscalid
M.544	I-24	boscalid

Mixture	Comp. I	Compound II
M.545	I-25	boscalid
M.546	I-26	boscalid
M.547	I-27	boscalid
M.548	I-28	boscalid
M.549	I-29	boscalid
M.550	I-30	boscalid
M.551	I-31	boscalid
M.552	I-32	boscalid
M.553	I-33	boscalid
M.554	I-34	boscalid
M.555	I-35	boscalid
M.556	I-36	boscalid
M.557	I-37	boscalid
M.558	I-38	boscalid
M.559	I-39	boscalid
M.560	I-40	boscalid
M.561	I-1	dimethomorph
M.562	I-2	dimethomorph
M.563	I-3	dimethomorph
M.564	I-4	dimethomorph
M.565	I-5	dimethomorph
M.566	I-6	dimethomorph
M.567	I-7	dimethomorph
M.568	I-8	dimethomorph
M.569	I-9	dimethomorph
M.570	I-10	dimethomorph
M.571	I-11	dimethomorph
M.572	I-12	dimethomorph
M.573	I-13	dimethomorph
M.574	I-14	dimethomorph
M.575	I-15	dimethomorph
M.576	I-16	dimethomorph
M.577	I-17	dimethomorph
M.578	I-18	dimethomorph
M.579	I-19	dimethomorph
M.580	I-20	dimethomorph
M.581	I-21	dimethomorph
M.582	I-22	dimethomorph
M.583	I-23	dimethomorph
M.584	I-24	dimethomorph

Mixture	Comp. I	Compound II
M.585	I-25	dimethomorph
M.586	I-26	dimethomorph
M.587	I-27	dimethomorph
M.588	I-28	dimethomorph
M.589	I-29	dimethomorph
M.590	I-30	dimethomorph
M.591	I-31	dimethomorph
M.592	I-32	dimethomorph
M.593	I-33	dimethomorph
M.594	I-34	dimethomorph
M.595	I-35	dimethomorph
M.596	I-36	dimethomorph
M.597	I-37	dimethomorph
M.598	I-38	dimethomorph
M.599	I-39	dimethomorph
M.600	I-40	dimethomorph
M.601	I-1	penthiopyrad
M.602	I-2	penthiopyrad
M.603	I-3	penthiopyrad
M.604	I-4	penthiopyrad
M.605	I-5	penthiopyrad
M.606	I-6	penthiopyrad
M.607	I-7	penthiopyrad
M.608	I-8	penthiopyrad
M.609	I-9	penthiopyrad
M.610	I-10	penthiopyrad
M.611	I-11	penthiopyrad
M.612	I-12	penthiopyrad
M.613	I-13	penthiopyrad
M.614	I-14	penthiopyrad
M.615	I-15	penthiopyrad
M.616	I-16	penthiopyrad
M.617	I-17	penthiopyrad
M.618	I-18	penthiopyrad
M.619	I-19	penthiopyrad
M.620	I-20	penthiopyrad
M.621	I-21	penthiopyrad
M.622	I-22	penthiopyrad
M.623	I-23	penthiopyrad
M.624	I-24	penthiopyrad

Mixture	Comp. I	Compound II
M.625	I-25	penthiopyrad
M.626	I-26	penthiopyrad
M.627	I-27	penthiopyrad
M.628	I-28	penthiopyrad
M.629	I-29	penthiopyrad
M.630	I-30	penthiopyrad
M.631	I-31	penthiopyrad
M.632	I-32	penthiopyrad
M.633	I-33	penthiopyrad
M.634	I-34	penthiopyrad
M.635	I-35	penthiopyrad
M.636	I-36	penthiopyrad
M.637	I-37	penthiopyrad
M.638	I-38	penthiopyrad
M.639	I-39	penthiopyrad
M.640	I-40	penthiopyrad
M.641	I-1	dodemorph
M.642	I-2	dodemorph
M.643	I-3	dodemorph
M.644	I-4	dodemorph
M.645	I-5	dodemorph
M.646	I-6	dodemorph
M.647	I-7	dodemorph
M.648	I-8	dodemorph
M.649	I-9	dodemorph
M.650	I-10	dodemorph
M.651	I-11	dodemorph
M.652	I-12	dodemorph
M.653	I-13	dodemorph
M.654	I-14	dodemorph
M.655	I-15	dodemorph
M.656	I-16	dodemorph
M.657	I-17	dodemorph
M.658	I-18	dodemorph
M.659	I-19	dodemorph
M.660	I-20	dodemorph
M.661	I-21	dodemorph
M.662	I-22	dodemorph
M.663	I-23	dodemorph
M.664	I-24	dodemorph

Mixture	Comp. I	Compound II
M.665	I-25	dodemorph
M.666	I-26	dodemorph
M.667	I-27	dodemorph
M.668	I-28	dodemorph
M.669	I-29	dodemorph
M.670	I-30	dodemorph
M.671	I-31	dodemorph
M.672	I-32	dodemorph
M.673	I-33	dodemorph
M.674	I-34	dodemorph
M.675	I-35	dodemorph
M.676	I-36	dodemorph
M.677	I-37	dodemorph
M.678	I-38	dodemorph
M.679	I-39	dodemorph
M.680	I-40	dodemorph
M.681	I-1	famoxadone
M.682	I-2	famoxadone
M.683	I-3	famoxadone
M.684	I-4	famoxadone
M.685	I-5	famoxadone
M.686	I-6	famoxadone
M.687	I-7	famoxadone
M.688	I-8	famoxadone
M.689	I-9	famoxadone
M.690	I-10	famoxadone
M.691	I-11	famoxadone
M.692	I-12	famoxadone
M.693	I-13	famoxadone
M.694	I-14	famoxadone
M.695	I-15	famoxadone
M.696	I-16	famoxadone
M.697	I-17	famoxadone
M.698	I-18	famoxadone
M.699	I-19	famoxadone
M.700	I-20	famoxadone
M.701	I-21	famoxadone
M.702	I-22	famoxadone
M.703	I-23	famoxadone
M.704	I-24	famoxadone

Mixture	Comp. I	Compound II
M.705	I-25	famoxadone
M.706	I-26	famoxadone
M.707	I-27	famoxadone
M.708	I-28	famoxadone
M.709	I-29	famoxadone
M.710	I-30	famoxadone
M.711	I-31	famoxadone
M.712	I-32	famoxadone
M.713	I-33	famoxadone
M.714	I-34	famoxadone
M.715	I-35	famoxadone
M.716	I-36	famoxadone
M.717	I-37	famoxadone
M.718	I-38	famoxadone
M.719	I-39	famoxadone
M.720	I-40	famoxadone
M.721	I-1	fenpropimorph
M.722	I-2	fenpropimorph
M.723	I-3	fenpropimorph
M.724	I-4	fenpropimorph
M.725	I-5	fenpropimorph
M.726	I-6	fenpropimorph
M.727	I-7	fenpropimorph
M.728	I-8	fenpropimorph
M.729	I-9	fenpropimorph
M.730	I-10	fenpropimorph
M.731	I-11	fenpropimorph
M.732	I-12	fenpropimorph
M.733	I-13	fenpropimorph
M.734	I-14	fenpropimorph
M.735	I-15	fenpropimorph
M.736	I-16	fenpropimorph
M.737	I-17	fenpropimorph
M.738	I-18	fenpropimorph
M.739	I-19	fenpropimorph
M.740	I-20	fenpropimorph
M.741	I-21	fenpropimorph
M.742	I-22	fenpropimorph
M.743	I-23	fenpropimorph
M.744	I-24	fenpropimorph

Mixture	Comp. I	Compound II
M.745	I-25	fenpropimorph
M.746	I-26	fenpropimorph
M.747	I-27	fenpropimorph
M.748	I-28	fenpropimorph
M.749	I-29	fenpropimorph
M.750	I-30	fenpropimorph
M.751	I-31	fenpropimorph
M.752	I-32	fenpropimorph
M.753	I-33	fenpropimorph
M.754	I-34	fenpropimorph
M.755	I-35	fenpropimorph
M.756	I-36	fenpropimorph
M.757	I-37	fenpropimorph
M.758	I-38	fenpropimorph
M.759	I-39	fenpropimorph
M.760	I-40	fenpropimorph
M.761	I-1	proquinazid
M.762	I-2	proquinazid
M.763	I-3	proquinazid
M.764	I-4	proquinazid
M.765	I-5	proquinazid
M.766	I-6	proquinazid
M.767	I-7	proquinazid
M.768	I-8	proquinazid
M.769	I-9	proquinazid
M.770	I-10	proquinazid
M.771	I-11	proquinazid
M.772	I-12	proquinazid
M.773	I-13	proquinazid
M.774	I-14	proquinazid
M.775	I-15	proquinazid
M.776	I-16	proquinazid
M.777	I-17	proquinazid
M.778	I-18	proquinazid
M.779	I-19	proquinazid
M.780	I-20	proquinazid
M.781	I-21	proquinazid
M.782	I-22	proquinazid
M.783	I-23	proquinazid
M.784	I-24	proquinazid

Mixture	Comp. I	Compound II
M.785	I-25	proquinazid
M.786	I-26	proquinazid
M.787	I-27	proquinazid
M.788	I-28	proquinazid
M.789	I-29	proquinazid
M.790	I-30	proquinazid
M.791	I-31	proquinazid
M.792	I-32	proquinazid
M.793	I-33	proquinazid
M.794	I-34	proquinazid
M.795	I-35	proquinazid
M.796	I-36	proquinazid
M.797	I-37	proquinazid
M.798	I-38	proquinazid
M.799	I-39	proquinazid
M.800	I-40	proquinazid
M.801	I-1	pyrimethanil
M.802	I-2	pyrimethanil
M.803	I-3	pyrimethanil
M.804	I-4	pyrimethanil
M.805	I-5	pyrimethanil
M.806	I-6	pyrimethanil
M.807	I-7	pyrimethanil
M.808	I-8	pyrimethanil
M.809	I-9	pyrimethanil
M.810	I-10	pyrimethanil
M.811	I-11	pyrimethanil
M.812	I-12	pyrimethanil
M.813	I-13	pyrimethanil
M.814	I-14	pyrimethanil
M.815	I-15	pyrimethanil
M.816	I-16	pyrimethanil
M.817	I-17	pyrimethanil
M.818	I-18	pyrimethanil
M.819	I-19	pyrimethanil
M.820	I-20	pyrimethanil
M.821	I-21	pyrimethanil
M.822	I-22	pyrimethanil
M.823	I-23	pyrimethanil
M.824	I-24	pyrimethanil

Mixture	Comp. I	Compound II
M.825	I-25	pyrimethanil
M.826	I-26	pyrimethanil
M.827	I-27	pyrimethanil
M.828	I-28	pyrimethanil
M.829	I-29	pyrimethanil
M.830	I-30	pyrimethanil
M.831	I-31	pyrimethanil
M.832	I-32	pyrimethanil
M.833	I-33	pyrimethanil
M.834	I-34	pyrimethanil
M.835	I-35	pyrimethanil
M.836	I-36	pyrimethanil
M.837	I-37	pyrimethanil
M.838	I-38	pyrimethanil
M.839	I-39	pyrimethanil
M.840	I-40	pyrimethanil
M.841	I-1	tridemorph
M.842	I-2	tridemorph
M.843	I-3	tridemorph
M.844	I-4	tridemorph
M.845	I-5	tridemorph
M.846	I-6	tridemorph
M.847	I-7	tridemorph
M.848	I-8	tridemorph
M.849	I-9	tridemorph
M.850	I-10	tridemorph
M.851	I-11	tridemorph
M.852	I-12	tridemorph
M.853	I-13	tridemorph
M.854	I-14	tridemorph
M.855	I-15	tridemorph
M.856	I-16	tridemorph
M.857	I-17	tridemorph
M.858	I-18	tridemorph
M.859	I-19	tridemorph
M.860	I-20	tridemorph
M.861	I-21	tridemorph
M.862	I-22	tridemorph
M.863	I-23	tridemorph
M.864	I-24	tridemorph

Mixture	Comp. I	Compound II
M.865	I-25	tridemorph
M.866	I-26	tridemorph
M.867	I-27	tridemorph
M.868	I-28	tridemorph
M.869	I-29	tridemorph
M.870	I-30	tridemorph
M.871	I-31	tridemorph
M.872	I-32	tridemorph
M.873	I-33	tridemorph
M.874	I-34	tridemorph
M.875	I-35	tridemorph
M.876	I-36	tridemorph
M.877	I-37	tridemorph
M.878	I-38	tridemorph
M.879	I-39	tridemorph
M.880	I-40	tridemorph
M.881	I-1	II-TFPTAP
M.882	I-2	II-TFPTAP
M.883	I-3	II-TFPTAP
M.884	I-4	II-TFPTAP
M.885	I-5	II-TFPTAP
M.886	I-6	II-TFPTAP
M.887	I-7	II-TFPTAP
M.888	I-8	II-TFPTAP
M.889	I-9	II-TFPTAP
M.890	I-10	II-TFPTAP
M.891	I-11	II-TFPTAP
M.892	I-12	II-TFPTAP
M.893	I-13	II-TFPTAP
M.894	I-14	II-TFPTAP
M.895	I-15	II-TFPTAP
M.896	I-16	II-TFPTAP
M.897	I-17	II-TFPTAP
M.898	I-18	II-TFPTAP
M.899	I-19	II-TFPTAP
M.900	I-20	II-TFPTAP
M.901	I-21	II-TFPTAP
M.902	I-22	II-TFPTAP
M.903	I-23	II-TFPTAP
M.904	I-24	II-TFPTAP

Mixture	Comp. I	Compound II
M.905	I-25	II-TFPTAP
M.906	I-26	II-TFPTAP
M.907	I-27	II-TFPTAP
M.908	I-28	II-TFPTAP
M.909	I-29	II-TFPTAP
M.910	I-30	II-TFPTAP
M.911	I-31	II-TFPTAP
M.912	I-32	II-TFPTAP
M.913	I-33	II-TFPTAP
M.914	I-34	II-TFPTAP
M.915	I-35	II-TFPTAP
M.916	I-36	II-TFPTAP
M.917	I-37	II-TFPTAP
M.918	I-38	II-TFPTAP
M.919	I-39	II-TFPTAP
M.920	I-40	II-TFPTAP
M.921	I-1	maneb
M.922	I-2	maneb
M.923	I-3	maneb
M.924	I-4	maneb
M.925	I-5	maneb
M.926	I-6	maneb
M.927	I-7	maneb
M.928	I-8	maneb
M.929	I-9	maneb
M.930	I-10	maneb
M.931	I-11	maneb
M.932	I-12	maneb
M.933	I-13	maneb
M.934	I-14	maneb
M.935	I-15	maneb
M.936	I-16	maneb
M.937	I-17	maneb
M.938	I-18	maneb
M.939	I-19	maneb
M.940	I-20	maneb
M.941	I-21	maneb
M.942	I-22	maneb
M.943	I-23	maneb
M.944	I-24	maneb

Mixture	Comp. I	Compound II
M.945	I-25	maneb
M.946	I-26	maneb
M.947	I-27	maneb
M.948	I-28	maneb
M.949	I-29	maneb
M.950	I-30	maneb
M.951	I-31	maneb
M.952	I-32	maneb
M.953	I-33	maneb
M.954	I-34	maneb
M.955	I-35	maneb
M.956	I-36	maneb
M.957	I-37	maneb
M.958	I-38	maneb
M.959	I-39	maneb
M.960	I-40	maneb
M.961	I-1	mancozeb
M.962	I-2	mancozeb
M.963	I-3	mancozeb
M.964	I-4	mancozeb
M.965	I-5	mancozeb
M.966	I-6	mancozeb
M.967	I-7	mancozeb
M.968	I-8	mancozeb
M.969	I-9	mancozeb
M.970	I-10	mancozeb
M.971	I-11	mancozeb
M.972	I-12	mancozeb
M.973	I-13	mancozeb
M.974	I-14	mancozeb
M.975	I-15	mancozeb
M.976	I-16	mancozeb
M.977	I-17	mancozeb
M.978	I-18	mancozeb
M.979	I-19	mancozeb
M.980	I-20	mancozeb
M.981	I-21	mancozeb
M.982	I-22	mancozeb
M.983	I-23	mancozeb
M.984	I-24	mancozeb

Mixture	Comp. I	Compound II
M.985	I-25	mancozeb
M.986	I-26	mancozeb
M.987	I-27	mancozeb
M.988	I-28	mancozeb
M.989	I-29	mancozeb
M.990	I-30	mancozeb
M.991	I-31	mancozeb
M.992	I-32	mancozeb
M.993	I-33	mancozeb
M.994	I-34	mancozeb
M.995	I-35	mancozeb
M.996	I-36	mancozeb
M.997	I-37	mancozeb
M.998	I-38	mancozeb
M.999	I-39	mancozeb
M.1000	I-40	mancozeb
M.1001	I-1	metiram
M.1002	I-2	metiram
M.1003	I-3	metiram
M.1004	I-4	metiram
M.1005	I-5	metiram
M.1006	I-6	metiram
M.1007	I-7	metiram
M.1008	I-8	metiram
M.1009	I-9	metiram
M.1010	I-10	metiram
M.1011	I-11	metiram
M.1012	I-12	metiram
M.1013	I-13	metiram
M.1014	I-14	metiram
M.1015	I-15	metiram
M.1016	I-16	metiram
M.1017	I-17	metiram
M.1018	I-18	metiram
M.1019	I-19	metiram
M.1020	I-20	metiram
M.1021	I-21	metiram
M.1022	I-22	metiram
M.1023	I-23	metiram
M.1024	I-24	metiram

Mixture	Comp. I	Compound II
M.1025	I-25	metiram
M.1026	I-26	metiram
M.1027	I-27	metiram
M.1028	I-28	metiram
M.1029	I-29	metiram
M.1030	I-30	metiram
M.1031	I-31	metiram
M.1032	I-32	metiram
M.1033	I-33	metiram
M.1034	I-34	metiram
M.1035	I-35	metiram
M.1036	I-36	metiram
M.1037	I-37	metiram
M.1038	I-38	metiram
M.1039	I-39	metiram
M.1040	I-40	metiram
M.1041	I-1	thiram
M.1042	I-2	thiram
M.1043	I-3	thiram
M.1044	I-4	thiram
M.1045	I-5	thiram
M.1046	I-6	thiram
M.1047	I-7	thiram
M.1048	I-8	thiram
M.1049	I-9	thiram
M.1050	I-10	thiram
M.1051	I-11	thiram
M.1052	I-12	thiram
M.1053	I-13	thiram
M.1054	I-14	thiram
M.1055	I-15	thiram
M.1056	I-16	thiram
M.1057	I-17	thiram
M.1058	I-18	thiram
M.1059	I-19	thiram
M.1060	I-20	thiram
M.1061	I-21	thiram
M.1062	I-22	thiram
M.1063	I-23	thiram
M.1064	I-24	thiram

Mixture	Comp. I	Compound II
M.1065	I-25	thiram
M.1066	I-26	thiram
M.1067	I-27	thiram
M.1068	I-28	thiram
M.1069	I-29	thiram
M.1070	I-30	thiram
M.1071	I-31	thiram
M.1072	I-32	thiram
M.1073	I-33	thiram
M.1074	I-34	thiram
M.1075	I-35	thiram
M.1076	I-36	thiram
M.1077	I-37	thiram
M.1078	I-38	thiram
M.1079	I-39	thiram
M.1080	I-40	thiram
M.1081	I-1	chlorothalonil
M.1082	I-2	chlorothalonil
M.1083	I-3	chlorothalonil
M.1084	I-4	chlorothalonil
M.1085	I-5	chlorothalonil
M.1086	I-6	chlorothalonil
M.1087	I-7	chlorothalonil
M.1088	I-8	chlorothalonil
M.1089	I-9	chlorothalonil
M.1090	I-10	chlorothalonil
M.1091	I-11	chlorothalonil
M.1092	I-12	chlorothalonil
M.1093	I-13	chlorothalonil
M.1094	I-14	chlorothalonil
M.1095	I-15	chlorothalonil
M.1096	I-16	chlorothalonil
M.1097	I-17	chlorothalonil
M.1098	I-18	chlorothalonil
M.1099	I-19	chlorothalonil
M.1100	I-20	chlorothalonil
M.1101	I-21	chlorothalonil
M.1102	I-22	chlorothalonil
M.1103	I-23	chlorothalonil
M.1104	I-24	chlorothalonil

Mixture	Comp. I	Compound II
M.1105	I-25	chlorothalonil
M.1106	I-26	chlorothalonil
M.1107	I-27	chlorothalonil
M.1108	I-28	chlorothalonil
M.1109	I-29	chlorothalonil
M.1110	I-30	chlorothalonil
M.1111	I-31	chlorothalonil
M.1112	I-32	chlorothalonil
M.1113	I-33	chlorothalonil
M.1114	I-34	chlorothalonil
M.1115	I-35	chlorothalonil
M.1116	I-36	chlorothalonil
M.1117	I-37	chlorothalonil
M.1118	I-38	chlorothalonil
M.1119	I-39	chlorothalonil
M.1120	I-40	chlorothalonil
M.1121	I-1	dithianon
M.1122	I-2	dithianon
M.1123	I-3	dithianon
M.1124	I-4	dithianon
M.1125	I-5	dithianon
M.1126	I-6	dithianon
M.1127	I-7	dithianon
M.1128	I-8	dithianon
M.1129	I-9	dithianon
M.1130	I-10	dithianon
M.1131	I-11	dithianon
M.1132	I-12	dithianon
M.1133	I-13	dithianon
M.1134	I-14	dithianon
M.1135	I-15	dithianon
M.1136	I-16	dithianon
M.1137	I-17	dithianon
M.1138	I-18	dithianon
M.1139	I-19	dithianon
M.1140	I-20	dithianon
M.1141	I-21	dithianon
M.1142	I-22	dithianon
M.1143	I-23	dithianon
M.1144	I-24	dithianon

Mixture	Comp. I	Compound II
M.1145	I-25	dithianon
M.1146	I-26	dithianon
M.1147	I-27	dithianon
M.1148	I-28	dithianon
M.1149	I-29	dithianon
M.1150	I-30	dithianon
M.1151	I-31	dithianon
M.1152	I-32	dithianon
M.1153	I-33	dithianon
M.1154	I-34	dithianon
M.1155	I-35	dithianon
M.1156	I-36	dithianon
M.1157	I-37	dithianon
M.1158	I-38	dithianon
M.1159	I-39	dithianon
M.1160	I-40	dithianon
M.1161	I-1	flusulfamide
M.1162	I-2	flusulfamide
M.1163	I-3	flusulfamide
M.1164	I-4	flusulfamide
M.1165	I-5	flusulfamide
M.1166	I-6	flusulfamide
M.1167	I-7	flusulfamide
M.1168	I-8	flusulfamide
M.1169	I-9	flusulfamide
M.1170	I-10	flusulfamide
M.1171	I-11	flusulfamide
M.1172	I-12	flusulfamide
M.1173	I-13	flusulfamide
M.1174	I-14	flusulfamide
M.1175	I-15	flusulfamide
M.1176	I-16	flusulfamide
M.1177	I-17	flusulfamide
M.1178	I-18	flusulfamide
M.1179	I-19	flusulfamide
M.1180	I-20	flusulfamide
M.1181	I-21	flusulfamide
M.1182	I-22	flusulfamide
M.1183	I-23	flusulfamide
M.1184	I-24	flusulfamide

Mixture	Comp. I	Compound II
M.1185	I-25	flusulfamide
M.1186	I-26	flusulfamide
M.1187	I-27	flusulfamide
M.1188	I-28	flusulfamide
M.1189	I-29	flusulfamide
M.1190	I-30	flusulfamide
M.1191	I-31	flusulfamide
M.1192	I-32	flusulfamide
M.1193	I-33	flusulfamide
M.1194	I-34	flusulfamide
M.1195	I-35	flusulfamide
M.1196	I-36	flusulfamide
M.1197	I-37	flusulfamide
M.1198	I-38	flusulfamide
M.1199	I-39	flusulfamide
M.1200	I-40	flusulfamide
M.1201	I-1	metrafenone
M.1202	I-2	metrafenone
M.1203	I-3	metrafenone
M.1204	I-4	metrafenone
M.1205	I-5	metrafenone
M.1206	I-6	metrafenone
M.1207	I-7	metrafenone
M.1208	I-8	metrafenone
M.1209	I-9	metrafenone
M.1210	I-10	metrafenone
M.1211	I-11	metrafenone
M.1212	I-12	metrafenone
M.1213	I-13	metrafenone
M.1214	I-14	metrafenone
M.1215	I-15	metrafenone
M.1216	I-16	metrafenone
M.1217	I-17	metrafenone
M.1218	I-18	metrafenone
M.1219	I-19	metrafenone
M.1220	I-20	metrafenone
M.1221	I-21	metrafenone
M.1222	I-22	metrafenone
M.1223	I-23	metrafenone
M.1224	I-24	metrafenone

Mixture	Comp. I	Compound II
M.1225	I-25	metrafenone
M.1226	I-26	metrafenone
M.1227	I-27	metrafenone
M.1228	I-28	metrafenone
M.1229	I-29	metrafenone
M.1230	I-30	metrafenone
M.1231	I-31	metrafenone
M.1232	I-32	metrafenone
M.1233	I-33	metrafenone
M.1234	I-34	metrafenone
M.1235	I-35	metrafenone
M.1236	I-36	metrafenone
M.1237	I-37	metrafenone
M.1238	I-38	metrafenone
M.1239	I-39	metrafenone
M.1240	I-40	metrafenone
M.1241	I-1	fluxapyroxad
M.1242	I-2	fluxapyroxad
M.1243	I-3	fluxapyroxad
M.1244	I-4	fluxapyroxad
M.1245	I-5	fluxapyroxad
M.1246	I-6	fluxapyroxad
M.1247	I-7	fluxapyroxad
M.1248	I-8	fluxapyroxad
M.1249	I-9	fluxapyroxad
M.1250	I-10	fluxapyroxad
M.1251	I-11	fluxapyroxad
M.1252	I-12	fluxapyroxad
M.1253	I-13	fluxapyroxad
M.1254	I-14	fluxapyroxad
M.1255	I-15	fluxapyroxad
M.1256	I-16	fluxapyroxad
M.1257	I-17	fluxapyroxad
M.1258	I-18	fluxapyroxad
M.1259	I-19	fluxapyroxad
M.1260	I-20	fluxapyroxad
M.1261	I-21	fluxapyroxad
M.1262	I-22	fluxapyroxad
M.1263	I-23	fluxapyroxad
M.1264	I-24	fluxapyroxad

Mixture	Comp. I	Compound II
M.1265	I-25	fluxapyroxad
M.1266	I-26	fluxapyroxad
M.1267	I-27	fluxapyroxad
M.1268	I-28	fluxapyroxad
M.1269	I-29	fluxapyroxad
M.1270	I-30	fluxapyroxad
M.1271	I-31	fluxapyroxad
M.1272	I-32	fluxapyroxad
M.1273	I-33	fluxapyroxad
M.1274	I-34	fluxapyroxad
M.1275	I-35	fluxapyroxad
M.1276	I-36	fluxapyroxad
M.1277	I-37	fluxapyroxad
M.1278	I-38	fluxapyroxad
M.1279	I-39	fluxapyroxad
M.1280	I-40	fluxapyroxad
M.1281	I-1	bixafen
M.1282	I-2	bixafen
M.1283	I-3	bixafen
M.1284	I-4	bixafen
M.1285	I-5	bixafen
M.1286	I-6	bixafen
M.1287	I-7	bixafen
M.1288	I-8	bixafen
M.1289	I-9	bixafen
M.1290	I-10	bixafen
M.1291	I-11	bixafen
M.1292	I-12	bixafen
M.1293	I-13	bixafen
M.1294	I-14	bixafen
M.1295	I-15	bixafen
M.1296	I-16	bixafen
M.1297	I-17	bixafen
M.1298	I-18	bixafen
M.1299	I-19	bixafen
M.1300	I-20	bixafen
M.1301	I-21	bixafen
M.1302	I-22	bixafen
M.1303	I-23	bixafen
M.1304	I-24	bixafen

Mixture	Comp. I	Compound II
M.1305	I-25	bixafen
M.1306	I-26	bixafen
M.1307	I-27	bixafen
M.1308	I-28	bixafen
M.1309	I-29	bixafen
M.1310	I-30	bixafen
M.1311	I-31	bixafen
M.1312	I-32	bixafen
M.1313	I-33	bixafen
M.1314	I-34	bixafen
M.1315	I-35	bixafen
M.1316	I-36	bixafen
M.1317	I-37	bixafen
M.1318	I-38	bixafen
M.1319	I-39	bixafen
M.1320	I-40	bixafen
M.1321	I-1	penflufen
M.1322	I-2	penflufen
M.1323	I-3	penflufen
M.1324	I-4	penflufen
M.1325	I-5	penflufen
M.1326	I-6	penflufen
M.1327	I-7	penflufen
M.1328	I-8	penflufen
M.1329	I-9	penflufen
M.1330	I-10	penflufen
M.1331	I-11	penflufen
M.1332	I-12	penflufen
M.1333	I-13	penflufen
M.1334	I-14	penflufen
M.1335	I-15	penflufen
M.1336	I-16	penflufen
M.1337	I-17	penflufen
M.1338	I-18	penflufen
M.1339	I-19	penflufen
M.1340	I-20	penflufen
M.1341	I-21	penflufen
M.1342	I-22	penflufen
M.1343	I-23	penflufen
M.1344	I-24	penflufen

Mixture	Comp. I	Compound II
M.1345	I-25	penflufen
M.1346	I-26	penflufen
M.1347	I-27	penflufen
M.1348	I-28	penflufen
M.1349	I-29	penflufen
M.1350	I-30	penflufen
M.1351	I-31	penflufen
M.1352	I-32	penflufen
M.1353	I-33	penflufen
M.1354	I-34	penflufen
M.1355	I-35	penflufen
M.1356	I-36	penflufen
M.1357	I-37	penflufen
M.1358	I-38	penflufen
M.1359	I-39	penflufen
M.1360	I-40	penflufen
M.1361	I-1	sedaxane
M.1362	I-2	sedaxane
M.1363	I-3	sedaxane
M.1364	I-4	sedaxane
M.1365	I-5	sedaxane
M.1366	I-6	sedaxane
M.1367	I-7	sedaxane
M.1368	I-8	sedaxane
M.1369	I-9	sedaxane
M.1370	I-10	sedaxane
M.1371	I-11	sedaxane
M.1372	I-12	sedaxane
M.1373	I-13	sedaxane
M.1374	I-14	sedaxane
M.1375	I-15	sedaxane
M.1376	I-16	sedaxane
M.1377	I-17	sedaxane
M.1378	I-18	sedaxane
M.1379	I-19	sedaxane
M.1380	I-20	sedaxane
M.1381	I-21	sedaxane
M.1382	I-22	sedaxane
M.1383	I-23	sedaxane
M.1384	I-24	sedaxane

Mixture	Comp. I	Compound II
M.1385	I-25	sedaxane
M.1386	I-26	sedaxane
M.1387	I-27	sedaxane
M.1388	I-28	sedaxane
M.1389	I-29	sedaxane
M.1390	I-30	sedaxane
M.1391	I-31	sedaxane
M.1392	I-32	sedaxane
M.1393	I-33	sedaxane
M.1394	I-34	sedaxane
M.1395	I-35	sedaxane
M.1396	I-36	sedaxane
M.1397	I-37	sedaxane
M.1398	I-38	sedaxane
M.1399	I-39	sedaxane
M.1400	I-40	sedaxane
M.1401	I-1	isopyrazam
M.1402	I-2	isopyrazam
M.1403	I-3	isopyrazam
M.1404	I-4	isopyrazam
M.1405	I-5	isopyrazam
M.1406	I-6	isopyrazam
M.1407	I-7	isopyrazam
M.1408	I-8	isopyrazam
M.1409	I-9	isopyrazam
M.1410	I-10	isopyrazam
M.1411	I-11	isopyrazam
M.1412	I-12	isopyrazam
M.1413	I-13	isopyrazam

Mixture	Comp. I	Compound II
M.1414	I-14	isopyrazam
M.1415	I-15	isopyrazam
M.1416	I-16	isopyrazam
M.1417	I-17	isopyrazam
M.1418	I-18	isopyrazam
M.1419	I-19	isopyrazam
M.1420	I-20	isopyrazam
M.1421	I-21	isopyrazam
M.1422	I-22	isopyrazam
M.1423	I-23	isopyrazam
M.1424	I-24	isopyrazam
M.1425	I-25	isopyrazam
M.1426	I-26	isopyrazam
M.1427	I-27	isopyrazam
M.1428	I-28	isopyrazam
M.1429	I-29	isopyrazam
M.1430	I-30	isopyrazam
M.1431	I-31	isopyrazam
M.1432	I-32	isopyrazam
M.1433	I-33	isopyrazam
M.1434	I-34	isopyrazam
M.1435	I-35	isopyrazam
M.1436	I-36	isopyrazam
M.1437	I-37	isopyrazam
M.1438	I-38	isopyrazam
M.1439	I-39	isopyrazam
M.1440	I-40	isopyrazam
M.1441	I-41	isopyrazam

Compound II-TFPTAP is 5-chloro-7-(4-methylpiperidin-1-yl)-6-(2,4,6-trifluorophenyl)-[1,2,4]triazolo[1,5-a]pyrimidine.

Fluxapyroxad is N-(3',4',5' trifluorobiphenyl-2 yl)-3-difluoromethyl-1-methyl-1H-pyrazole-4 carboxamide.

In one embodiment of the invention, the component 2 is a fungicide, preferably selected from group F.I) to F.XI).

In one embodiment of the invention, the component 2 is a growth regulator, preferably selected from group F.XII).

In one embodiment of the invention, the component 2 is a biopesticide, preferably selected from group F.XIII). In one sub-embodiment, the mixtures according to the invention are as described herein, with the proviso that they are NOT mixtures comprising:

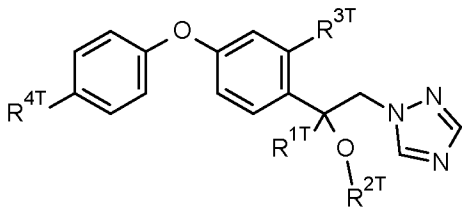
A) a biopesticide, in particular as described herein in group F.XIII and M.Y, and

B) a compound selected from N [4,6-dichloro-2-[(diethyl-lambda-4-sulfanylidene)carbamoyl]-phenyl]-2-(3-chloro-2 pyridyl)-5-(trifluoromethyl)pyr¬azole-3-carboxamide; N-[4-chloro-2-[(diethyl-lambda-4-sulfanylidene)carbamoyl]-6 methyl-phenyl]-2-(3-chloro-2-pyridyl)-5-(triflu¬oromethyl)pyrazole-3-carboxamide; N-[4-chloro-2-[(di-2-propyl-lambda-4-sulfanyli¬dene)carbamoyl]-6-methyl-phenyl]-2 (3-chloro-2-pyridyl)-5-(trifluoromethyl)pyrazole-3-carboxamide; N-[4,6-dichloro-2 [(di-2-propyl-lambda-4-sulfanylidene)carbamoyl]-phenyl]-2-(3-chloro-2-pyridyl)-5 (trifluoromethyl)pyrazole-3-carboxamide; N-[4,6-di¬chloro-2-[(diethyl-lambda-4 sulfanylidene)carbamoyl]-phenyl]-2-(3-chloro-2-pyridyl)-5-(difluoromethyl)pyr¬azole-3-carboxamide; N-[4,6-dibromo-2-[(di-2-propyl-lambda-4 sulfanylidene)carba¬moyl]-phenyl]-2-(3-chloro-2-pyridyl)-5-(trifluoromethyl)pyr¬azole-3-carboxamide; N [4-chloro-2-[(di-2-propyl-lambda-4-sulfanylidene)carba¬moyl]-6-cyano-phenyl]-2 (3-chloro-2-pyridyl)-5-(trifluoromethyl)pyrazole-3-carbox¬amide; N-[4,6-dibromo-2 [(diethyl-lambda-4-sulfanylidene)carbamoyl]-phenyl]-2 (3 chloro-2-pyridyl)-5 (tri¬fluoromethyl)pyrazole-3-carboxamide [compound I]; and

C) a triazole compound selected from:

C-a) triazole compounds as described in EP13175404.6,

C-b) a compound of formula T:



T

wherein

R^{1T} is (C_1-C_4)-alkyl, (C_3-C_6)-cycloalkyl or (C_2-C_4)-alkinyl;

R^{2T} is hydrogen, (C_1-C_3)-alkyl, (C_2-C_4)-alkenyl or (C_2-C_4)-alkynyl;

R^{3T} is Cl or CF_3; and

R^{4T} is Cl or F;

C-c) a strobilurin-type compound as described as compound I in EP13172462.7;

C-d) a strobilurin-type compound as described as compound I in EP13172461.9,;

Furthermore, in one sub-embodiment, the mixtures according to the invention are as described herein, with the proviso that they are NOT mixtures as described in EP 13160219.5 or EP13160196.5, comprising:

- a biopesticide which is Bacillus subtilis strain FB17, or a cell-free extract thereof or at least one me-tabolite thereof, and/or a mutant of Bacillus subtilis FB17 having all the identify-ing characteristics thereof or extract of the mutant;

- a compound selected from the group of N [4,6-dichloro-2-[(diethyl-lambda-4-sulfanylidene)carbamoyl]-phenyl]-2-(3-chloro-2 pyridyl)-5-(trifluoromethyl)pyr¬azole-3-carboxamide; N-[4-chloro-2-[(diethyl-lambda-4-sulfanylidene)carbamoyl]-6 methyl-phenyl]-2-(3-chloro-2-pyridyl)-5-(triflu¬oromethyl)pyrazole-3-carboxamide; N-[4-chloro-2-[(di-2-propyl-

lambda-4-sulfanyli¬dene)carbamoyl]-6-methyl-phenyl]-2 (3-chloro-2-pyridyl)-5-(trifluoromethyl)pyrazole-3-carboxamide; N-[4,6-dichloro-2 [(di-2-propyl-lambda-4-sulfanylidene)carbamoyl]-phenyl]-2-(3-chloro-2-pyridyl)-5 (trifluoromethyl)pyrazole-3-carboxamide; N-[4,6-di¬chloro-2-[(diethyl-lambda-4 sulfanylidene)carbamoyl]-phenyl]-2-(3-chloro-2-pyridyl)-5-(difluoromethyl)pyr¬azole-3-carboxamide; N-[4,6-dibromo-2-[(di-2-propyl-lambda-4 sulfanylidene)carba¬moyl]-phenyl]-2-(3-chloro-2-pyridyl)-5-(trifluoromethyl)pyr¬azole-3-carboxamide; N [4-chloro-2-[(di-2-propyl-lambda-4-sulfanylidene)carba¬moyl]-6-cyano-phenyl]-2 (3-chloro-2-pyridyl)-5-(trifluoromethyl)pyrazole-3-carbox¬amide; N-[4,6-dibromo-2 [(diethyl-lambda-4-sulfanylidene)carbamoyl]-phenyl]-2 (3 chloro-2-pyridyl)-5 (tri¬fluoromethyl)pyrazole-3-carboxamide [compound I].

The present invention furthermore relates to agrochemical compositions comprising a mixture of at least one compound I (component 1) and at least one further active substance useful for plant protection, e. g. selected from the group F.XIII) (component 2), in particular at least one further fungicidal biopesticide selected from the groups F.XIII -1) and F.XIII -2), as described above, and if desired one suitable solvent or solid carrier. Preference is also given to mixtures comprise as biopesticide II (component 3) a biopesticide from group F.XIII -1), preferably selected from Bacillus amyloliquefaciens AP-136 (NRRL B-50614), B. amyloliquefaciens AP-188 (NRRL B-50615), B. amyloliquefaciens AP-218 (NRRL B-50618), B. amyloliquefaciens AP-219 (NRRL B-50619), B. amyloliquefaciens AP-295 (NRRL B-50620), B. amyloliquefaciens IT-45 (CNCM I-3800, NCBI 1091041), B. amyloliquefaciens subsp. plantarum MBI600 (NRRL B-50595), B. mojavensis AP-209 (No. NRRL B-50616), B. pumilus INR-7 (otherwise referred to as BU-F22 (NRRL B-50153) and BU-F33 (NRRL B-50185)), B. pumilus KFP9F, B. pumilus QST 2808 (NRRL B-30087), B. pumilus GHA 181, B. simplex ABU 288 (NRRL B-50340), B. solisalsi AP-217 (NRRL B-50617), B. subtilis CX-9060, B. subtilis GB03, B. subtilis GB07, B. subtilis QST-713 (NRRL B-21661), B. subtilis var. amyloliquefaciens FZB23, B. subtilis var. amyloliquefaciens D747, Paenibacillus alvei NAS6G6, Paenibacillus polymyxa PKB1 (ATCC No. 202127), Sphaerodes mycoparasitica IDAC 301008-01 and Trichoderma fertile JM41R, even more preferably from Bacillus amyloliquefaciens AP-136 (NRRL B-50614), B. amyloliquefaciens AP-188 (NRRL B-50615), B. amyloliquefaciens AP-218 (NRRL B-50618), B. amyloliquefaciens AP-219 (NRRL B-50619), B. amyloliquefaciens AP-295 (NRRL B-50620), B. amyloliquefaciens IT-45 (CNCM I-3800, NCBI 1091041), B. mojavensis AP-209 (No. NRRL B-50616), B. pumilus INR-7 (otherwise referred to as BU-F22 (NRRL B-50153) and BU-F33 (NRRL B-50185)), B. pumilus QST 2808 (NRRL B-30087), B. simplex ABU 288 (NRRL B-50340), B. subtilis QST-713 (NRRL B-21661), B. subtilis MBI600 (NRRL B-50595), Paenibacillus alvei NAS6G6, Sphaerodes mycoparasitica IDAC 301008-01 and Trichoderma fertile JM41R.

Preference is also given to mixtures comprise as biopesticide II (component 3) a biopesticide from group L2), preferably selected from chitosan (hydrolysate), methyl-jasmonate, cis-jasmone, laminarin, Reynoutria sachlinensis extract and tea tree oil.

Preference is also given to mixtures comprise as biopesticide II (component 3) a biopesticide from group L3), preferably selected from Bacillus firmus St 1582, Bacillus thuringiensis ssp.

kurstaki SB4, Beauveria bassiana GHA, B. bassiana H123, B. bassiana DSM 12256, B. bassiana PRPI 5339, Metarhizium anisopliae var. acridum IMI 330189, M. anisopliae FI-985, M. anisopliae FI-1045, M. anisopliae F52, M. anisopliae ICIPE 69, Paecilomyces lilacinus DSM 15169, P. lilacinus BCP2, Paenibacillus poppiliae Dutky-1940 (NRRL B-2309 = ATCC 14706), P. poppiliae KLN 3 and P. poppiliae Dutky 1, even more preferably from Bacillus thuringiensis ssp. kurstaki SB4 B. bassiana DSM 12256, B. bassiana PRPI 5339, Metarhizium anisopliae var. acridum IMI 330189, M. anisopliae FI-985, M. anisopliae FI-1045, Paecilomyces lilacinus DSM 15169, P. lilacinus BCP2, Paenibacillus poppiliae Dutky-1940 (NRRL B-2309 = ATCC 14706), P. poppiliae KLN 3 and P. poppiliae Dutky 1.

Preference is also given to mixtures comprise as biopesticide II (component 3) a biopesticide from group L4), preferably selected from methyl jasmonate, Acacia negraq extract, extract of grapefruit seeds and pulp, Catnip oil, Neem oil, Quillay extract and Tagetes oil.

Preference is also given to mixtures comprise as biopesticide II (component 3) a biopesticide from group L5), preferably selected from Azospirillum amazonense BR 11140 (SpY2T), A. brasilense XOH, A. brasilense BR 11005 (Sp245), A. brasilense BR 11002, A. lipoferum BR 11646 (Sp31), A. irakense, A. halopraeferens, Bacillus amyloliquefaciens AP-136 (NRRL B-50614), Bradyrhizobium sp. (Vigna), B. japonicum USDA 3, B. japonicum USDA 31, B. japonicum USDA 76, B. japonicum USDA 110, B. japonicum USDA 121, Glomus intraradices RTI-801, Paenibacillus alvei NAS6G6, Penicillium bilaiae, Rhizobium leguminosarum bv. phaseolii, R. l. trifolii, R. l. bv. viciae, and Sinorhizobium meliloti, more preferably selected from Azospirillum brasilense BR 11005 (Sp245), Bradyrhizobium sp. (Vigna), B. japonicum USDA 3, B. japonicum USDA 31, B. japonicum USDA 76, B. japonicum USDA 110, B. japonicum USDA 121, Rhizobium leguminosarum bv. phaseolii, R. l. trifolii, R. l. bv. viciae, and Sinorhizobium meliloti.

Preference is also given to mixtures comprise as biopesticide II (component 3) a biopesticide from group L6), preferably selected from abscisic acid, aluminium silicate (kaolin), humates, Ascophyllum nodosum (Norwegian kelp, Brown kelp) extract and Ecklonia maxima (kelp) extract.

The inventive mixtures comprising as biopesticide II a microbial pesticide from groups L1), L3) and L5) may be formulated as an inoculant for a plant. The term "inoculant" means a preparation that includes an isolated culture of a microbial pesticide and optionally a carrier, which may include a biologically acceptable medium.

Invertebrate Pests and fungi

The mixtures according to the invention and compositions thereof, respectively, are useful for controlling phytopathogenic fungi (harmful fungi), in particular
those causing the following 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. zeae-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. zeae*) 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. sabinae* (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 root) 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; *Pseudocercosporella 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; *Pseudopezicula 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; *Setospaeria* 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. avaenae*), 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 invention 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 cerevisae*.

The mixtures according to the invention are in particular suitable for efficiently controlling arthropodal pests such as arachnids, myriapedes and insects as well as nematodes. The mixtures according to the invention are especially suitable for efficiently combating the following pests:

insects from the order of the **lepidopterans** (***Lepidoptera***), for example *Acronicta major, Adoxophyes orana, Aedia leucomelas,* Agrotis spp. such as *Agrotis fucosa, Agrotis segetum, Agrotis ypsilon; Alabama argillacea, Anticarsia gemmatalis, Anticarsia spp., Argyresthia conjugella, Autographa gamma, Barathra brassicae, Bucculatrix thurberiella, Bupalus piniarius,*

Cacoecia murinana, Cacoecia podana, Capua reticulana, Carpocapsa pomonella, Cheimatobia brumata, Chilo spp. such as *Chilo suppressalis; Choristoneura fumiferana, Choristoneura occidentalis, Cirphis unipuncta, Clysia ambiguella, Cnaphalocerus spp., Cydia pomonella, Dendrolimus pini, Diaphania nitidalis, Diatraea grandiosella, Earias insulana, Elasmopalpus lignosellus, Ephestia cautella, Ephestia kuehniella, Eupoecilia ambiguella, Euproctis chrysorrhoea, Euxoa spp., Evetria bouliana,* Feltia spp. such as *Feltia subterranean; Galleria mellonella, Grapholitha funebrana, Grapholitha molesta,* Helicoverpa spp. such as *Helicoverpa armigera, Helicoverpa zea;* Heliothis spp. such as *Heliothis armigera, Heliothis virescens, Heliothis zea; Hellula undalis, Hibernia defoliaria, Hofmannophila pseudospretella, Homona magnanima, Hyphantria cunea, Hyponomeuta padella, Hyponomeuta malinellus, Keiferia lycopersicella, Lambdina fiscellaria,* Laphygma spp. such as *Laphygma exigua; Leucoptera coffeella, Leucoptera scitella, Lithocolletis blancardella, Lithophane antennata, Lobesia botrana, Loxagrotis albicosta, Loxostege sticticalis,* Lymantria spp. such as *Lymantria dispar, Lymantria monacha; Lyonetia clerkella, Malacosoma neustria,* Mamestra spp. such as *Mamestra brassicae; Mocis repanda, Mythimna separata, Orgyia pseudotsugata, Oria spp.,* Ostrinia spp. such as *Ostrinia nubilalis; Oulema oryzae, Panolis flammea,* Pectinophora spp. such as *Pectinophora gossypiella; Peridroma saucia, Phalera bucephala,* Phthorimaea spp. such as *Phthorimaea operculella; Phyllocnistis citrella,* Pieris spp. such as *Pieris brassicae, Pieris rapae; Plathypena scabra, Plutella maculipennis, Plutella xylostella, Prodenia spp., Pseudaletia spp., Pseudoplusia includens, Pyrausta nubilalis, Rhyacionia frustrana, Scrobipalpula absoluta, Sitotroga cerealella, Sparganothis pilleriana,* Spodoptera spp. such as *Spodoptera frugiperda, Spodoptera littoralis, Spodoptera litura; Thaumatopoea pityocampa, Thermesia gemmatalis, Tinea pellionella, Tineola bisselliella, Tortrix viridana,* Trichoplusia spp. such as *Trichoplusia ni; Tuta absoluta, and Zeiraphera canadensis,*

beetles (***Coleoptera***), for example *Acanthoscehdes obtectus, Adoretus spp., Agelastica alni, Agrilus sinuatus,* Agriotes spp. such as *Agriotes fuscicollis, Agriotes lineatus, Agriotes obscurus; Amphimallus solstitialis, Anisandrus dispar, Anobium punctatum, Anomala rufocuprea,* Anoplophora spp. such as *Anoplophora glabripennis;* Anthonomus spp. such as *Anthonomus grandis, Anthonomus pomorum; Anthrenus spp., Aphthona euphoridae, Apogonia spp., Athous haemorrhoidalis,* Atomaria spp. such as *Atomaria linearis; Attagenus spp., Aulacophora femoralis, Blastophagus piniperda, Blitophaga undata, Bruchidius obtectus,* Bruchus spp. such as *Bruchus lentis, Bruchus pisorum, Bruchus rufimanus; Byctiscus betulae, Callosobruchus chinensis, Cassida nebulosa, Cerotoma trifurcata, Cetonia aurata,* Ceuthorhynchus spp. such as *Ceuthorrhynchus assimilis, Ceuthorrhynchus napi; Chaetocnema tibialis, Cleonus mendicus,* Conoderus spp. such as *Conoderus vespertinus; Cosmopolites spp., Costelytra zealandica, Crioceris asparagi, Cryptorhynchus lapathi,* Ctenicera ssp. such as *Ctenicera destructor; Curculio spp., Dectes texanus, Dermestes spp.,* Diabrotica spp. such as *Diabrotica 12-punctata Diabrotica speciosa, Diabrotica longicornis, Diabrotica semipunctata, Diabrotica virgifera;* Epilachna spp. such as *Epilachna varivestis, Epilachna vigintioctomaculata;* Epitrix spp. such as *Epitrix hirtipennis; Eutinobothrus brasiliensis, Faustinus cubae, Gibbium psylloides, Heteronychus arator, Hylamorpha elegans, Hylobius abietis, Hylotrupes bajulus, Hypera brunneipennis, Hypera postica, Hypothenemus spp., Ips typographus, Lachnosterna*

consanguinea, Lema bilineata, Lema melanopus, Leptinotarsa spp. such as *Leptinotarsa decemlineata; Limonius californicus, Lissorhoptrus oryzophilus, Lissorhoptrus oryzophilus, Lixus spp.,* Lyctus spp. such as *Lyctus bruneus; Melanotus communis,* Meligethes spp. such as *Meligethes aeneus; Melolontha hippocastani, Melolontha melolontha, Migdolus spp.,* Monochamus spp. such as *Monochamus alternatus; Naupactus xanthographus, Niptus hololeucus, Oryctes rhinoceros, Oryzaephilus surinamensis, Otiorrhynchus sulcatus, Otiorrhynchus ovatus, Otiorrhynchus sulcatus, Oulema oryzae, Oxycetonia jucunda, Phaedon cochleariae, Phyllobius pyri, Phyllopertha horticola, Phyllophaga spp.,* Phyllotreta spp. such as *Phyllotreta chrysocephala, Phyllotreta nemorum, Phyllotreta striolata; Phyllophaga spp., Phyllopertha horticola, Popillia japonica, Premnotrypes spp., Psylliodes chrysocephala, Ptinus spp., Rhizobius ventralis , Rhizopertha dominica, Sitona lineatus,* Sitophilus spp. such as *Sitophilus granaria, Sitophilus zeamais;* Sphenophorus spp. such as *Sphenophorus levis;* Sternechus spp. such as *Sternechus subsignatus; Symphyletes spp., Tenebrio molitor,* Tribolium spp. such as *Tribolium castaneum; Trogoderma spp., Tychius spp., Xylotrechus spp., and Zabrus spp. such as Zabrus tenebrioides,*

flies, mosquitoes (***Diptera***), e.g. Aedes spp. such as *Aedes aegypti, Aedes albopictus, Aedes vexans; Anastrepha ludens,* Anopheles spp. such as *Anopheles albimanus, Anopheles crucians, Anopheles freeborni, Anopheles gambiae, Anopheles leucosphyrus, Anopheles maculipennis, Anopheles minimus, Anopheles quadrimaculatus, Anopheles sinensis; Bibio hortulanus, Calliphora erythrocephala, Calliphora vicina, Cerafitis capitata, Ceratitis capitata,* Chrysomyia spp. such as *Chrysomya bezziana, Chrysomya hominivorax, Chrysomya macellaria; Chrysops atlanticus, Chrysops discalis, Chrysops silacea,* Cochliomyia spp. such as *Cochliomyia hominivorax;* Contarinia spp. such as *Contarinia sorghicola; Cordylobia anthropophaga,* Culex spp. such as *Culex nigripalpus, Culex pipiens, Culex quinquefasciatus, Culex tarsalis, Culex tritaeniorhynchus; Culicoides furens, Culiseta inornata, Culiseta melanura, Cuterebra spp., Dacus cucurbitae, Dacus oleae, Dasineura brassicae,* Delia spp. such as *Delia antique, Delia coarctata, Delia platura, Delia radicum; Dermatobia hominis, Drosophila spp.,* Fannia spp. such as *Fannia canicularis;* Gastraphilus spp. such as *Gasterophilus intestinalis; Geomyza Tripunctata, Glossina fuscipes, Glossina morsitans, Glossina palpalis, Glossina tachinoides, Haematobia irritans, Haplodiplosis equestris, Hippelates spp.,* Hylemyia spp. such as *Hylemyia platura;* Hypoderma spp. such as *Hypoderma lineata; Hyppobosca spp., Leptoconops torrens,* Liriomyza spp. such as *Liriomyza sativae, Liriomyza trifolii;* Lucilia spp. such as *Lucilia caprina, Lucilia cuprina, Lucilia sericata; Lycoria pectoralis, Mansonia titillanus,* Mayetiola spp. such as *Mayetiola destructor;* Musca spp. such as *Musca autumnalis, Musca domestica; Muscina stabulans,* Oestrus spp. such as *Oestrus ovis; Opomyza florum,* Oscinella spp. such as *Oscinella frit; Pegomya hysocyami, Phlebotomus argentipes,* Phorbia spp. such as *Phorbia antiqua, Phorbia brassicae, Phorbia coarctata; Prosimulium mixtum, Psila rosae, Psorophora columbiae, Psorophora discolor, Rhagoletis cerasi, Rhagoletis pomonella,* Sarcophaga spp. such as *Sarcophaga haemorrhoidalis; Simulium vittatum,* Stomoxys spp. such as *Stomoxys calcitrans;* Tabanus spp. such as *Tabanus atratus, Tabanus bovinus, Tabanus lineola, Tabanus similis; Tannia spp., Tipula oleracea, Tipula paludosa, and Wohlfahrtia spp.,*

thrips (***Thysanoptera***), e.g. *Baliothrips biformis, Dichromothrips corbetti, Dichromothrips ssp., Enneothrips flavens,* Frankliniella spp. such as *Frankliniella fusca, Frankliniella occidentalis, Frankliniella tritici; Heliothrips spp., Hercinothrips femoralis, Kakothrips spp., Rhipiphorothrips cruentatus,* Scirtothrips spp. such as *Scirtothrips citri; Taeniothrips cardamoni,* Thrips spp. such as *Thrips oryzae, Thrips palmi, Thrips tabaci;*

termites (**Isoptera**), e.g. *Calotermes flavicollis, Coptotermes formosanus, Heterotermes aureus, Heterotermes longiceps, Heterotermes tenuis, Leucotermes flavipes, Odontotermes spp.,* Reticulitermes spp. such as *Reticulitermes speratus, Reticulitermes flavipes, Reticulitermes grassei, Reticulitermes lucifugus, Reticulitermes santonensis, Reticulitermes virginicus; Termes natalensis,*

cockroaches (**Blattaria - Blattodea**), e.g. *Acheta domesticus, Blatta orientalis, Blattella asahinae, Blattella germanica, Gryllotalpa spp., Leucophaea maderae, Locusta spp., Melanoplus spp., Periplaneta americana, Periplaneta australasiae, Periplaneta brunnea, Periplaneta fuligginosa, Periplaneta japonica,*

bugs, aphids, leafhoppers, whiteflies, scale insects, cicadas (***Hemiptera***), e.g. Acrosternum spp. such as *Acrosternum hilare;* Acyrthosipon spp. such as *Acyrthosiphon onobrychis, Acyrthosiphon pisum; Adelges laricis, Aeneolamia spp., Agonoscena spp., Aleurodes spp., Aleurolobus barodensis, Aleurothrixus spp., Amrasca spp., Anasa tristis, Antestiopsis spp., Anuraphis cardui, Aonidiella spp., Aphanostigma piri, Aphidula nasturtii,* Aphis spp. such as *Aphis fabae, Aphis forbesi, Aphis gossypii, Aphis grossulariae, Aphis pomi, Aphis sambuci, Aphis schneideri, Aphis spiraecola; Arboridia apicalis, Arilus critatus, Aspidiella spp., Aspidiotus spp., Atanus spp., Aulacorthum solani,* Bemisia spp. such as *Bemisia argentifolii, Bemisia tabaci;* Blissus spp. such as *Blissus leucopterus; Brachycaudus cardui, Brachycaudus helichrysi, Brachycaudus persicae, Brachycaudus prunicola, Brachycolus spp., Brevicoryne brassicae, Calligypona marginata, Calocoris spp., Campylomma livida, Capitophorus horni, Carneocephala fulgida, Cavelerius spp., Ceraplastes spp., Ceratovacuna lanigera, Cercopidae, Cerosipha gossypii, Chaetosiphon fragaefolii, Chionaspis tegalensis, Chlorita onukii, Chromaphis juglandicola, Chrysomphalus ficus, Cicadulina mbila,* Cimex spp. such as *Cimex hemipterus, Cimex lectularius; Coccomytilus halli, Coccus spp., Creontiades dilutus, Cryptomyzus ribis, Cryptomyzus ribis, Cyrtopeltis notatus, Dalbulus spp., Dasynus piperis, Dialeurades spp., Diaphorina spp., Diaspis spp., Dichelops furcatus, Diconocoris hewetti, Doralis spp., Dreyfusia nordmannianae, Dreyfusia piceae, Drosicha spp.,* Dysaphis spp. such as *Dysaphis plantaginea, Dysaphis pyri, Dysaphis radicola; Dysaulacorthum pseudosolani,* Dysdercus spp. such as *Dysdercus cingulatus, Dysdercus intermedius; Dysmicoccus spp.,* Empoasca spp. such as *Empoasca fabae, Empoasca solana; Eriosoma spp., Erythroneura spp.,* Eurygaster spp. such as *Eurygaster integriceps; Euscelis bilobatus, Euschistus spp. such as Euschistuos heros, Euschistus impictiventris, Euschistus servus; Geococcus coffeae,* Halyomorpha spp. such as *Halyomorpha halys; Heliopeltis spp., Homalodisca coagulata, Horcias nobilellus, Hyalopterus pruni, Hyperomyzus lactucae, Icerya spp., Idiocerus spp., Idioscopus spp., Laodelphax striatellus, Lecanium spp., Lepidosaphes spp., Leptocorisa spp.,*

Leptoglossus phyllopus, Lipaphis erysimi, Lygus spp. such as *Lygus hesperus, Lygus lineolaris, Lygus pratensis; Macropes excavatus,* Macrosiphum spp. such as *Macrosiphum rosae, Macrosiphum avenae, Macrosiphum euphorbiae; Mahanarva fimbriolata, Megacopta cribraria, Megoura viciae, Melanaphis pyrarius, Melanaphis sacchari, Metcafiella spp., Metopolophium dirhodum, Miridae spp., Monellia costalis, Monelliopsis pecanis,* Myzus spp. such as *Myzus ascalonicus, Myzus cerasi, Myzus persicae, Myzus varians; Nasonovia ribis-nigri,* Nephotettix spp. such as *Nephotettix malayanus, Nephotettix nigropictus, Nephotettix parvus, Nephotettix virescens;* Nezara spp. such as *Nezara viridula; Nilaparvata lugens, Oebalus spp., Oncometopia spp., Orthezia praelonga, Parabemisia myricae, Paratrioza spp., Parlatoria spp.,* Pemphigus spp. such as *Pemphigus bursarius; Pentomidae, Peregrinus maidis, Perkinsiella saccharicida, Phenacoccus spp., Phloeomyzus passerinii, Phorodon humuli, Phylloxera spp., Piesma quadrata,* Piezodorus spp. such as *Piezodorus guildinii, Pinnaspis aspidistrae, Planococcus spp., Protopulvinaria pyriformis, Psallus seriatus, Pseudacysta persea, Pseudaulacaspis pentagona,* Pseudococcus spp. such as *Pseudococcus comstocki;* Psylla spp. such as *Psylla mali, Psylla piri; Pteromalus spp., Pyrilla spp., Quadraspidiotus spp., Quesada gigas, Rastrococcus spp., Reduvius senilis, Rhodnius spp., Rhopalomyzus ascalonicus,* Rhopalosiphum spp. such as *Rhopalosiphum pseudobrassicas, Rhopalosiphum insertum, Rhopalosiphum maidis, Rhopalosiphum padi; Sagatodes spp., Sahlbergella singularis, Saissetia spp., Sappaphis mala, Sappaphis mali, Scaphoides titanus, Schizaphis graminum, Schizoneura lanuginosa, Scotinophora spp., Selenaspidus articulatus, Sitobion avenae, Sogata spp., Sogatella furcifera, Solubea insularis , Stephanitis nashi, Stictocephala festina, Tenalaphara malayensis,* Thyanta spp. such as *Thyanta perditor; Tibraca spp., Tinocallis caryaefoliae, Tomaspis spp.,* Toxoptera spp. such as *Toxoptera aurantii;* Trialeurodes spp. such as *Trialeurodes vaporariorum; Triatoma spp., Trioza spp., Typhlocyba spp.,* Unaspis spp. such as *Unaspis yanonensis; and Viteus vitifolii,*

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

crickets, grasshoppers, locusts (**Orthoptera**), e.g. *Acheta domestica, Calliptamus italicus, Chortoicetes terminifera, Dociostaurus maroccanus, Gryllotalpa africana, Gryllotalpa gryllotalpa, Hieroglyphus daganensis, Kraussaria angulifera, Locusta migratoria, Locustana pardalina, Melanoplus bivittatus, Melanoplus femurrubrum, Melanoplus mexicanus, Melanoplus sanguinipes, Melanoplus spretus, Nomadacris septemfasciata, Oedaleus senegalensis, Schistocerca americana, Schistocerca gregaria, Tachycines asynamorus, and Zonozerus variegatus,*

arachnids (***Arachnida***), such as acari,e.g. of the families Argasidae, Ixodidae and Sarcoptidae, such as Amblyomma spp. (e.g. *Amblyomma americanum, Amblyomma variegatum, Amblyomma maculatum*), Argas spp. (e.g. *Argas persicus*), Boophilus spp. (e.g. *Boophilus annulatus, Boophilus decoloratus, Boophilus microplus*), *Dermacentor silvarum, Dermacentor andersoni, Dermacentor variabilis,* Hyalomma spp. (e.g. *Hyalomma truncatum*), Ixodes spp. (e.g. *Ixodes ricinus, Ixodes rubicundus, Ixodes scapularis, Ixodes holocyclus, Ixodes pacificus*), Ornithodorus spp. (e.g. *Ornithodorus moubata, Ornithodorus hermsi, Ornithodorus turicata*), *Ornithonyssus bacoti, Otobius megnini, Dermanyssus gallinae,* Psoroptes spp. (e.g. *Psoroptes ovis*), Rhipicephalus spp. (e.g. *Rhipicephalus sanguineus, Rhipicephalus appendiculatus, Rhipicephalus evertsi), Rhizoglyphus spp.,* Sarcoptes spp. (e.g. *Sarcoptes scabiei*), and **Eriophyidae** spp. such as *Acaria sheldoni*, Aculops spp. (e.g. *Aculops pelekassi*) Aculus spp. (e.g. *Aculus schlechtendali*), *Epitrimerus pyri, Phyllocoptruta oleivora* and Eriophyes spp. (e.g. *Eriophyes sheldoni*); Tarsonemidae spp. such as *Hemitarsonemus spp.*, *Phytonemus pallidus and Polyphagotarsonemus latus, Stenotarsonemus spp.*; Tenuipalpidae spp. such as Brevipalpus spp. (e.g. *Brevipalpus phoenicis*); Tetranychidae spp. such as *Eotetranychus spp.*, *Eutetranychus spp.*, *Oligonychus spp., Tetranychus cinnabarinus, Tetranychus kanzawai, Tetranychus pacificus, Tetranychus telarius* and *Tetranychus* urticae; *Bryobia praetiosa*, Panonychus spp. (e.g. *Panonychus ulmi*, *Panonychus citri*), *Metatetranychus spp.* and Oligonychus spp. (e.g. *Oligonychus pratensis*), *Vasates lycopersici*; Araneida, e.g. *Latrodectus mactans*, and *Loxosceles reclusa*. And *Acarus siro, Chorioptes spp.*, *Scorpio maurus*

fleas (***Siphonaptera***), e.g. *Ceratophyllus spp., 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. *Geophilus spp.,* Scutigera spp. such as *Scutigera coleoptrata*;

millipedes (***Diplopoda***), e.g. *Blaniulus guttulatus*, *Narceus spp.*,

Earwigs (***Dermaptera***), e.g. *forficula auricularia*,

lice (***Phthiraptera***), e.g. *Damalinia spp.*, Pediculus spp. such as *Pediculus humanus capitis, Pediculus humanus corporis; Pthirus pubis*, Haematopinus spp. such as *Haematopinus eurysternus*, *Haematopinus suis*; Linognathus spp. such as *Linognathus vituli; Bovicola bovis, Menopon gallinae, Menacanthus stramineus* and *Solenopotes capillatus, Trichodectes spp.,*

springtails (*Collembola*), *e.g.* Onychiurus ssp. such as *Onychiurus armatus,*

They are also suitable for controlling **nematodes**: plant parasitic nematodes such as root knot nematodes, *Meloidogyne hapla, Meloidogyne incognita, Meloidogyne javanica*, and other Meloidogyne species; cyst-forming nematodes, *Globodera rostochiensis* and other Globodera species; *Heterodera avenae, Heterodera glycines, Heterodera schachtii, Heterodera trifolii*, and

other Heterodera species; Seed gall nematodes, Anguina species; Stem and foliar nematodes, Aphelenchoides species such as *Aphelenchoides besseyi* ; Sting nematodes, *Belonolaimus longicaudatus* and other Belonolaimus species; Pine nematodes, *Bursaphelenchus lignicolus Mamiya et Kiyohara, Bursaphelenchus xylophilus* and other Bursaphelenchus species; Ring nematodes, Criconema species, Criconemella species, Criconemoides species, Mesocriconema species; Stem and bulb nematodes, *Ditylenchus destructor, Ditylenchus dipsaci* and other Ditylenchus species; Awl nematodes, Dolichodorus species; Spiral nematodes, *Heliocotylenchus multicinctus* and other Helicotylenchus species; Sheath and sheathoid nematodes, Hemicycliophora species and Hemicriconemoides species; Hirshmanniella species; Lance nematodes, Hoploaimus species; false rootknot nematodes, Nacobbus species; Needle nematodes, *Longidorus elongatus* and other Longidorus species; Lesion nematodes, *Pratylenchus brachyurus, Pratylenchus neglectus, Pratylenchus penetrans, Pratylenchus curvitatus, Pratylenchus goodeyi* and other Pratylenchus species; Burrowing nematodes, *Radopholus similis* and other Radopholus species; Reniform nematodes, *Rotylenchus robustus, Rotylenchus reniformis* and other Rotylenchus species; Scutellonema species; Stubby root nematodes, *Trichodorus primitivus* and other Trichodorus species, Paratrichodorus species; Stunt nematodes, *Tylenchorhynchus claytoni*, *Tylenchorhynchus dubius* and other Tylenchorhynchus species; Citrus nematodes, Tylenchulus species such as T*ylenchulus semipenetrans*; Dagger nematodes, Xiphinema species; and other plant parasitic nematode species.

Examples of further pest species which may be controlled by compounds of fomula (I) include: from the class of the *Bivalva*, for example, *Dreissena spp.*; from the class of the *Gastropoda,* for example, *Arion spp., Biomphalaria spp., Bulinus spp., Deroceras spp., Galba spp., Lymnaea spp., Oncomelania spp., Succinea spp.;* from the class of the *helminths,* for example, *Ancylostoma duodenale, Ancylostoma ceylanicum, Acylostoma braziliensis, Ancylostoma spp., Ascaris lubricoides, Ascaris spp., Brugia malayi, Brugia timori, Bunostomum spp., Chabertia spp., Clonorchis spp., Cooperia spp., Dicrocoelium spp., Dictyocaulus filaria, Diphyllobothrium latum, Dracunculus medinensis, Echinococcus granulosus, Echinococcus multilocularis, Enterobius vermicularis, Faciola spp.,* Haemonchus spp. such as *Haemonchus contortus; Heterakis spp., Hymenolepis nana, Hyostrongulus spp., Loa Loa, Nematodirus spp., Oesophagostomum spp., Opisthorchis spp., Onchocerca volvulus, Ostertagia spp., Paragonimus spp., Schistosomen spp., Strongyloides fuelleborni, Strongyloides stercora lis, Stronyloides spp., Taenia saginata, Taenia solium, Trichinella spiralis, Trichinella nativa, Trichinella britovi, Trichinella nelsoni, Trichinella pseudopsiralis, Trichostrongulus spp., Trichuris trichuria, Wuchereria bancrofti;* from the order of the *Isopoda,* for example, *Armadillidium vulgare, Oniscus asellus, Porcellio scaber;* from the order of the *Symphyla,* for example, *Scutigerella immaculata.*

Further examples of pest species which may be controlled by compounds of formula (I) include: *Anisoplia austriaca, Apamea spp., Austroasca viridigrisea, Baliothrips biformis, Caenorhabditis elegans, Cephus spp., Ceutorhynchus napi, Chaetocnema aridula, Chilo auricilius, Chilo indicus , Chilo polychrysus, Chortiocetes terminifera, Cnaphalocroci medinalis, Cnaphalocrosis spp.,*

Colias eurytheme, Collops spp., Cornitermes cumulans, Creontiades spp., Cyclocephala spp., Dalbulus maidis, Deraceras reticulatum , Diatrea saccharalis, Dichelops furcatus, Dicladispa armigera , Diloboderus spp. such as *Diloboderus abderus; Edessa spp., Epinotia spp., Formicidae, Geocoris spp., Globitermes sulfureus, Gryllotalpidae, Halotydeus destructor, Hipnodes bicolor, Hydrellia philippina, Julus spp., Laodelphax spp., Leptocorsia acuta , Leptocorsia oratorius , Liogenys fuscus, Lucillia spp., Lyogenys fuscus, Mahanarva spp., Maladera matrida, Marasmia spp., Mastotermes spp., Mealybugs, Megascelis ssp, Metamasius hemipterus, Microtheca spp., Mocis latipes, Murgantia spp., Mythemina separata , Neocapritermes opacus, Neocapritermes parvus, Neomegalotomus spp., Neotermes spp., Nymphula depunctalis, Oebalus pugnax,* Orseolia spp. such as *Orseolia oryzae; Oxycaraenus hyalinipennis, Plusia spp., Pomacea canaliculata, Procornitermes ssp, Procornitermes triacifer , Psylloides spp., Rachiplusia spp., Rhodopholus spp., Scaptocoris castanea, Scaptocoris spp.,* Scirpophaga spp. such as *Scirpophaga incertulas , Scirpophaga innotata;* Scotinophara spp. such as *Scotinophara coarctata;* Sesamia spp. such as *Sesamia inferens, Sogaella frucifera, Solenapsis geminata, Spissistilus spp., Stalk borer, Stenchaetothrips biformis, Steneotarsonemus spinki, Sylepta derogata, Telehin licus, Trichostrongylus spp..*

Mixtures of the present invention are particularly useful for controlling insects, preferably sucking or piercing insects such as insects from the genera Thysanoptera, Diptera and Hemiptera, and chewing-biting pests such as insects from the genera of Lepidoptera and Coleoptera, in particular the following species:
Thysanoptera : *Frankliniella fusca, Frankliniella occidentalis, Frankliniella tritici, Scirtothrips citri, Thrips oryzae, Thrips palmi* and *Thrips tabaci*,

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, 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, 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 autumnalis, 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 spp., Simulium vittatum, Stomoxys calcitrans, Tabanus bovinus, Tabanus atratus, Tabanus lineola,* and *Tabanus similis, Tipula oleracea*, and *Tipula paludosa;*

Hemiptera, in particular aphids: *Acyrthosiphon onobrychis, Adelges laricis, Aphidula nasturtii, Aphis fabae, Aphis forbesi, Aphis pomi, Aphis gossypii, Aphis grossulariae, Aphis schneideri, Aphis spiraecola, Aphis sambuci, Acyrthosiphon pisum, Aulacorthum solani, Brachycaudus cardui, Brachycaudus helichrysi, Brachycaudus persicae, Brachycaudus prunicola, Brevicoryne brassicae, Capitophorus horni, Cerosipha gossypii, Chaetosiphon fragaefolii, Cryptomyzus ribis, Dreyfusia nordmannianae, Dreyfusia piceae, Dysaphis radicola, Dysaulacorthum pseudosolani, Dysaphis plantaginea, Dysaphis pyri, Empoasca fabae, Hyalopterus pruni, Hyperomyzus lactucae, Macrosiphum avenae, Macrosiphum euphorbiae, Macrosiphon rosae, Megoura viciae, Melanaphis pyrarius, Metopolophium dirhodum, Myzodes 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,* and *Viteus vitifolii.*

Lepidoptera, in particular: *Agrotis ypsilon, Agrotis segetum, Alabama argillacea, Anticarsia gemmatalis, Argyresthia conjugella, Autographa gamma, Bupalus piniarius, Cacoecia murinana, Capua reticulana, Cheimatobia brumata, Choristoneura 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 pilleriana, Spodoptera frugiperda, Spodoptera littoralis, Spodoptera litura, Thaumatopoea pityocampa, Tuta absoluta, Tortrix viridana, Trichoplusia ni* and *Zeiraphera canadensis*.

Mixtures of the present invention are particularly useful for controlling insects from the order of Coleoptera, in particular *Agrilus sinuatus, Agriotes lineatus, Agriotes obscurus, Amphimallus solstitialis, Anisandrus dispar, Anoplophora glabripennis, 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, 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, Otiorrhynchus sulcatus, Otiorrhynchus ovatus, Phaedon cochleariae, Phyllobius pyri, Phyllotreta chrysocephala, Phyllophaga sp., Phyllopertha horticola, Phyllotreta nemorum, Phyllotreta striolata, Popillia japonica, Sitona lineatus and *Sitophilus granaria*.

Mixtures of the present invention are particularly useful for controlling insects of the orders Lepidoptera, Coleoptera, Hemiptera and Thysanoptera.

The mixtures of the present invention are especially suitable for efficiently combating pests like insects from the order of the lepidopterans (Lepidoptera), beetles (Coleoptera), flies and mosquitoes (Diptera), thrips (Thysanoptera), termites (Isoptera), bugs, aphids, leafhoppers, whiteflies, scale insects, cicadas (Hemiptera), ants, bees, wasps, sawflies (Hymenoptera), crickets, grasshoppers, locusts (Orthoptera), and also Arachnoidea, such as arachnids (Acarina).

In a preferred embodiment, the mixtures according to the invention, especially the mixtures as individualized herein, especially the mixtures according to table M as shown above, have the following application types:

Table AP-T:

(Abbreviations: SPC = specialty crops; SPC-FV = fruiting vegetable; SPC-LV = leafy vegetable; SPC-T: tubers; ST = seed treatment)

Appl. type	**Crop**	**Pest**
AP-T-1	Soybeans	Spodoptera littoralis
AP-T-2	Soybeans	Anticarsia gemmatalis
AP-T-3	Soybeans	Spodoptera exigua
AP-T-4	Soybeans	Stinkbug
AP-T-5	Soybeans	Helicoverpa sp.
AP-T-6	Soybeans	Spodoptera eridania
AP-T-7	Corn	Spodoptera Frugiperta
AP-T-8	Corn	Spodoptera exigua
AP-T-9	Rice	Sesamia inferens
AP-T-10	Rice	Cnaphalocerus medinalis
AP-T-11	Rice	Chilo suppressalis
AP-T-12	Rice	Leptocorisa oratorius
AP-T-13	Rice	Brown plant hopper
AP-T-14	Cotton	Spodoptera littoralis
AP-T-15	Cotton	Thrips spp.
AP-T-16	Cotton	Spodoptera eridania
AP-T-17	Cotton	Helicoverpa sp.
AP-T-18	Canola	Pollen beetle
AP-T-19	SPC	Tuta Absoluta
AP-T-20	SPC	Fruit Borer
AP-T-21	SPC	Spodoptera littoralis
AP-T-22	SPC	Plusia gamma
AP-T-23	SPC	Plutella xylostella

AP-T-24	SPC	Frankliniella occidentalis
AP-T-25	SPC	Trichoplusia ni
AP-T-26	SPC	Pieris rapae
AP-T-27	SPC	Spodoptera sp.
AP-T-28	SPC	Crocidolomia pavonana
AP-T-29	SPC	Pyrausta furnacalis
AP-T-30	SPC	Liromyza trifolii
AP-T-31	SPC	Cydia pomonella
AP-T-32	SPC	Epitrix sp.
AP-T-33	SPC	Leptinotarsa decemlineata
AP-T-34	SPC	Bemisia tabaci
AP-T-35	SPC	Thrips tabaci
AP-T-36	SPC	Spodoptera eridania
AP-T-37	SPC	Lobesia botrana
AP-T-38	SPC	Altica chapybea
AP-T-39	SPC	Phyllocnistis citrella
AP-T-40	SPC-FV	Tuta Absoluta
AP-T-41	SPC-FV	Fruit Borer
AP-T-42	SPC-FV	Spodoptera littoralis
AP-T-43	SPC-FV	Plusia gamma
AP-T-44	SPC-FV	Plutella xylostella
AP-T-45	SPC-FV	Frankliniella occidentalis
AP-T-46	SPC-FV	Trichoplusia ni
AP-T-47	SPC-FV	Pieris rapae
AP-T-48	SPC-FV	Spodoptera sp.
AP-T-49	SPC-FV	Crocidolomia pavonana
AP-T-50	SPC-FV	Pyrausta furnacalis
AP-T-51	SPC-FV	Liromyza trifolii
AP-T-52	SPC-FV	Cydia pomonella
AP-T-53	SPC-FV	Epitrix sp.
AP-T-54	SPC-FV	Leptinotarsa decemlineata
AP-T-55	SPC-FV	Bemisia tabaci
AP-T-56	SPC-FV	Thrips tabaci
AP-T-57	SPC-FV	Spodoptera eridania
AP-T-58	SPC-FV	Lobesia botrana
AP-T-59	SPC-FV	Altica chapybea
AP-T-60	SPC-FV	Phyllocnistis citrella
AP-T-61	Tomato	Tuta Absoluta
AP-T-62	Tomato	Fruit Borer
AP-T-63	Tomato	Spodoptera littoralis
AP-T-64	Tomato	Plusia gamma
AP-T-65	Tomato	Plutella xylostella
AP-T-66	Tomato	Frankliniella occidentalis
AP-T-67	Tomato	Trichoplusia ni
AP-T-68	Tomato	Pieris rapae
AP-T-69	Tomato	Spodoptera sp.
AP-T-70	Tomato	Crocidolomia pavonana
AP-T-71	Tomato	Pyrausta furnacalis
AP-T-72	Tomato	Liromyza trifolii
AP-T-73	Tomato	Cydia pomonella
AP-T-74	Tomato	Epitrix sp.
AP-T-75	Tomato	Leptinotarsa decemlineata
AP-T-76	Tomato	Bemisia tabaci
AP-T-77	Tomato	Thrips tabaci
AP-T-78	Tomato	Spodoptera eridania
AP-T-79	Tomato	Lobesia botrana
AP-T-80	Tomato	Altica chapybea
AP-T-81	Tomato	Phyllocnistis citrella
AP-T-82	Pepper	Tuta Absoluta
AP-T-83	Pepper	Fruit Borer
AP-T-84	Pepper	Spodoptera littoralis
AP-T-85	Pepper	Plusia gamma
AP-T-86	Pepper	Plutella xylostella

AP-T-87	Pepper	Frankliniella occidentalis
AP-T-88	Pepper	Trichoplusia ni
AP-T-89	Pepper	Pieris rapae
AP-T-90	Pepper	Spodoptera sp.
AP-T-91	Pepper	Crocidolomia pavonana
AP-T-92	Pepper	Pyrausta furnacalis
AP-T-93	Pepper	Liromyza trifolii
AP-T-94	Pepper	Cydia pomonella
AP-T-95	Pepper	Epitrix sp.
AP-T-96	Pepper	Leptinotarsa decemlineata
AP-T-97	Pepper	Bemisia tabaci
AP-T-98	Pepper	Thrips tabaci
AP-T-99	Pepper	Spodoptera eridania
AP-T-100	Pepper	Lobesia botrana
AP-T-101	Pepper	Altica chapybea
AP-T-102	Pepper	Phyllocnistis citrella
AP-T-103	Eggplant	Tuta Absoluta
AP-T-104	Eggplant	Fruit Borer
AP-T-105	Eggplant	Spodoptera littoralis
AP-T-106	Eggplant	Plusia gamma
AP-T-107	Eggplant	Plutella xylostella
AP-T-108	Eggplant	Frankliniella occidentalis
AP-T-109	Eggplant	Trichoplusia ni
AP-T-110	Eggplant	Pieris rapae
AP-T-111	Eggplant	Spodoptera sp.
AP-T-112	Eggplant	Crocidolomia pavonana
AP-T-113	Eggplant	Pyrausta furnacalis
AP-T-114	Eggplant	Liromyza trifolii
AP-T-115	Eggplant	Cydia pomonella
AP-T-116	Eggplant	Epitrix sp.
AP-T-117	Eggplant	Leptinotarsa decemlineata
AP-T-118	Eggplant	Bemisia tabaci
AP-T-119	Eggplant	Thrips tabaci
AP-T-120	Eggplant	Spodoptera eridania
AP-T-121	Eggplant	Lobesia botrana
AP-T-122	Eggplant	Altica chapybea
AP-T-123	Eggplant	Phyllocnistis citrella
AP-T-124	SPC-LV	Tuta Absoluta
AP-T-125	SPC-LV	Fruit Borer
AP-T-126	SPC-LV	Spodoptera littoralis
AP-T-127	SPC-LV	Plusia gamma
AP-T-128	SPC-LV	Plutella xylostella
AP-T-129	SPC-LV	Frankliniella occidentalis
AP-T-130	SPC-LV	Trichoplusia ni
AP-T-131	SPC-LV	Pieris rapae
AP-T-132	SPC-LV	Spodoptera sp.
AP-T-133	SPC-LV	Crocidolomia pavonana
AP-T-134	SPC-LV	Pyrausta furnacalis
AP-T-135	SPC-LV	Liromyza trifolii
AP-T-136	SPC-LV	Cydia pomonella
AP-T-137	SPC-LV	Epitrix sp.
AP-T-138	SPC-LV	Leptinotarsa decemlineata
AP-T-139	SPC-LV	Bemisia tabaci
AP-T-140	SPC-LV	Thrips tabaci
AP-T-141	SPC-LV	Spodoptera eridania
AP-T-142	SPC-LV	Lobesia botrana
AP-T-143	SPC-LV	Altica chapybea
AP-T-144	SPC-LV	Phyllocnistis citrella
AP-T-145	Cabbage	Tuta Absoluta
AP-T-146	Cabbage	Fruit Borer
AP-T-147	Cabbage	Spodoptera littoralis
AP-T-148	Cabbage	Plusia gamma
AP-T-149	Cabbage	Plutella xylostella

AP-T-150	Cabbage	Frankliniella occidentalis
AP-T-151	Cabbage	Trichoplusia ni
AP-T-152	Cabbage	Pieris rapae
AP-T-153	Cabbage	Spodoptera sp.
AP-T-154	Cabbage	Crocidolomia pavonana
AP-T-155	Cabbage	Pyrausta furnacalis
AP-T-156	Cabbage	Liromyza trifolii
AP-T-157	Cabbage	Cydia pomonella
AP-T-158	Cabbage	Epitrix sp.
AP-T-159	Cabbage	Leptinotarsa decemlineata
AP-T-160	Cabbage	Bemisia tabaci
AP-T-161	Cabbage	Thrips tabaci
AP-T-162	Cabbage	Spodoptera eridania
AP-T-163	Cabbage	Lobesia botrana
AP-T-164	Cabbage	Altica chapybea
AP-T-165	Cabbage	Phyllocnistis citrella
AP-T-166	Lettuce	Tuta Absoluta
AP-T-167	Lettuce	Fruit Borer
AP-T-168	Lettuce	Spodoptera littoralis
AP-T-169	Lettuce	Plusia gamma
AP-T-170	Lettuce	Plutella xylostella
AP-T-171	Lettuce	Frankliniella occidentalis
AP-T-172	Lettuce	Trichoplusia ni
AP-T-173	Lettuce	Pieris rapae
AP-T-174	Lettuce	Spodoptera sp.
AP-T-175	Lettuce	Crocidolomia pavonana
AP-T-176	Lettuce	Pyrausta furnacalis
AP-T-177	Lettuce	Liromyza trifolii
AP-T-178	Lettuce	Cydia pomonella
AP-T-179	Lettuce	Epitrix sp.
AP-T-180	Lettuce	Leptinotarsa decemlineata
AP-T-181	Lettuce	Bemisia tabaci
AP-T-182	Lettuce	Thrips tabaci
AP-T-183	Lettuce	Spodoptera eridania
AP-T-184	Lettuce	Lobesia botrana
AP-T-185	Lettuce	Altica chapybea
AP-T-186	Lettuce	Phyllocnistis citrella
AP-T-187	SPC-T	Tuta Absoluta
AP-T-188	SPC-T	Fruit Borer
AP-T-189	SPC-T	Spodoptera littoralis
AP-T-190	SPC-T	Plusia gamma
AP-T-191	SPC-T	Plutella xylostella
AP-T-192	SPC-T	Frankliniella occidentalis
AP-T-193	SPC-T	Trichoplusia ni
AP-T-194	SPC-T	Pieris rapae
AP-T-195	SPC-T	Spodoptera sp.
AP-T-196	SPC-T	Crocidolomia pavonana
AP-T-197	SPC-T	Pyrausta furnacalis
AP-T-198	SPC-T	Liromyza trifolii
AP-T-199	SPC-T	Cydia pomonella
AP-T-200	SPC-T	Epitrix sp.
AP-T-201	SPC-T	Leptinotarsa decemlineata
AP-T-202	SPC-T	Bemisia tabaci
AP-T-203	SPC-T	Thrips tabaci
AP-T-204	SPC-T	Spodoptera eridania
AP-T-205	SPC-T	Lobesia botrana
AP-T-206	SPC-T	Altica chapybea
AP-T-207	SPC-T	Phyllocnistis citrella
AP-T-208	Potatoes	Tuta Absoluta
AP-T-209	Potatoes	Fruit Borer
AP-T-210	Potatoes	Spodoptera littoralis
AP-T-211	Potatoes	Plusia gamma
AP-T-212	Potatoes	Plutella xylostella

AP-T-213	Potatoes	Frankliniella occidentalis
AP-T-214	Potatoes	Trichoplusia ni
AP-T-215	Potatoes	Pieris rapae
AP-T-216	Potatoes	Spodoptera sp.
AP-T-217	Potatoes	Crocidolomia pavonana
AP-T-218	Potatoes	Pyrausta furnacalis
AP-T-219	Potatoes	Liromyza trifolii
AP-T-220	Potatoes	Cydia pomonella
AP-T-221	Potatoes	Epitrix sp.
AP-T-222	Potatoes	Leptinotarsa decemlineata
AP-T-223	Potatoes	Bemisia tabaci
AP-T-224	Potatoes	Thrips tabaci
AP-T-225	Potatoes	Spodoptera eridania
AP-T-226	Potatoes	Lobesia botrana
AP-T-227	Potatoes	Altica chapybea
AP-T-228	Potatoes	Phyllocnistis citrella
AP-T-229	Potatoes	wireworm
AP-T-230	Onions	Tuta Absoluta
AP-T-231	Onions	Fruit Borer
AP-T-232	Onions	Spodoptera littoralis
AP-T-233	Onions	Plusia gamma
AP-T-234	Onions	Plutella xylostella

AP-T-235	Onions	Frankliniella occidentalis
AP-T-236	Onions	Trichoplusia ni
AP-T-237	Onions	Pieris rapae
AP-T-238	Onions	Spodoptera sp.
AP-T-239	Onions	Crocidolomia pavonana
AP-T-240	Onions	Pyrausta furnacalis
AP-T-241	Onions	Liromyza trifolii
AP-T-242	Onions	Cydia pomonella
AP-T-243	Onions	Epitrix sp.
AP-T-244	Onions	Leptinotarsa decemlineata
AP-T-245	Onions	Bemisia tabaci
AP-T-246	Onions	Thrips tabaci
AP-T-247	Onions	Spodoptera eridania
AP-T-248	Onions	Lobesia botrana
AP-T-249	Onions	Altica chapybea
AP-T-250	Onions	Phyllocnistis citrella
AP-T-251	ST	Agrotis ipsilon
AP-T-252	ST	Spodoptera frugiperta
AP-T-253	ST	Phyllotreta sp.
AP-T-254	ST	Stem Girdler
AP-T-255	ST	Agriotes sp.
AP-T-256	ST	Delia platura

Plant health, increased yield

The combinations according to the present invention and compositions thereof, respectively, are useful for improving the health of plants and/or increasing the yield of plants (crop yield).

"Plant health" is intended to mean a condition of the plant which is determined by several aspects alone or in combination with each other.

One indicator (indicator 1) for the condition of the plant is the yield, which is crop and/or fruit yield. "Crop" and "fruit" are to be understood as any plant product which is further utilized after harvesting, e.g. fruits in the proper sense, vegetables, nuts, grains, seeds, wood (e.g. in the case of silviculture plants), flowers (e.g. in the case of gardening plants, ornamentals) etc., that is anything of economic value that is produced by the plant. One way of determining the yield is the Thousand Grain Weight (TGW) of the harvested grains.

In one embodiment of the present invention, the plant yield becomes manifest by an increase in Thousand Grain Weight (TGW), straw yield, grain yield, tillering, harvest index and the single ear grain yield.

Another indicator (indicator 2) for the condition of the plant is the plant vigour. The plant vigour becomes manifest in several aspects, too, some of which are visual appearance, e.g. leaf color, fruit color and aspect, amount of dead basal leaves and/or extent of leaf blades, plant weight, plant height, extent of plant verse (lodging), number, strongness and productivity of tillers or branches or halms, panicles' length, seed set, extent of root system, strongness of roots, extent of nodulation, in particular of rhizobial nodulation, point of time of germination, emergence, flowering, grain maturity and/or senescence, protein content, sugar content and the like.

In one embodiment of the present invention, the plant vigour becomes manifest by an increase in plant height, number of halms with ear, tillering, plant shoot growth, number of grains per ear and the grean leaf area.

Another indicator (indicator 3) for the condition of the plant is the plant's tolerance or resistance to abiotic stress factors. Abiotic stress, especially over longer terms, can have harmful effects on plants. Abiotic stress is caused for example by extremes in temperature such as heat or cold or strong variations in temperature or temperatures unusual for the specific season, drought, extreme wetness like flooding or waterlogging, anaerobic conditions, high salinity, radiation (e.g. increased UV radiation due to the decreasing ozone protective layer), increased ozone levels and organic pollution (e.g. by phythotoxic amounts of pesticides) or inorganic pollution (e.g. by heavy metal contaminants). As a result, the quantity and the quality of the stressed plants, their crops and fruits decrease. As far as quality is concerned, reproductive development is usually severely affected with consequences on the crops which are important for fruits or seeds. Synthesis, accumulation and storage of proteins are mostly affected by temperature; growth is slowed by almost all stresses; polysaccharide synthesis, both structural and storage is reduced or modified: these effects bring to a decrease in biomass and to changes in the nutritional value of the product.

In one embodiment of the present invention, the tolerance of a plant against drought stress (abiotic stress) becomes manifest by an increase of water use efficiency and a reduction of the plant’s transpiration.

In one preferred embodiment, the present invention provides the use of the mixture according to the invention for increasing the yield of a plant (hereinafter termed crop yield), preferably of an agricultural, silvicultural and/or ornamental plant, more preferably of an agricultural plant.

The present invention further provides a method for increasing the yield of a plant (crop yield), preferably of an agricultural, silvicultural and/or ornamental plant, more preferably of an agricultural plant.

In a more preferred embodiment, the aforementioned method for increasing the yield of the plant comprises treating the plant and/or the locus where the plant is growing or is expected to grow with a mixture according to the invention, wherein the plant is preferably selected from the group consisting of field crops, such as potatoes, sugar beets,

cereals such as wheat, rye, barley, oats, sorghum, rice, corn, cotton, rape, oilseed rape and canola, legumes such as soybeans, peas and field beans, sunflowers, sugar cane; ornamentals; or vegetables, such as cucumbers, tomatoes, or onions, leeks, lettuce, squashes, more preferably agricultural plants are potatoes, sugar beets, cereals such as wheat, rye, barley, oats, sorghum, rice, corn, cotton, soybeans, oilseed rape, canola, sunflower.

In an especially preferred embodiment, the aforementioned method for increasing the plant health of the plant comprises treating the plant and/or the locus where the plant is growing or is expected to grow with a mixture according to the invention, wherein the plant is wheat, maize (corn) and soybeans.

In a particular preferred embodiment, the aforementioned method for increasing the yield of the plant comprises treating the plant and/or the locus where the plant is growing or is expected to grow with a mixture according to the invention, wherein the plant is transgenic or non-transgenic soybean.

According to the present invention, "increased yield" of a plant, in particular of an agricultural, silvicultural and/or ornamental plant, more preferably of an agricultural plant means that the yield of a product of the respective plant is increased by a measurable amount over the yield of the same product of the plant produced under the same conditions, but without the application of the composition of the invention.

According to the present invention, it is preferred that the yield be increased by at least 0,5%, more preferred at least 1%, even more preferred at least 2%, still more preferred at least 4%.

The improvement of the yield increase according to the present invention particularly means that the improvement of any one or several or all of the above mentioned plant characteristics are improved independently of the pesticidal action of the combination of the present invention.

In another preferred embodiment, the present invention provides the use of the mixture or combination of the present invention for increasing the yield and/or improving the vigor of a plant, e.g. of an agricultural, silvicultural and/or ornamental plant, more preferably an agricultural plant.

The present invention further provides a method for increasing the yield and/or improving the vigor of a plant, preferably of an agricultural, silvicultural and/or ornamental plant, more preferably of an agricultural plant.

In a more preferred embodiment, the aforementioned method for increasing or improving the vigour of the plant comprises treating the plant and/or the locus where the plant is growing or is expected to grow with a mixture according to the invention, wherein the plant is preferably selected from the group consisting of field crops, such as potatoes, sugar beets, cereals such as wheat, rye, barley, oats, sorghum, rice, corn, cotton, rape, oilseed rape and canola, legumes such as soybeans, peas and field beans, sunflowers, sugar cane; ornamentals; or vegetables, such as cucumbers, tomatoes, or onions, leeks, lettuce, squashes, more preferably agricultural plants are potatoes, sugar beets, cereals such as wheat, rye, barley, oats, sorghum, rice, corn, cotton, soybeans, oilseed rape, canola, sunflower.

In a particular preferred embodiment, the aforementioned method for increasing the vigour of the plant treating the plant and/or the locus where the plant is growing or is expected to grow with a mixture according to the invention, wherein the plant is transgenic or non-transgenic soybean.

According to the present invention, "improved plant vigour" means that certain crop characteristics are increased or improved by a measurable or noticeable amount over the same factor of the plant produced under the same conditions, but without the application of the composition of the present invention.

Improved plant vigour can be characterized, among others, by at least one of the following improved properties of the plant:

- improved vitality of the plant,
- improved quality of the plant and/or of the plant products, e.g. enhanced protein
- content, enhanced fruit size, more uniform fruit or grain color etc.,
- improved storability of harvested plant or plant parts,
- improved visual appearance,
- delay of senescence, thus, longer lasting photosynthetic active leaf apparatus,
- enhanced root growth and/or more developed root system,
- enhanced nodulation, in particular rhizobial nodulation,
- longer panicles,
- bigger pods,
- improved pod set,
- improved seed set,
- improved fruit set,
- reduced flower abortion,
- reduced pod abortion,
- reduced seed abortion,
- bigger leaf blade,
- less dead basal leaves,
- improved leaf area index,
- increased or improved plant stand density,
- less plant verse (lodging),
- increased plant weight,
- increased plant height,
- increased shoot growth,
- tillering increase,
- increase in branching,
- stronger and/or more productive tillers or branches,
- less non-productive tillers,
- enhanced photosynthetic activity and/or enhanced pigment content and thus
- greener leaf color,
- reduced production of ethylene and/or the inhibition of its reception by the plant,
- earlier and improved germination,
- improved emergence,

- earlier flowering,
- earlier fruiting,
- earlier grain maturity,
- more uniform ripening,
- less fertilizers needed,
- improved harvest index,
- improved shelf life,
- increased water-use efficiency,
- increase in green leaf area,
- better harvestability.
- improved quality of the plant and/or of the plant products, e.g. enhanced protein
- content, enhanced fruit size, more uniform fruit or grain color etc.,
- improved storability of harvested plant or plant parts,
- improved visual appearance,
- delay of senescence, thus, longer lasting photosynthetic active leaf apparatus,
- enhanced root growth and/or more developed root system,
- enhanced nodulation, in particular rhizobial nodulation,
- longer panicles,
- bigger pods,
- improved pod set,
- improved seed set,
- improved fruit set,
- reduced flower abortion,
- reduced pod abortion,
- reduced seed abortion,
- bigger leaf blade,
- less dead basal leaves,
- improved leaf area index,
- increased or improved plant stand density,
- less plant verse (lodging),
- increased plant weight,
- increased plant height,
- increased shoot growth,
- tillering increase,
- increase in branching,
- stronger and/or more productive tillers or branches,
- less non-productive tillers,
- enhanced photosynthetic activity and/or enhanced pigment content and thus
- greener leaf color,
- reduced production of ethylene and/or the inhibition of its reception by the plant,
- earlier and improved germination,
- improved emergence,
- earlier flowering,

- earlier fruiting,
- earlier grain maturity,
- more uniform ripening,
- less fertilizers needed,
- improved harvest index,
- improved shelf life,
- increased water-use efficiency,
- increase in green leaf area,
- better harvestability.

In another preferred embodiment of the invention, the mixture according to the invention is used for increased shoot growth.

In another preferred embodiment of the invention, the mixture according to the invention is used for reduction of ethylene production and/or inhibition of eth-ylene reception by the plant.

In another preferred embodiment of the invention, the mixture according to the invention is used for more uniform ripening of the plant, plant parts or fruits.

In another preferred embodiment of the invention, the mixture according to the invention is used for improved harvestability.

In a most preferred embodiment of the invention, the mixture according to the invention is used for enhancing improved vitality of the plant.

In another most preferred embodiment of the invention, the combination of the present invention is used for delayed senescence and consequently longer pho-tosynthetic activity of the leaf apparatus.

In another most preferred embodiment of the invention, the mixture according to the invention is used for bigger leaf blades.

In another most preferred embodiment of the invention, the mixture according to the invention is used for less dead basal leaves.

In another most preferred embodiment of the invention, the mixture according to the invention is used for improved seed or fruit set.

In another most preferred embodiment of the invention, the mixture according to the invention is used for increased plant weight.

In another most preferred embodiment of the invention, the mixture according to the invention is used for increased plant height.

In another most preferred embodiment of the invention, the mixture according to the invention is used for increased shoot growth.

In yet another preferred embodiment, the present invention provides the use of the mixture according to the invention for enhancing the plant's tolerance or resistance to abiotic stress factors.

The present invention further provides a method for enhancing a plant's tolerance or resistance to abiotic stress factors, which comprises treating the plant and/or the locus where the plant is growing or is expected to grow with a mixture according to the invention.

In a more preferred embodiment, the aforementioned method for enhancing a plant's tolerance or resistance to abiotic stress factors comprises treating the plant and/or the

locus where the plant is growing or is expected to grow with a mixture according to the invention, wherein the plant is preferably selected from the group consisting of field crops, such as potatoes, sugar beets, cereals such as wheat, rye, barley, oats, sorghum, rice, corn, cotton, soybeans, rape, oilseed rape and canola, legumes such as soybeans, peas and field beans, sunflowers, sugar cane; ornamentals; or vegetables, such as cucumbers, tomatoes, or onions, leeks, lettuce, squashes, more preferably agricultural plants are potatoes, sugar beets, cereals such as wheat, rye, barley, oats, sorghum, rice, corn, cotton, soybeans, oilseed rape, canola, sunflower.

In a particular preferred embodiment, the aforementioned method for enhancing a plant's tolerance or resistance to abiotic stress factors treating the plant, the locus where the plant is growing or is expected to grow with a mixture according to the invention, wherein the plant is transgenic or non-transgenic soybean.

Abiotic stress factors have been defined above.

According to the present invention, "enhanced tolerance or resistance of a plant to abiotic stress factors" means (1.) that certain negative factors caused by abiotic stress are diminished in a measurable or noticeable amount as compared to plants exposed to the same conditions, but without being treated with the and (2.) that the negative effects are not diminished by a direct action of the composition on the stress factors, e.g. by its fungicidal or insecticidal action which directly destroys the microorganisms or pests, but rather by a stimulation of the plants' own defensive reactions against said stress factors.

Negative factors caused by abiotic stress are also well-known and can often be observed as reduced plant vigor (see above), e.g. dotted leaves, "burned leaves", reduced growth, less flowers, less biomass, less crop yields, reduced nutritional value of the crops, later crop maturity, to give just a few examples.

In preferred embodiment, the tolerance of and/or resistance against abiotic stress factors is enhanced. Thus, according to a further embodiment of the present invention, the inventive compositions are used for stimulating the plant's own defensive reactions against abiotic stress such as extremes in temperature, e.g. heat or cold or strong variations in temperature or temperatures unusual for the specific season, drought, extreme wetness, high salinity, radiation (e.g. increased UV radiation due to the decreasing ozone protective layer), increased ozone levels, organic pollution (e.g. by phythotoxic amounts of pesticides) and/or inorganic pollution (e.g. by heavy metal contaminants).

In a more preferred embodiment, the mixture according to the invention is used for stimulating a plant's own defensive reactions against abiotic stress, where the abiotic stress factors are preferably selected from extremes in temperature, drought and extreme wetness.

In a more preferred embodiment, the mixture according to the invention is used for stimulating a plant's own defensive reactions against abiotic stress, where the abiotic stress factor is drought stress.

In another more preferred embodiment, the mixture according to the invention is used for reducing or inhibiting the injury caused to plants by phythotoxic amounts of

pesticides such as fungicides, herbicides and/or insecticides.

Formulations

The mixtures according to the present invention can be converted into the customary formulations, for example solutions, emulsions, suspensions, dusts, powders, pastes and granules. The use form depends on the particular intended purpose; in each case, it should ensure a fine and even distribution of the compounds of the mixtures according to the invention.

Therefore the invention also relates to agrochemical compositions comprising an auxiliary and a mixture according to the invention, i.e. a mixture of at least one compound I of formula I and of at least one compound II according to the present invention.

An agrochemical composition comprises a pesticidally effective amount of a pesticidal mixture. The term "effective amount" denotes an amount of the composition or of the mixture, which is sufficient for controlling harmful pests on cultivated plants or in the protection of materials and which does not result in a substantial damage to the treated plants. Such an amount can vary in a broad range and is dependent on various factors, such as the animal pests species to be controlled, the treated cultivated plant or material, the climatic conditions and the specific mixture used.

The mixtures according to the present invention 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. 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, 6th Ed. May 2008, CropLife International.

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.

Examples for 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.

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.

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.

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 emusifier, 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 Ed.).

Suitable anionic surfactants are alkali, alkaline earth or ammonium salts of sulfonates, sulfates, phosphates, carboxylates, and mixtures thereof. Examples of sulfonates are alkylarylsulfonates, diphenylsulfonates, alpha-olefin sulfonates, lignine sulfonates, sulfonates of fatty acids and oils, sulfonates of ethoxylated alkylphenols, sulfonates of alkoxylated arylphenols, sulfonates of condensed naphthalenes, sulfonates of dodecyl- and tridecylbenzenes, sulfonates of naphthalenes and alkyl¬naphthalenes, 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 alkoxylates, N-subsituted fatty acid amides, amine oxides, esters, sugar-based surfactants, polymeric surfactants, and mixtures thereof. Examples of alkoxylates are compounds such as alcohols, alkylphenols, amines, amides, arylphenols, fatty acids or fatty acid esters which have been alkoxylated with 1 to 50 equivalents. Ethylene oxide and/or propylene oxide may be employed for the alkoxylation, preferably ethylene oxide. Examples of N-subsititued 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 home- 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 compound I or II or the mixture according to the invention on the target. Examples are surfactants, mineral or vegetable oils, and other auxilaries. 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 a compound I or II or a mixture according to the invention and 5-15 wt% wetting agent (e.g. alcohol alkoxylates) are dissolved in water and/or in a water-soluble solvent (e.g. alcohols) up to 100 wt%. The active substance dissolves upon dilution with water.

ii) Dispersible concentrates (DC)

5-25 wt% of a compound I or II or a mixture according to the invention and 1-10 wt% dispersant (e. g. polyvinylpyrrolidone) are dissolved in up to 100 wt% organic solvent (e.g. cyclohexanone). Dilution with water gives a dispersion.

iii) Emulsifiable concentrates (EC)

15-70 wt% of a compound I or II or a mixture according to the invention and 5-10 wt% emulsifiers (e.g. calcium dodecylbenzenesulfonate and castor oil ethoxylate) are dissolved in up to 100 wt% water-insoluble organic solvent (e.g. aromatic hydrocarbon). Dilution with water gives an emulsion.

iv) Emulsions (EW, EO, ES)

5-40 wt% of a compound I or II or a mixture according to the invention 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 up to 100 wt% water 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 a compound I or II or a mixture according to the invention 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 up to 100 wt% water 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 a compound I or II or a mixture according to the invention are ground finely with addition of up to 100 wt% dispersants and wetting agents (e.g. sodium lignosulfonate and alcohol ethoxylate) 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 a compound I or II or a mixture according to the invention 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 up to 100 wt% solid carrier, e.g. silica gel. 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 a compound I or II or a mixture according to the invention are comminuted with addition of 3-10 wt% dispersants (e.g. sodium lignosulfonate), 1-5 wt% thickener (e.g. carboxymethylcellulose) and up to 100 wt% water to give a fine suspension of the active substance. Dilution with water gives a stable suspension of the active substance.

ix) Microemulsion (ME)

5-20 wt% of a compound I or II or a mixture according to the invention are added to 5-30 wt% organic solvent blend (e.g. fatty acid dimethylamide and cyclohexanone), 10-25 wt% surfactant blend (e.g. alkohol ethoxylate and arylphenol ethoxylate), and water up to 100 %. This mixture is stirred for 1 h to produce spontaneously a thermodynamically stable microemulsion.

x) Microcapsules (CS)

An oil phase comprising 5-50 wt% of a compound I or II or a mixture according to the invention, 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 a compound I 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 a polyurea microcapsules. The monomers amount to 1-10 wt%. The wt% relate to the total CS composition.

xi) Dustable powders (DP, DS)

1-10 wt% of a compound I or II or a mixture according to the invention are ground finely and mixed intimately with up to 100 wt% solid carrier, e.g. finely divided kaolin.

xii) Granules (GR, FG)

0.5-30 wt% of a compound I or II or a mixture according to the invention is ground finely and associated with up to 100 wt% solid carrier (e.g. silicate). Granulation is achieved by extrusion, spray-drying or the fluidized bed.

xiii) Ultra-low volume liquids (UL)

1-50 wt% of a compound I or II or a mixture according to the invention are dissolved in up to 100 wt% organic solvent, e.g. aromatic hydrocarbon.

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 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).

In one embodiment, a suspoconcentration (SC) is preferred for the application in crop protection. In one sub-embodiment thereof, the SC agrochemical composition comprises between 50 to 500 g/L (grams per Litre), or between 100 and 250 g/L, or 100 g/L or 150g/L or 200g/L or 250 g/L.

In a further embodiment, thegranules according to formulation type xii are especially preferred for the application in rice.

Water-soluble concentrates (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% by weight, in the ready-to-use preparations. Application can be carried out before or during sowing. Methods for applying or treating compound I or II or a mixture according to the invention 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, compound I 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 0.001 to 1 kg per ha, more preferably from 0.005 to 0.9 kg per ha, in particular from 0.005 to 0.5 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 0.1 to 1000 g, preferably from 0.1 to 300 g, more preferably from 0.1 to 100 g and most preferably from 0.25 to 100 g, per 100 kilogram of plant propagation material (preferably seed) 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 other pesticides (e.g. herbicides, insecticides, fungicides, growth regulators, safeners, biopesticides) 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.

Biopesticides are typically created by growing and concentrating naturally occurring organisms and/or their metabolites including bacteria and other microbes, fungi, viruses, nematodes, proteins, etc. They are often considered to be important components of integrated pest management (IPM) programmes, and have received much practical attention as substitutes to synthetic chemical plant protection products (PPPs).

Biopesticides fall into two major classes, microbial and biochemical pesticides:

(1) Microbial pesticides consist of bacteria, fungi or viruses (and often include the metabolites that bacteria and fungi produce). Entomopathogenic nematodes are also classed as microbial pesticides, even though they are multi-cellular.

(2) Biochemical pesticides are naturally occurring substances that control pests or provide other crop protection uses as defined below, but are relatively non-toxic to mammals.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 a binary or ternary 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 components of the composition according to the invention or partially premixed components, e. g. components comprising compounds I and/or active substances, e.g. from the groups M or F, may be mixed by the user in a spray tank and further auxiliaries and additives may be added, if appropriate.

In a further embodiment, either individual components of the composition according to the invention or partially premixed components, e. g. components comprising compounds I and/or

active substances from the group M or F, can be applied jointly (e.g. after tank mix) or consecutively.

Further active ingredients:

Another aspect of the present invention is when preparing the mixtures, it is preferred to employ the mixture according to the invention or pure active compounds I and II, to which further active compounds, e.g. against harmful fungi or invertebrate pests or compounds having herbicidal activity, or growth-regulating agents or fertilizers can be added.

Compositions of this invention may further contain other active ingredients than those listed above. For example fungicides, herbicides, fertilizers such as ammonium nitrate, urea, potash, and superphosphate, phytotoxicants and plant growth regulators and safeners. These additional ingredients may be used sequentially or in combination with the above-described compositions, if appropriate also added only immediately prior to use (tank mix). For example, the plant(s) may be sprayed with a composition of this invention either before or after being treated with other active ingredients.

The further active ingredients may be selected from the group F as defined for of compounds II herein, or from the following list M of active substances, in conjunction with which the mixtures according to the invention can be used, which is intended to illustrate the possible combinations but does not limit them:

M.1 Acetylcholine esterase (AChE) inhibitors from the class of

M.1A carbamates, including aldicarb, alanycarb, bendiocarb, benfuracarb, butocarboxim, butoxycarboxim, carbaryl, carbofuran, carbosulfan, ethiofencarb, fenobucarb, formetanate, furathiocarb, isoprocarb, methiocarb, methomyl, metolcarb, oxamyl, pirimicarb, propoxur, thiodicarb, thiofanox, trimethacarb, XMC, xylylcarb and triazamate; or from the class of

M.1B organophosphates, including acephate, azamethiphos, azinphos-ethyl, azinphosmethyl, cadusafos, chlorethoxyfos, chlorfenvinphos, chlormephos, chlorpyrifos, chlorpyrifos-methyl, coumaphos, cyanophos, demeton-S-methyl, diazinon, dichlorvos/ DDVP, dicrotophos, dimethoate, dimethylvinphos, disulfoton, EPN, ethion, ethoprophos, famphur, fenamiphos, fenitrothion, fenthion, fosthiazate, heptenophos, imicyafos, isofenphos, isopropyl O-(methoxyaminothio-phosphoryl) salicylate, isoxathion, malathion, mecarbam, methamidophos, methidathion, mevinphos, monocrotophos, naled, omethoate, oxydemeton-methyl, parathion, parathion-methyl, phenthoate, phorate, phosalone, phosmet, phosphamidon, phoxim, pirimiphos- methyl, profenofos, propetamphos, prothiofos, pyraclofos, pyridaphenthion, quinalphos, sulfotep, tebupirimfos, temephos, terbufos, tetrachlorvinphos, thiometon, triazophos, trichlorfon and vamidothion;

M.2 GABA-gated chloride channel antagonists such as:

M.2A cyclodiene organochlorine compounds, including endosulfan or chlordane; or

M.2B fiproles (phenylpyrazoles), including ethiprole, fipronil, flufiprole, pyrafluprole and pyriprole;

M.3 Sodium channel modulators from the class of

M.3A pyrethroids, including acrinathrin, allethrin, d-cis-trans allethrin, d-trans allethrin, bifenthrin, bioallethrin, bioallethrin S-cylclopentenyl, bioresmethrin, cycloprothrin, cyfluthrin, beta-cyfluthrin, cyhalothrin, lambda-cyhalothrin, gamma-cyhalothrin, cypermethrin, alpha-cypermethrin, beta-cypermethrin, theta-cypermethrin, zeta-cypermethrin, cyphenothrin, deltamethrin, empenthrin, esfenvalerate, etofenprox, fenpropathrin, fenvalerate, flucythrinate, flumethrin, tau-fluvalinate, halfenprox, imiprothrin, meperfluthrin, metofluthrin, momfluorothrin, permethrin, phenothrin, prallethrin, profluthrin, pyrethrin (pyrethrum), resmethrin, silafluofen, tefluthrin, tetramethylfluthrin, tetramethrin, tralomethrin and transfluthrin; or

M.3B sodium channel modulators such as DDT or methoxychlor;

M.4 Nicotinic acetylcholine receptor agonists (nAChR) from the class of

M.4A neonicotinoids, including acetamiprid, chlothianidin, dinotefuran, imidacloprid, nitenpyram, thiacloprid and thiamethoxam; or the compounds

M.4A.1: 1-[(6-chloro-3-pyridinyl)methyl]-2,3,5,6,7,8-hexahydro-9-nitro-(5S,8R)-5,8-Epoxy-1H-imidazo[1,2-a]azepine; or

M.4A.2: 1-[(6-chloro-3-pyridyl)methyl]-2-nitro-1-[(E)-pentylideneamino]guanidine; or

M4A.3: 1-[(6-chloro-3-pyridyl)methyl]-7-methyl-8-nitro-5-propoxy-3,5,6,7-tetrahydro-2H-imidazo[1,2-a]pyridine; or

M.4B nicotine.

M.5 Nicotinic acetylcholine receptor allosteric activators from the class of spinosyns, including spinosad or spinetoram;

M.6 Chloride channel activators from the class of avermectins and milbemycins, including abamectin, emamectin benzoate, ivermectin, lepimectin or milbemectin;

M.7 Juvenile hormone mimics, such as

M.7A juvenile hormone analogues as hydroprene, kinoprene and methoprene; or others as

M.7B fenoxycarb, or

M.7C pyriproxyfen;

M.8 miscellaneous non-specific (multi-site) inhibitors, including

M.8A alkyl halides as methyl bromide and other alkyl halides, or

M.8B chloropicrin, or

M.8C sulfuryl fluoride, or

M.8D borax, or
M.8E tartar emetic;
M.9 Selective homopteran feeding blockers, including
M.9B pymetrozine, or
M.9C flonicamid;

M.10 Mite growth inhibitors, including
M.10A clofentezine, hexythiazox and diflovidazin, or
M.10B etoxazole;

M.11 Microbial disruptors of insect midgut membranes, including *bacillus thuringiensis* or *bacillus sphaericus* and the insecticdal proteins they produce such as *bacillus thuringiensis subsp. israelensis*, *bacillus sphaericus*, *bacillus thuringiensis subsp. aizawai*, *bacillus thuringiensis subsp. kurstaki* and *bacillus thuringiensis subsp. tenebrionis*, or the Bt crop proteins: Cry1Ab, Cry1Ac, Cry1Fa, Cry2Ab, mCry3A, Cry3Ab, Cry3Bb and Cry34/35Ab1;

M.12 Inhibitors of mitochondrial ATP synthase, including
M.12A diafenthiuron, or
M.12B organotin miticides such as azocyclotin, cyhexatin or fenbutatin oxide, or
M.12C propargite, or
M.12D tetradifon;

M.13 Uncouplers of oxidative phosphorylation via disruption of the proton gradient, including chlorfenapyr, DNOC or sulfluramid;

M.14 Nicotinic acetylcholine receptor (nAChR) channel blockers, including nereistoxin analogues as bensultap, cartap hydrochloride, thiocyclam or thiosultap sodium;

M.15 Inhibitors of the chitin biosynthesis type 0, such as benzoylure including bistrifluron, chlorfluazuron, diflubenzuron, flucycloxuron, flufenoxuron, hexaflumuron, lufenuron, novaluron, noviflumuron, teflubenzuron or triflumuron;

M.16 Inhibitors of the chitin biosynthesis type 1, including buprofezin;

M.17 Moulting disruptors, Dipteran, including cyromazine;

M.18 Ecdyson receptor agonists such as diacylhydrazines, including methoxyfenozide, tebufenozide, halofenozide, fufenozide or chromafenozide;

M.19 Octopamin receptor agonists, including amitraz;

M.20 Mitochondrial complex III electron transport inhibitors, including
M.20A hydramethylnon, or
M.20B acequinocyl, or
M.20C fluacrypyrim;

M.21 Mitochondrial complex I electron transport inhibitors, including
M.21A METI acaricides and insecticides such as fenazaquin, fenpyroximate, pyrimidifen, pyridaben, tebufenpyrad or tolfenpyrad, or
M.21B rotenone;

M.22 Voltage-dependent sodium channel blockers, including
M.22A indoxacarb, or
M.22B metaflumizone; or
M.22C 1-[(E)-[2-(4-cyanophenyl)-1-[3-(trifluoromethyl)phenyl]ethylidene]amino]-3-[4-(difluoromethoxy)phenyl]urea;

M.23 Inhibitors of the acetyl CoA carboxylase, including Tetronic and Tetramic acid derivatives, including spirodiclofen, spiromesifen or spirotetramat;

M.24 Mitochondrial complex IV electron transport inhibitors, including
M.24A phosphine such as aluminium phosphide, calcium phosphide, phosphine or zinc phosphide, or
M.24B cyanide.

M.25 Mitochondrial complex II electron transport inhibitors, such as beta-ketonitrile derivatives, including cyenopyrafen or cyflumetofen;

M.26 Ryanodine receptor-modulators from the class of diamides, including flubendiamide, chlorantraniliprole (rynaxypyr®), cyantraniliprole (cyazypyr®), or
the phthalamide compounds
M.26.1: (R)-3-Chlor-N1-{2-methyl-4-[1,2,2,2 –tetrafluor-1-(trifluormethyl)ethyl]phenyl}-N2-(1-methyl-2-methylsulfonylethyl)phthalamid and
M.26.2: (S)-3-Chlor-N1-{2-methyl-4-[1,2,2,2 –tetrafluor-1-(trifluormethyl)ethyl]phenyl}-N2-(1-methyl-2-methylsulfonylethyl)phthalamid, or the compound
M.26.3: 3-bromo-N-{2-bromo-4-chloro-6-[(1-cyclopropylethyl)carbamoyl]phenyl}-1-(3-chlorpyridin-2-yl)-1H-pyrazole-5-carboxamide (proposed ISO name: cyclaniliprole),

or the compound
M.26.4: methyl-2-[3,5-dibromo-2-({[3-bromo-1-(3-chlorpyridin-2-yl)-1H-pyrazol-5-yl]carbonyl}amino)benzoyl]-1,2-dimethylhydrazinecarboxylate; or a compound selected from II-M.26.5a) to II-M.26.5d):

II-M.26.5a: N-[2-(5-amino-1,3,4-thiadiazol-2-yl)-4-chloro-6-methyl-phenyl]-5-bromo-2-(3-chloro-2-pyridyl)pyrazole-3-carboxamide;

II-M.26.5b: 5-chloro-2-(3-chloro-2-pyridyl)-N-[2,4-dichloro-6-[(1-cyano-1-methyl-ethyl)carbamoyl]phenyl]pyrazole-3-carboxamide;

II-M.26.5c: 5-bromo-N-[2,4-dichloro-6-(methylcarbamoyl)phenyl]-2-(3,5-dichloro-2-pyridyl)pyrazole-3-carboxamide;

II-M.26.5d: N-[2-(tert-butylcarbamoyl)-4-chloro-6-methyl-phenyl]-2-(3-chloro-2-pyridyl)-5-(fluoromethoxy)pyrazole-3-carboxamide; or

II-M.26.6: N2-(1-cyano-1-methyl-ethyl)-N1-(2,4-dimethylphenyl)-3-iodo-phthalamide; or

II-M.26.7: 3-chloro-N2-(1-cyano-1-methyl-ethyl)-N1-(2,4-dimethylphenyl)phthalamide;

M.X insecticidal active compounds of unknown or uncertain mode of action, including afidopyropen, azadirachtin, amidoflumet, benzoximate, bifenazate, bromopropylate, chinomethionat, cryolite, dicofol, flufenerim, flometoquin, fluensulfone, flupyradifurone, piperonyl butoxide, pyridalyl, pyrifluquinazon, sulfoxaflor, pyflubumide, or the compounds

M.X.1: 4-[5-(3,5-Dichloro-phenyl)-5-trifluoromethyl-4,5-dihydro-isoxazol-3-yl]-2-methyl-N-[(2,2,2-trifluoro-ethylcarbamoyl)-methyl]-benzamide, or the compound

M.X.2: cyclopropaneacetic acid, 1,1'-[(3S,4R,4aR,6S,6aS,12R,12aS,12bS)-4-[[(2-cyclopropylacetyl)oxy]methyl]-1,3,4,4a,5,6,6a,12,12a,12b-decahydro-12-hydroxy-4,6a,12b-trimethyl-11-oxo-9-(3-pyridinyl)-2H,11H-naphtho[2,1-b]pyrano[3,4-e]pyran-3,6-diyl] ester, or the compound

M.X.3: 11-(4-chloro-2,6-dimethylphenyl)-12-hydroxy-1,4-dioxa-9-azadispiro[4.2.4.2]-tetradec-11-en-10-one, or the compound

M.X.4 3-(4'-fluoro-2,4-dimethylbiphenyl-3-yl)-4-hydroxy-8-oxa-1-azaspiro[4.5]dec-3-en-2-one, or the compound

M.X.5: 1-[2-fluoro-4-methyl-5-[(2,2,2-trifluoroethyl)sulfinyl]phenyl]-3-(trifluoromethyl)-1H-1,2,4-triazole-5-amine, or actives on basis of *bacillus firmus* (Votivo, I-1582), or

M.X.6: a compound selected from the group of

M.X.6a: (E/Z)-N-[1-[(6-chloro-3-pyridyl)methyl]-2-pyridylidene]-2,2,2-trifluoro-acetamide;

M.X.6b: (E/Z)-N-[1-[(6-chloro-5-fluoro-3-pyridyl)methyl]-2-pyridylidene]-2,2,2-trifluoro-acetamide;

M.X.6c: (E/Z)-2,2,2-trifluoro-N-[1-[(6-fluoro-3-pyridyl)methyl]-2-pyridylidene]acetamide;

M.X.6d: (E/Z)-N-[1-[(6-bromo-3-pyridyl)methyl]-2-pyridylidene]-2,2,2-trifluoro-acetamide;

M.X.6e: (E/Z)-N-[1-[1-(6-chloro-3-pyridyl)ethyl]-2-pyridylidene]-2,2,2-trifluoro-acetamide;

M.X.6f: (E/Z)-N-[1-[(6-chloro-3-pyridyl)methyl]-2-pyridylidene]-2,2-difluoro-acetamide;

M.X.6g: (E/Z)-2-chloro-N-[1-[(6-chloro-3-pyridyl)methyl]-2-pyridylidene]-2,2-difluoro-acetamide;

M.X.6h: (E/Z)-N-[1-[(2-chloropyrimidin-5-yl)methyl]-2-pyridylidene]-2,2,2-trifluoro-acetamide and

M.X.6i: (E/Z)-N-[1-[(6-chloro-3-pyridyl)methyl]-2-pyridylidene]-2,2,3,3,3-pentafluoro-propanamide); or

M.X.7: triflumezopyrim; or

II-M.X.8: 4-[5-[3-chloro-5-(trifluoromethyl)phenyl]-5-(trifluoromethyl)-4H-isoxazol-3-yl]-N-[2-oxo-2-(2,2,2-trifluoroethylamino)ethyl]naphthalene-1-carboxamide, or

II-M.X.9: 3-[3-chloro-5-(trifluoromethyl)phenyl]-4-oxo-1-(pyrimidin-5-ylmethyl)pyrido[1,2-a]pyrimidin-1-ium-2-olate; or

II-M.X.10: 8-chloro-N-[2-chloro-5-methoxyphenyl)sulfonyl]-6-trifluoromethyl)-imidazo[1,2-a]pyridine-2-carboxamide; or

II-M.X.11: 4-[5-(3,5-dichlorophenyl)-5-(trifluoromethyl)-4H-isoxazol-3-yl]-2-methyl-N-(1-oxothietan-3-yl)benzamide; or

II-M.X.12: 5-[3-[2,6-dichloro-4-(3,3-dichloroallyloxy)phenoxy]propoxy]-1H-pyrazole; or

M.Y Biopesticides, e.g.

M.Y-1: Microbial pesticides with insecticidal, acaricidal, molluscidal and/or nematicidal activity: Bacillus firmus, B. thuringiensis ssp. israelensis, B. t. ssp. galleriae, B. t. ssp. kurstaki, Beauveria bassiana, Burkholderia sp., Chromobacterium subtsugae, Cydia pomonella granulosis virus, Isaria fumosorosea, Lecanicillium longisporum, L. muscarium (formerly Verticillium lecanii), Metarhizium anisopliae, M. anisopliae var. acridum, Paecilomyces fumosoroseus, P. lilacinus, Paenibacillus poppiliae, Pasteuria spp., P. nishizawae, P. reneformis, P. usagae, Pseudomonas fluorescens, Steinernema feltiae, Streptomces galbus;

M.Y-2) Biochemical pesticides with insecticidal, acaricidal, molluscidal, pheromone and/or nematicidal activity: L-carvone, citral, (E,Z)-7,9-dodecadien-1-yl acetate, ethyl formate, (E,Z)-2,4-ethyl decadienoate (pear ester), (Z,Z,E)-7,11,13-hexadecatrienal, heptyl butyrate, isopropyl myristate, lavanulyl senecioate, 2-methyl 1-butanol, methyl eugenol, methyl jasmonate, (E,Z)-2,13-octadecadien-1-ol, (E,Z)-2,13-octadecadien-1-ol acetate, (E,Z)-3,13-octadecadien-1-ol, R-1-octen-3-ol, pentatermanone, potassium silicate, sorbitol actanoate, (E,Z,Z)-3,8,11-tetradecatrienyl acetate, (Z,E)-9,12-tetradecadien-1-yl acetate, Z-7-tetradecen-2-one, Z-9-tetradecen-1-yl acetate, Z-11-tetradecenal, Z-11-tetradecen-1-ol, Acacia negra extract, extract of grapefruit seeds and pulp, extract of Chenopodium ambrosiodae, Catnip oil, Neem oil, Quillay extract, Tagetes oil.

The commercially available compounds II of the group M listed above may be found in The Pesticide Manual, 15th Edition, C. D. S. Tomlin, British Crop Protection Council (2011) among other publications.

The quinoline derivative flometoquin is shown in WO2006/013896. The aminofuranone compounds flupyradifurone is known from WO 2007/115644. The sulfoximine compound sulfoxaflor is known from WO2007/149134. The pyrethroid momfluorothrin is known from US6908945. The pyrazole acaricide pyflubumide is known from WO2007/020986. The

isoxazoline compound M.X.1 has been described in WO2005/085216, M.X.8 in WO2009/002809 and in WO2011/149749 and the isoxazoline M.X.9 in WO2013/050317. . The pyripyropene derivative M.X.2 has been described in WO 2006/129714. The spiroketal-substituted cyclic ketoenol derivative M.X.3 is known from WO2006/089633 and the biphenyl-substituted spirocyclic ketoenol derivative M.X.4 from WO2008/067911. Triazoylphenylsulfide like M.X.5 have been described in WO2006/043635 and biological control agents on basis of *bacillus firmus* in WO2009/124707. The neonicotionids M4A.1 is known from WO20120/069266 and WO2011/06946, the M.4A.2 from WO2013/003977, the M4A.3.from WO2010/069266. The metaflumizone analogue M.22C is described in CN 10171577.

Cyantraniliprole (Cyazypyr) is known from e.g. WO 2004/067528. The phthalamides M.26.1 and M.26.2 are both known from WO 2007/101540. The anthranilamide M.26.3 has been described in WO 2005/077934. The hydrazide compound M.26.4 has been described in WO 2007/043677. The anthranilamide M.26.5a) is described in WO2011/085575, the M.26.5b) in WO2008/134969, the M.26.5c) in US2011/046186 and the M.26.5d in WO2012/034403. The diamide compounds M.26.6 and M.26.7 can be found in CN102613183.

The compounds M.X.6a) to M.X.6i) listed in M.X.6 have been described in WO2012/029672. The mesoionic antagonist compound M.X.8 was described in WO2012/092115, the nematicide M.X.9 in WO2013/055584 and the Pyridalyl-type analogue M.X.12 in WO2010/060379.

The biopesticides of group M.Y are disclosed above in the paragraphs about biopesticides from group F.XIII).

Applications

Due to their excellent activity, the mixtures according to the invention may be used for controlling invertebrate pests.

The compounds I and the one or more compound(s) II can be applied simultaneously, that is jointly or separately, or in succession, that is immediately one after another and thereby creating the mixture "in-situ" on the desired location, as e.g. the plant, the sequence, in the case of separate application, generally not having any effect on the result of the control measures.

The compounds I and the one or more compound(s) II are usually applied in a weight ratio of from 5000:1 to 1:5000, preferably from 1000:1 to 1:1000, preferably from 625:1 to 1:625, preferably 500:1 to 1:100, preferably from 100:1 to 1:100 preferably from 20:1 to 1:50, preferably from 20:1 to 1:20, preferab,y from 10:1 to 1:10, in particular from 5:1 to 1:20, in particular from 5:1 to 1:10, in particular from 5:1 to 1:5.

Depending on the desired effect, the application rates of the mixtures according to the invention are from 5 g/ha to 2000 g/ha, preferably from 0.5 g/ha to 1000 g/ha, preferably from 1 to 750 g/ha, in particular from 5 to 500 g/ha.

The mixtures according to the invention are effective through both contact and ingestion.

The mixtures according to the invention can be applied to any and all developmental stages, 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.

According to a preferred embodiment, the mixtures according to the invention are used in crop protection, especially for the protection of living plants.

According to another specific embodiment of the invention, the mixtures according to the present invention are employed via soil application. Soil application is especially favorable for use against ants, termites, crickets, or cockroaches.

According to another embodiment of the invention, for use against non crop pests such as ants, termites, wasps, flies, mosquitoes, crickets, locusts, or cockroaches the mixtures according to the present invention are prepared into a bait preparation.
The bait can be a liquid, a solid or a semisolid preparation (e.g. a gel).
The animal pest (also referred to as “invertebrate pest”), i.e. the insects, arachnids and nematodes, the plant, soil or water in which the plant is growing can be contacted with the mixtures according to the invention or composition(s) comprising them by any application method known in the art. As such, "contacting" includes both direct contact (applying the compounds/compositions directly on the animal pest or plant - typically to the foliage, stem or roots of the plant) and indirect contact (applying the compounds/mixtures/compositions to the locus of the animal pest or plant).
The mixtures according to the invention or the pesticidal compositions comprising them may be used to protect growing plants and crops from attack or infestation by animal pests, especially insects, acaridae or arachnids by contacting the plant/crop with a pesticidally effective amount of the mixtures according to the invention. The term "crop" refers both to growing and harvested crops.
The mixtures according to the invention and the compositions comprising them are particularly important in the control of a multitude of insects on various cultivated plants, such as cereal, root crops, oil crops, vegetables, spices, ornamentals, for example seed of durum and other wheat, barley, oats, rye, maize (fodder maize and sugar maize / sweet and field corn), soybeans, oil crops, crucifers, cotton, sunflowers, bananas, rice, oilseed rape, turnip rape, sugarbeet, fodder beet, eggplants, potatoes, grass, lawn, turf, fodder grass, tomatoes, leeks, pumpkin/squash, cabbage, iceberg lettuce, pepper, cucumbers, melons, Brassica species, melons, beans, peas, garlic, onions, carrots, tuberous plants such as potatoes, sugar cane, tobacco, grapes, petunias, geranium/pelargoniums, pansies and impatiens.
Particularly preferred is the application of the mixtures according to the invention and the compositions comprising them on rice. Particularly preferred is the application of the mixtures according to the invention and the compositions comprising them on soybeans. Particularly preferred is the application of the mixtures according to the invention and the compositions comprising them on corn.
Also preferred is the application of the mixtures according to the invention, especially the mixtures as individualized herein, e.g. in Table AP-T, on specialty crops like fruits and

vegetables. In one embodiment thereof, the application is on fruiting vegetables, and especially on tomato, on pepper or on eggplant.
In another embodiment thereof, the application is on leafy vegetables, and especially on cabbage or on lettuce.
In still another embodiment thereof, the application is on tubers (tuber vegetables), and especially on potato or on onion.

The mixtures according to the invention are employed as such or in form of compositions by treating the insects or the plants, plant propagation materials, such as seeds, soil, surfaces, materials or rooms to be protected from insecticidal attack with an insecticidally effective amount of the active compounds. The application can be carried out both before and after the infection of the plants, plant propagation materials, such as seeds, soil, surfaces, materials or rooms by the insects.
The present invention also includes a method of combating animal pests which comprises contacting the animal pests, their habitat, breeding ground, food supply, cultivated plants, seed, soil, area, material or environment in which the animal pests are growing or may grow, or the materials, plants, seeds, soils, surfaces or spaces to be protected from animal attack or infestation with a pesticidally effective amount of a mixture of at least one active compound I and at least one active compound II.
Moreover, animal pests may be controlled by contacting the target pest, its food supply, habitat, breeding ground or its locus with a pesticidally effective amount of a mixture according to the invention. As such, the application may be carried out before or after the infection of the locus, growing crops, or harvested crops by the pest.
The mixtures according to the invention can also be applied preventively to places at which occurrence of the pests is expected.
The mixtures according to the invention may be also used to protect growing plants from attack or infestation by pests by contacting the plant with a pesticidally effective amount of mixtures according to the invention. As such, "contacting" includes both direct contact (applying the compounds/compositions directly on the pest and/or plant - typically to the foliage, stem or roots of the plant) and indirect contact (applying the mixtures according to the invention /compositions to the locus of the pest and/or plant).
"Locus" means a habitat, breeding ground, plant, seed, soil, area, material or environment in which a pest or parasite is growing or may grow.
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. Seedlings and young plants, which are to be transplanted after germination or after emergence from soil, may also be included. These plant propagation materials may be treated prophylactically with a plant protection compound either at or before planting or transplanting.
The term "cultivated plants" is to be understood as including plants which have been modified by breeding, mutagenesis or genetic engineering. Genetically modified plants are plants, the genetic material of which 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-transtional modification of protein(s) (oligo- or polypeptides) for example by glycosylation or polymer additions such as prenylated, acetylated or farnesylated moieties or PEG moieties(e.g. as disclosed in Biotechnol Prog. 2001 Jul-Aug;17(4):720-8., Protein Eng Des Sel. 2004 Jan;17(1):57-66, Nat Protoc. 2007;2(5): 1225-35., Curr Opin Chem Biol. 2006 Oct;10(5):487-91. Epub 2006 Aug 28., Biomaterials. 2001 Mar;22(5):405-17, Bioconjug Chem. 2005 Jan-Feb;16(1):113-21).

The term "cultivated plants" is to be understood also including plants that have been rendered tolerant to applications of specific classes of herbicides, such as hydroxy- phenylpyruvate dioxygenase (HPPD) inhibitors; acetolactate synthase (ALS) inhibitors, such as sulfonyl ureas (see e. g. US 6,222,100, WO 01/82685, WO 00/26390, WO 97/ 41218, WO 98/02526, WO 98/02527, WO 04/106529, WO 05/20673, WO 03/14357, WO 03/13225, WO 03/14356, WO 04/16073) or imidazolinones (see e. g. US 6222100, WO 01/82685, WO 00/26390, WO 97/41218, WO 98/02526, WO 98/02527, WO 04/ 106529, WO 05/20673, WO 03/14357, WO 03/13225, WO 03/14356, WO 04/16073); enolpyruvylshikimate-3-phosphate synthase (EPSPS) inhibitors, such as glyphosate (see e. g. WO 92/00377); glutamine synthetase (GS) inhibitors, such as glufosinate (see e. g. EP-A-0242236, EP-A-242246) or oxynil herbicides (see e. g. US 5,559,024) as a result of conventional methods of breeding or genetic engineering. Several cultivated plants have been rendered tolerant to herbicides by conventional methods of breeding (mutagenesis), for example Clearfield® summer rape (Canola) being tolerant to imidazolinones, e. g. imazamox. 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) and LibertyLink® (glufosinate).

The term "cultivated plants" is to be understood also including plants 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 ä-endotoxins, e. g. CrylA(b), CrylA(c), CrylF, CrylF(a2), CrylIA(b), CrylIIA, CrylIIB(b1) or Cry9c; vegetative insecticidal proteins (VIP), e. g. VIP1, VIP2, VIP3 or VIP3A; insecticidal proteins of bacteria colonizing nematodes, for example 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 Streptomycetes 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, for example WO 02/015701). Further examples of such toxins or genetically-modified plants capable of synthesizing such toxins are dis-closed, for example, in EP-A 374 753, WO 93/007278, WO 95/34656, EP-A 427 529, EP-A 451 878, WO 03/018810 und WO 03/052073. The methods for producing such genetically modified plants are generally known to the person skilled in the art and are described, for example, in the publications mentioned above. These insecticidal proteins contained in the genetically modified plants impart to the plants producing these proteins protection from harmful pests from certain taxonomic groups of arthropods, particularly to beetles (Coleoptera), flies (Diptera), and butterflies and moths (Lepidoptera) and to plant parasitic nematodes (Nematoda).

The term "cultivated plants" is to be understood also including plants 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, for example EP-A 0 392 225), plant disease resistance genes (for example potato cultivars, which express resistance genes acting against Phytophthora infestans derived from the mexican wild potato Solanum bulbocastanum) or T4-lyso-zym (e. g. potato cultivars capable of synthesizing these proteins with increased resistance against bacteria such as Erwinia amylvora). The methods for producing such genetically modified plants are generally known to the person skilled in the art and are described, for example, in the publications mentioned above.

The term "cultivated plants" is to be understood also including plants that are by the use of recombinant DNA techniques capable to synthesize one or more proteins to increase the productivity (e. g. bio mass production, grain yield, starch content, oil content or protein content), tolerance to drought, salinity or other growth-limiting environ-mental factors or tolerance to pests and fungal, bacterial or viral pathogens of those plants.

The term "cultivated plants" is to be understood also including plants 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, for ex-ample oil crops that produce health-promoting long-chain omega-3 fatty acids or unsaturated omega-9 fatty acids (e. g. Nexera® rape).

The term "cultivated plants" is to be understood also including plants 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, for example potatoes that produce increased amounts of amylopectin (e. g. Amflora® potato).

In general, "pesticidally effective amount" means the amount of active ingredients or mixture according to the invention 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 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.

In the case of foliar treatment ,the quantity of active ingredient ranges from 0.0001 to 500 g per 100 m^2, preferably from 0.001 to 20 g per 100 m^2, or from 1 to 100 g per hectare, preferably from 10 to 50 g per hectare, or from 12 to 50 g per hectare, or from 10 to 30 g per hectare, or from 20 to 40 g per hectare, or from 10 to 20 g per hectare, or from 20 to 30 g per hectare, or from 30 to 40 g per hectare, or from 40 to 50 g per hectare.

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^2, preferably from 0.001 to 20 g per 100 m^2.

Customary application rates in the protection of materials are, for example, from 0.01 g to 1000 g of active compounds per m^2 treated material, desirably from 0.1 g to 50 g per m^2.

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.

The mixtures according to the invention are effective through both contact (via soil, glass, wall, bed net, carpet, plant parts or animal parts), and ingestion (bait, or plant part).

The mixtures according to the invention may also be applied against non-crop insect pests, such as ants, termites, wasps, flies, mosquitos, crickets, or cockroaches. For use against said non-crop pests, the mixtures according to the invention are preferably used in a bait composition.

The bait can be a liquid, a solid or a semisolid preparation (e.g. a gel). Solid baits can be formed into various shapes and forms suitable to the respective application e.g. granules, blocks, sticks, disks. Liquid baits can be filled into various devices to ensure proper application, e.g. open containers, spray devices, droplet sources, or evaporation sources. Gels can be based on aqueous or oily matrices and can be formulated to particular necessities in terms of stickyness, moisture retention or aging characteristics.

The bait employed in the composition is a product, which is sufficiently attractive to incite insects such as ants, termites, wasps, flies, mosquitos, crickets etc. or cockroaches to eat it. The attractiveness can be manipulated by using feeding stimulants or sex pheromones. Food stimulants are chosen, for example, but not exclusively, from animal and/or plant proteins (meat-, fish- or blood meal, insect parts, egg yolk), from fats and oils of animal and/or plant origin, or mono-, oligo- or polyorganosaccharides, especially from sucrose, lactose, fructose, dextrose, glucose, starch, pectin or even molasses or honey. Fresh or decaying parts of fruits, crops, plants, animals, insects or specific parts thereof can also serve as a feeding stimulant. Sex pheromones are known to be more insect specific. Specific pheromones are described in the literature and are known to those skilled in the art.

For use in bait compositions, the typical content of active ingredients is from 0.001 weight % to 15 weight %, desirably from 0.001 weight % to 5% weight % of active compounds.

Formulations of compounds of formula I or compounds II or mixtures according to the invention as aerosols (e.g in spray cans), oil sprays or pump sprays are highly suitable for the non-professional user for controlling pests such as flies, fleas, ticks, mosquitos or cockroaches. Aerosol recipes are preferably composed of the active compound(s), solvents such as lower alcohols (e.g. methanol, ethanol, propanol, butanol), ketones (e.g. acetone, methyl ethyl

ketone), paraffin hydrocarbons (e.g. kerosenes) having boiling ranges of approximately 50 to 250 °C, dimethylformamide, N-methylpyrrolidone, dimethyl sulfoxide, aromatic hydrocarbons such as toluene, xylene, water, furthermore auxiliaries such as emulsifiers such as sorbitol monooleate, oleyl ethoxylate having 3-7 mol of ethylene oxide, fatty alcohol ethoxylate, perfume oils such as ethereal oils, esters of medium fatty acids with lower alcohols, aromatic carbonyl compounds, if appropriate stabilizers such as sodium benzoate, amphoteric surfactants, lower epoxides, triethyl orthoformate and, if required, propellants such as propane, butane, nitrogen, compressed air, dimethyl ether, carbon dioxide, nitrous oxide, or mixtures of these gases.
The oil spray formulations differ from the aerosol recipes in that no propellants are used.
For use in spray compositions, the content of active ingredient is from 0.001 to 80 weights %, preferably from 0.01 to 50 weight % and most preferably from 0.01 to 15 weight %.
The mixtures according to the invention respective their compositions can also be used in mosquito and fumigating coils, smoke cartridges, vaporizer plates or long-term vaporizers and also in moth papers, moth pads or other heat-independent vaporizer systems.
Methods to control infectious diseases transmitted by insects (e.g. malaria, dengue and yellow fever, lymphatic filariasis, and leishmaniasis) with mixtures according to the invention 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, nonwovens, netting material or foils and tarpaulins preferably comprise a mixture including the insecticide, optionally a repellent and at least one binder. Suitable repellents for example are N,N-Diethyl-meta-toluamide (DEET), N,N-diethylphenylacetamide (DEPA), 1-(3-cyclohexan-1-yl-carbonyl)-2-methylpiperine, (2-hydroxymethylcyclohexyl) acetic acid lactone, 2-ethyl-1,3-hexandiol, indalone, Methylneodecanamide (MNDA), a pyrethroid not used for insect control such as {(+/-)-3-allyl-2-methyl-4-oxocyclopent-2-(+)-enyl-(+)-trans-chrysantemate (Esbiothrin), a repellent derived from or identical with plant extracts like limonene, eugenol, (+)-Eucamalol (1), (-)-1-epi-eucamalol or crude plant extracts from plants like Eucalyptus maculata, Vitex rotundifolia, Cymbopogan martinii, Cymbopogan citratus (lemon grass), Cymopogan nartdus (citronella). Suitable binders are selected for example from polymers and copolymers of vinyl esters of aliphatic acids (such as such as vinyl acetate and vinyl versatate), acrylic and methacrylic esters of alcohols, such as butyl acrylate, 2-ethylhexylacrylate, and methyl acrylate, mono- and di-ethylenically unsaturated hydrocarbons, such as styrene, and aliphatic diens, such as butadiene.
The impregnation of curtains and bednets is done in general by dipping the textile material into emulsions or dispersions of the insecticide or spraying them onto the nets.
The mixtures according to the invention and their compositions can be used for protecting wooden materials such as trees, board fences, sleepers, etc. and buildings such as houses, outhouses, 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). The mixtures according to the invention are applied not only to the surrounding soil surface or into the under-floor soil in order to protect wooden materials but it can also be applied to lumbered articles such as surfaces of the under-floor concrete, alcove posts, beams, plywoods, furniture, etc., wooden articles such as particle boards, half boards, etc. and vinyl

articles such as coated electric wires, vinyl sheets, heat insulating material such as styrene foams, etc. In case of application against ants doing harm to crops or human beings, the ant controller of the present invention is applied to the crops or the surrounding soil, or is directly applied to the nest of ants or the like.

Seed treatment

The mixtures according to the invention are also suitable for the treatment of seeds in order to protect the seed from insect pest, in particular from soil-living insect pests and the resulting plant's roots and shoots against soil pests and foliar insects.

The mixtures according to the invention are particularly useful for the protection of the seed from soil pests and the resulting plant's roots and shoots against soil pests and foliar insects. The protection of the resulting plant's roots and shoots is preferred. More preferred is the protection of resulting plant's shoots from piercing and sucking insects, wherein the protection from aphids is most preferred.

The present invention therefore comprises a method for the protection of seeds from insects, in particular from soil insects and of the seedlings' roots and shoots from insects, in particular from soil and foliar insects, said method comprising contacting the seeds before sowing and/or after pregermination with a mixtures according to the invention. Particularly preferred is a method, wherein the plant's roots and shoots are protected, more preferably a method, wherein the plants shoots are protected from piercing and sucking insects, most preferably a method, wherein the plants shoots are protected from aphids. Also preferred ist a method, wherein the plant's roots and shoots are protected from chewing and biting insects, most preferably a method, wherein the plants shoots and roots are protected from Lepidoptera and/or Coleoptera, most preferably wherein the plant shoots and roots are protected Sesamia inferens, Cnaphalocerus medinalis, Oulema oryzae, Lissorhoptus oryzophilus, Nephotettox virens, Nilaparvata lugens, Laodelphax striatellus.

The term seed embraces seeds and plant propagules of all kinds including but not limited to true seeds, seed pieces, suckers, corms, bulbs, fruit, tubers, grains, cuttings, cut shoots and the like and means in a preferred embodiment true seeds.

The term seed treatment comprises all suitable seed treatment techniques known in the art, such as seed dressing, seed coating, seed dusting, seed soaking and seed pelleting.

The present invention also comprises seeds coated with or containing the active mixtures according to the invention.

The term "coated with and/or containing" generally signifies that the active ingredient is for the most part on the surface of the propagation product at the time of application, although a greater or lesser part of the ingredient may penetrate into the propagation product, depending on the method of application. When the said propagation product is (re)planted, it may absorb the active ingredient.

Suitable seed is seed of cereals, root crops, oil crops, vegetables, spices, ornamentals, for example seed of durum and other wheat, barley, oats, rye, maize (fodder maize and sugar maize / sweet and field corn), soybeans, oil crops, crucifers, cotton, sunflowers, bananas, rice, oilseed rape, turnip rape, sugarbeet, fodder beet, eggplants, potatoes, grass, lawn, turf, fodder grass, tomatoes, leeks, pumpkin/squash, cabbage, iceberg lettuce, pepper, cucumbers, melons,

Brassica species, melons, beans, peas, garlic, onions, carrots, tuberous plants such as potatoes, sugar cane, tobacco, grapes, petunias, geranium/pelargoniums, pansies and impatiens.

In addition, the active mixtures according to the invention may also be used for the treatment of seeds from plants, which tolerate the action of herbicides or fungicides or insecticides owing to breeding, including genetic engineering methods.

For example, the active mixtures according to the invention can be employed in treatment of seeds from plants, which are resistant to herbicides from the group consisting of the sulfonylureas, imidazolinones, glufosinate-ammonium or glyphosate-isopropylammonium and analogous active substances (see for example, EP-A 242 236, EP-A 242 246) (WO 92/00377) (EP-A 257 993, U.S. 5,013,659) or in transgenic crop plants, for example cotton, with the capability of producing Bacillus thuringiensis toxins (Bt toxins) which make the plants resistant to certain pests (EP-A 142 924, EP-A 193 259),

Furthermore, the active mixtures according to the invention can be used also for the treatment of seeds from plants, which have modified characteristics in comparison with existing plants consist, which can be generated for example by traditional breeding methods and/or the generation of mutants, or by recombinant procedures). For example, a number of cases have been described of recombinant modifications of crop plants for the purpose of modifying the starch synthesized in the plants (e.g. WO 92/11376, WO 92/14827, WO 91/19806) or of transgenic crop plants having a modified fatty acid composition (WO 91/13972).

The seed treatment application of the active compounds is carried out by spraying or by dusting the seeds before sowing of the plants and before emergence of the plants.

Compositions which are especially useful for seed treatment are e.g.:

- A Soluble concentrates (SL, LS)
- D Emulsions (EW, EO, ES)
- E Suspensions (SC, OD, FS)
- F Water-dispersible granules and water-soluble granules (WG, SG)
- G Water-dispersible powders and water-soluble powders (WP, SP, WS)
- H Gel-Formulations (GF)
- I Dustable powders (DP, DS)

Conventional seed treatment formulations include for example flowable concentrates FS, solutions LS, powders for dry treatment DS, water dispersible powders for slurry treatment WS, water-soluble powders SS and emulsion ES and EC and gel formulation GF. These formulations can be applied to the seed diluted or undiluted. Application to the seeds is carried out before sowing, either directly on the seeds or after having pregerminated the latter

In a preferred embodiment a FS formulation is used for seed treatment. Typcially, a FS formulation may comprise 1-800 g/l of active ingredient, 1-200 g/l Surfactant, 0 to 200 g/l antifreezing agent, 0 to 400 g/l of binder, 0 to 200 g/l of a pigment and up to 1 liter of a solvent, preferably water.

Especially preferred FS formulations of compounds of formula I, compounds II or the mixtures according to the invention, for seed treatment usually comprise from 0.1 to 80% by weight (1 to

800 g/l) of the active ingredient, from 0.1 to 20 % by weight (1 to 200 g/l) of at least one surfactant, e.g. 0.05 to 5 % by weight of a wetter and from 0.5 to 15 % by weight of a dispersing agent, up to 20 % by weight, e.g. from 5 to 20 % of an anti-freeze agent, from 0 to 15 % by weight, e.g. 1 to 15 % by weight of a pigment and/or a dye, from 0 to 40 % by weight, e.g. 1 to 40 % by weight of a binder (sticker /adhesion agent), optionally up to 5 % by weight, e.g. from 0.1 to 5 % by weight of a thickener, optionally from 0.1 to 2 % of an anti-foam agent, and optionally a preservative such as a biocide, antioxidant or the like, e.g. in an amount from 0.01 to 1 % by weight and a filler/vehicle up to 100 % by weight.

Seed Treatment formulations may additionally also comprise binders and optionally colorants. Binders can be added to improve the adhesion of the active materials on the seeds after treatment. Suitable binders are homo- and copolymers from alkylene oxides like ethylene oxide or propylene oxide, polyvinylacetate, polyvinylalcohols, polyvinylpyrrolidones, and copolymers thereof, ethylene-vinyl acetate copolymers, acrylic homo- and copolymers, polyethyleneamines, polyethyleneamides and polyethyleneimines, polysaccharides like celluloses, tylose and starch, polyolefin homo- and copolymers like olefin/maleic anhydride copolymers, polyurethanes, polyesters, polystyrene homo and copolymers

Optionally, also colorants can be included in the formulation. Suitable colorants or dyes for seed treatment formulations are Rhodamin B, C.I. Pigment Red 112, C.I. Solvent Red 1, pigment blue 15:4, pigment blue 15:3, pigment blue 15:2, pigment blue 15:1, pigment blue 80, pigment yellow 1, pigment yellow 13, pigment red 112, pigment red 48:2, pigment red 48:1, pigment red 57:1, pigment red 53:1, pigment orange 43, pigment orange 34, pigment orange 5, pigment green 36, pigment green 7, pigment white 6, pigment brown 25, basic violet 10, basic violet 49, acid red 51, acid red 52, acid red 14, acid blue 9, acid yellow 23, basic red 10, basic red 108.

Examples of a gelling agent is carrageen (Satiagel®)

In the treatment of seed, the application rates of the compounds I are generally from 0.1 g to 10 kg per 100 kg of seed, preferably from 1 g to 5 kg per 100 kg of seed, more preferably from 1 g to 1000 g per 100 kg of seed and in particular from 1 g to 200 g per 100 kg of seed.

The invention therefore also relates to seed comprising a compound of the formula I, or an agriculturally useful salt of I, as defined herein. The amount of the compound I or the agriculturally useful salt thereof will in general vary from 0.1 g to 10 kg per 100 kg of seed, preferably from 1 g to 5 kg per 100 kg of seed, in particular from 1 g to 1000 g per 100 kg of seed. For specific crops such as lettuce the rate can be higher.

Animal health

The mixtures according to the invention are in particular also suitable for being used for combating parasites in and on animals.

An object of the present invention is therfore also to provide new methods to control parasites in and on animals. Another object of the invention is to provide safer pesticides for animals. Another object of the invention is further to provide pesticides for animals that may be used in lower doses than existing pesticides. And another object of the invention is to provide pesticides for animals, which provide a long residual control of the parasites.

The invention also relates to compositions comprising a parasiticidally effective amount of the mixtures according to the invention and an acceptable carrier, for combating parasites in and on animals.

The present invention also provides a method for treating, controlling, preventing and protecting animals against infestation and infection by parasites, which comprises orally, topically or parenterally administering or applying to the animals a parasiticidally effective amount of a mixture according to the invention or a composition comprising it.

The invention also provides a process for the preparation of a composition for treating, controlling, preventing or protecting animals against infestation or infection by parasites which comprises a parasiticidally effective amount of a mixture according to the invention or a composition comprising it.

Activity of compounds against agricultural pests does not suggest their suitability for control of endo- and ectoparasites in and on animals which requires, for example, low, non-emetic dosages in the case of oral application, metabolic compatibility with the animal, low toxicity, and a safe handling.

Surprisingly it has now been found that the mixtures according to the invention are suitable for combating endo- and ectoparasites in and on animals.

Mixtures according to the invention and compositions comprising them are preferably used for controlling and preventing infestations and infections animals including warm-blooded animals (including humans) and fish. They are for example suitable for controlling and preventing infestations and infections in mammals such as cattle, sheep, swine, camels, deer, horses, pigs, poultry, rabbits, goats, dogs and cats, water buffalo, donkeys, fallow deer and reindeer, and also in fur-bearing animals such as mink, chinchilla and raccoon, birds such as hens, geese, turkeys and ducks and fish such as fresh- and salt-water fish such as trout, carp and eels.

Mixtures according to the invention and compositions comprising them are preferably used for controlling and preventing infestations and infections in domestic animals, such as dogs or cats.

Infestations in warm-blooded animals and fish include, but are not limited to, lice, biting lice, ticks, nasal bots, keds, biting flies, muscoid flies, flies, myiasitic fly larvae, chiggers, gnats, mosquitoes and fleas.

The mixtures according to the invention and compositions comprising them are suitable for systemic and/or non-systemic control of ecto- and/or endoparasites. They are active against all or some stages of development.

The mixtures according to the invention are especially useful for combating ectoparasites.

The mixtures according to the invention are especially useful for combating parasites of the following orders and species, respectively:

fleas (Siphonaptera), e.g. *Ctenocephalides felis*, *Ctenocephalides canis, Xenopsylla cheopis*, *Pulex irritans*, *Tunga penetrans*, and *Nosopsyllus fasciatus,*

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

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, Chrysomya bezziana, Chrysomya hominivorax, Chrysomya macellaria, Chrysops discalis, Chrysops silacea, Chrysops atlanticus, Cochliomyia hominivorax, Cordylobia anthropophaga, Culicoides furens, Culex pipiens, Culex nigripalpus, Culex quinquefasciatus*, *Culex tarsalis, Culiseta inornata, Culiseta melanura*, *Dermatobia hominis, Fannia canicularis, Gasterophilus intestinalis, Glossina morsitans, Glossina palpalis, Glossina fuscipes, Glossina tachinoides, Haematobia irritans, Haplodiplosis equestris, Hippelates spp., Hypoderma lineata, Leptoconops torrens, Lucilia caprina, Lucilia cuprina, Lucilia sericata, Lycoria pectoralis, Mansonia spp., Musca domestica, Muscina stabulans, Oestrus ovis, Phlebotomus argentipes, Psorophora columbiae, Psorophora discolor*, *Prosimulium mixtum*, *Sarcophaga haemorrhoidalis*, *Sarcophaga sp., Simulium vittatum, Stomoxys calcitrans, Tabanus bovinus, Tabanus atratus, Tabanus lineola,* and *Tabanus similis,*

lice (Phthiraptera), e.g. *Pediculus humanus capitis, Pediculus humanus corporis, Pthirus pubis*, *Haematopinus eurysternus*, *Haematopinus suis*, *Linognathus vituli, Bovicola bovis, Menopon gallinae, Menacanthus stramineus* and *Solenopotes capillatus.*

ticks and parasitic mites (Parasitiformes): ticks (Ixodida), e.g. *Ixodes scapularis, Ixodes holocyclus, Ixodes pacificus, Rhiphicephalus sanguineus, Dermacentor andersoni, Dermacentor variabilis*, *Amblyomma americanum, Ambryomma maculatum, Ornithodorus hermsi, Ornithodorus turicata* and parasitic mites (Mesostigmata), e.g. *Ornithonyssus bacoti* and *Dermanyssus gallinae*,

Actinedida (Prostigmata) und Acaridida (Astigmata) e.g. *Acarapis spp., Cheyletiella spp., Ornithocheyletia spp., Myobia spp., Psorergates spp., Demodex spp., Trombicula spp., Listrophorus spp., Acarus spp., Tyrophagus spp., Caloglyphus spp., Hypodectes spp., Pterolichus spp., Psoroptes spp., Chorioptes spp., Otodectes spp., Sarcoptes spp., Notoedres spp.,Knemidocoptes spp., Cytodites spp.,* and *Laminosioptes spp,*

Bugs (Heteropterida): *Cimex lectularius, Cimex hemipterus, Reduvius senilis, Triatoma spp., Rhodnius ssp., Panstrongylus ssp.* and *Arilus critatus,*

Anoplurida, e.g. *Haematopinus spp., Linognathus spp., Pediculus spp., Phtirus spp.,* and *Solenopotes spp,*

Mallophagida (suborders Arnblycerina and Ischnocerina), e.g. *Trimenopon spp., Menopon spp., Trinoton spp., Bovicola spp., Werneckiella spp., Lepikentron spp., Trichodectes spp.,* and *Felicola spp,*

Roundworms Nematoda:

Wipeworms and Trichinosis (Trichosyringida), e.g. Trichinellidae *(Trichinella spp.), (*Trichuridae*) Trichuris spp., Capillaria spp,*

Rhabditida, e.g. *Rhabditis spp, Strongyloides spp., Helicephalobus spp,*

Strongylida, e.g. *Strongylus spp., Ancylostoma spp., Necator americanus, Bunostomum spp. (Hookworm), Trichostrongylus spp., Haemonchus contortus., Ostertagia spp., Cooperia spp., Nematodirus spp., Dictyocaulus spp., Cyathostoma spp., Oesophagostomum spp., Stephanurus dentatus, Ollulanus spp., Chabertia spp., Stephanurus dentatus , Syngamus trachea*, *Ancylostoma spp., Uncinaria spp., Globocephalus spp., Necator spp., Metastrongylus spp., Muellerius capillaris, Protostrongylus spp., Angiostrongylus spp., Parelaphostrongylus spp. Aleurostrongylus abstrusus,* and *Dioctophyma renale,*

Intestinal roundworms (Ascaridida), e.g. *Ascaris lumbricoides, Ascaris suum, Ascaridia galli, Parascaris equorum, Enterobius vermicularis (Threadworm), Toxocara canis, Toxascaris leonine, Skrjabinema spp.,* and *Oxyuris equi,*

Camallanida, e.g. *Dracunculus medinensis* (guinea worm)

Spirurida, e.g. *Thelazia spp. Wuchereria spp., Brugia spp., Onchocerca spp., Dirofilari spp.a, Dipetalonema spp., Setaria spp., Elaeophora spp., Spirocerca lupi,* and *Habronema spp.,*

Thorny headed worms (Acanthocephala), e.g. *Acanthocephalus spp., Macracanthorhynchus hirudinaceus* and *Oncicola spp,*

Planarians (Plathelminthes):

Flukes (Trematoda), e.g. *Faciola spp., Fascioloides magna, Paragonimus spp., Dicrocoelium spp., Fasciolopsis buski, Clonorchis sinensis, Schistosoma spp., Trichobilharzia spp., Alaria alata, Paragonimus spp.,* and *Nanocyetes spp*,

Cercomeromorpha, in particular Cestoda (Tapeworms), e.g. *Diphyllobothrium spp., Tenia spp., Echinococcus spp., Dipylidium caninum, Multiceps spp., Hymenolepis spp., Mesocestoides spp., Vampirolepis spp., Moniezia spp., Anoplocephala spp., Sirometra spp., Anoplocephala spp.,* and *Hymenolepis spp.*

The mixtures according to the invention and compositions containing them are particularly useful for the control of pests from the orders Diptera, Siphonaptera and Ixodida.

Moreover, the use of the mixtures according to the invention and compositions containing them for combating mosquitoes is especially preferred.

The use of the mixtures according to the invention and compositions containing them for combating flies is a further preferred embodiment of the present invention.

Furthermore, the use of the compounds of formula I and compositions containing them for combating fleas is especially preferred.

The use of the mixtures according to the invention and compositions containing them for combating ticks is a further preferred embodiment of the present invention.

The mixtures according to the invention also are especially useful for combating endoparasites (roundworms nematoda, thorny headed worms and planarians).

Administration can be carried out both prophylactically and therapeutically.

Administration of the active compounds or mixtures is carried out directly or in the form of suitable preparations, orally, topically/dermally or parenterally.

For oral administration to warm-blooded animals, the compounds of formula I, compounds II or the mixtures accordingto the invention may be formulated as animal feeds, animal feed premixes, animal feed concentrates, pills, solutions, pastes, suspensions, drenches, gels, tablets, boluses and capsules. In addition, the compounds of formula I, compounds II or the mixtures accordingto the invention may be administered to the animals in their drinking water. For oral administration, the dosage form chosen should provide the animal with 0.01 mg/kg to 100 mg/kg of animal body weight per day of the compounds of formula I, compounds II or the mixtures accordingto the invention, preferably with 0.5 mg/kg to 100 mg/kg of animal body weight per day.

Alternatively, the compounds of formula I, compounds II or the mixtures accordingto the invention may be administered to animals parenterally, for example, by intraruminal, intramuscular, intravenous or subcutaneous injection. The compounds of formula I, compounds

II or the mixtures accordingto the invention may be dispersed or dissolved in a physiologically acceptable carrier for subcutaneous injection. Alternatively, the compounds of formula I, compounds II or the mixtures accordingto the invention may be formulated into an implant for subcutaneous administration. In addition the compounds of formula I, compounds II or the mixtures accordingto the invention may be transdermally administered to animals. For parenteral administration, the dosage form chosen should provide the animal with 0.01 mg/kg to 100 mg/kg of animal body weight per day of the compounds of formula I, compounds II or the mixture accordingto the invention.

The compounds of formula I, compounds II or the mixtures accordingto the invention may also be applied topically to the animals in the form of dips, dusts, powders, collars, medallions, sprays, shampoos, spot-on and pour-on formulations and in ointments or oil-in-water or water-in-oil emulsions. For topical application, dips and sprays usually contain 0.5 ppm to 5,000 ppm and preferably 1 ppm to 3,000 ppm of the compounds of formula I, compounds II or the mixtures accordingto the invention. In addition, the compounds of formula I, compounds II or the mixtures accordingto the invention may be formulated as ear tags for animals, particularly quadrupeds such as cattle and sheep.

Suitable preparations are:

- Solutions such as oral solutions, concentrates for oral administration after dilution, solutions for use on the skin or in body cavities, pouring-on formulations, gels;
- Emulsions and suspensions for oral or dermal administration; semi-solid preparations;
- Formulations in which the active compound is processed in an ointment base or in an oil-in-water or water-in-oil emulsion base;
- Solid preparations such as powders, premixes or concentrates, granules, pellets, tablets, boluses, capsules; aerosols and inhalants, and active compound-containing shaped articles.

Compositions suitable for injection are prepared by dissolving the active ingredient in a suitable solvent and optionally adding further ingredients such as acids, bases, buffer salts, preservatives, and solubilizers. The solutions are filtered and filled sterile.

Suitable solvents are physiologically tolerable solvents such as water, alkanols such as ethanol, butanol, benzyl alcohol, glycerol, propylene glycol, polyethylene glycols, N-methyl-pyrrolidone, 2-pyrrolidone, and mixtures thereof.

The active compounds can optionally be dissolved in physiologically tolerable vegetable or synthetic oils which are suitable for injection.

Suitable solubilizers are solvents which promote the dissolution of the active compound in the main solvent or prevent its precipitation. Examples are polyvinylpyrrolidone, polyvinyl alcohol, polyoxyethylated castor oil, and polyoxyethylated sorbitan ester.

Suitable preservatives are benzyl alcohol, trichlorobutanol, p-hydroxybenzoic acid esters, and n-butanol.

Oral solutions are administered directly. Concentrates are administered orally after prior dilution to the use concentration. Oral solutions and concentrates are prepared according to the state of the art and as described above for injection solutions, sterile procedures not being necessary.

Solutions for use on the skin are trickled on, spread on, rubbed in, sprinkled on or sprayed on.

Solutions for use on the skin are prepared according to the state of the art and according to what is described above for injection solutions, sterile procedures not being necessary.

Further suitable solvents are polypropylene glycol, phenyl ethanol, phenoxy ethanol, ester such as ethyl or butyl acetate, benzyl benzoate, ethers such as alkyleneglycol alkylether, e.g. dipropylenglycol monomethylether, ketons such as acetone, methylethylketone, aromatic hydrocarbons, vegetable and synthetic oils, dimethylformamide, dimethylacetamide, transcutol, solketal, propylencarbonate, and mixtures thereof.

It may be advantageous to add thickeners during preparation. Suitable thickeners are inorganic thickeners such as bentonites, colloidal silicic acid, aluminium monostearate, organic thickeners such as cellulose derivatives, polyvinyl alcohols and their copolymers, acrylates and methacrylates.

Gels are applied to or spread on the skin or introduced into body cavities. Gels are prepared by treating solutions which have been prepared as described in the case of the injection solutions with sufficient thickener that a clear material having an ointment-like consistency results. The thickeners employed are the thickeners given above.

Pour-on formulations are poured or sprayed onto limited areas of the skin, the active compound penetrating the skin and acting systemically.

Pour-on formulations are prepared by dissolving, suspending or emulsifying the active compound in suitable skin-compatible solvents or solvent mixtures. If appropriate, other auxiliaries such as colorants, bioabsorption-promoting substances, antioxidants, light stabilizers, adhesives are added.

Suitable solvents which are: water, alkanols, glycols, polyethylene glycols, polypropylene glycols, glycerol, aromatic alcohols such as benzyl alcohol, phenylethanol, phenoxyethanol, esters such as ethyl acetate, butyl acetate, benzyl benzoate, ethers such as alkylene glycol alkyl ethers such as dipropylene glycol monomethyl ether, diethylene glycol mono-butyl ether, ketones such as acetone, methyl ethyl ketone, cyclic carbonates such as propylene carbonate, ethylene carbonate, aromatic and/or aliphatic hydrocarbons, vegetable or synthetic oils, DMF, dimethylacetamide, n-alkylpyrrolidones such as methylpyrrolidone, n-butylpyrrolidone or n-octylpyrrolidone, N-methylpyrrolidone, 2-pyrrolidone, 2,2-dimethyl-4-oxy-methylene-1,3-dioxolane and glycerol formal.

Suitable colorants are all colorants permitted for use on animals and which can be dissolved or suspended.

Suitable absorption-promoting substances are, for example, DMSO, spreading oils such as isopropyl myristate, dipropylene glycol pelargonate, silicone oils and copolymers thereof with polyethers, fatty acid esters, triglycerides, fatty alcohols.

Suitable antioxidants are sulfites or metabisulfites such as potassium metabisulfite, ascorbic acid, butylhydroxytoluene, butylhydroxyanisole, tocopherol.

Suitable light stabilizers are, for example, novantisolic acid.

Suitable adhesives are, for example, cellulose derivatives, starch derivatives, polyacrylates, natural polymers such as alginates, gelatin.

Emulsions can be administered orally, dermally or as injections.

Emulsions are either of the water-in-oil type or of the oil-in-water type.

They are prepared by dissolving the active compound either in the hydrophobic or in the hydrophilic phase and homogenizing this with the solvent of the other phase with the aid of suitable emulsifiers and, if appropriate, other auxiliaries such as colorants, absorption-promoting substances, preservatives, antioxidants, light stabilizers, viscosity-enhancing substances.

Suitable hydrophobic phases (oils) are:

liquid paraffins, silicone oils, natural vegetable oils such as sesame oil, almond oil, castor oil, synthetic triglycerides such as caprylic/capric biglyceride, triglyceride mixture with vegetable fatty acids of the chain length C_8-C_{12} or other specially selected natural fatty acids, partial glyceride mixtures of saturated or unsaturated fatty acids possibly also containing hydroxyl groups, mono- and diglycerides of the C_8-C_{10} fatty acids,

fatty acid esters such as ethyl stearate, di-n-butyryl adipate, hexyl laurate, dipropylene glycol perlargonate, esters of a branched fatty acid of medium chain length with saturated fatty alcohols of chain length C_{16}-C_{18}, isopropyl myristate, isopropyl palmitate, caprylic/capric acid esters of saturated fatty alcohols of chain length C_{12}-C_{18}, isopropyl stearate, oleyl oleate, decyl oleate, ethyl oleate, ethyl lactate, waxy fatty acid esters such as synthetic duck coccygeal gland fat, dibutyl phthalate, diisopropyl adipate, and ester mixtures related to the latter, fatty alcohols such as isotridecyl alcohol, 2-octyldodecanol, cetylstearyl alcohol, oleyl alcohol, and fatty acids such as oleic acid and mixtures thereof.

Suitable hydrophilic phases are: water, alcohols such as propylene glycol, glycerol, sorbitol and mixtures thereof.

Suitable emulsifiers are:

non-ionic surfactants, e.g. polyethoxylated castor oil, polyethoxylated sorbitan monooleate, sorbitan monostearate, glycerol monostearate, polyoxyethyl stearate, alkylphenol polyglycol ether;

ampholytic surfactants such as di-sodium N-lauryl-p-iminodipropionate or lecithin;

anionic surfactants, such as sodium lauryl sulfate, fatty alcohol ether sulfates, mono/dialkyl polyglycol ether orthophosphoric acid ester monoethanolamine salt;

cation-active surfactants, such as cetyltrimethylammonium chloride.

Suitable further auxiliaries are: substances which enhance the viscosity and stabilize the emulsion, such as carboxymethylcellulose, methylcellulose and other cellulose and starch derivatives, polyacrylates, alginates, gelatin, gum arabic, polyvinylpyrrolidone, polyvinyl alcohol, copolymers of methyl vinyl ether and maleic anhydride, polyethylene glycols, waxes, colloidal silicic acid or mixtures of the substances mentioned.

Suspensions can be administered orally or topically/dermally. They are prepared by suspending the active compound in a suspending agent, if appropriate with addition of other auxiliaries such as wetting agents, colorants, bioabsorption-promoting substances, preservatives, antioxidants, light stabilizers.

Liquid suspending agents are all homogeneous solvents and solvent mixtures.

Suitable wetting agents (dispersants) are the emulsifiers given above.

Other auxiliaries which may be mentioned are those given above.

Semi-solid preparations can be administered orally or topically/dermally. They differ from the suspensions and emulsions described above only by their higher viscosity.

For the production of solid preparations, the active compound is mixed with suitable excipients, if appropriate with addition of auxiliaries, and brought into the desired form.

Suitable excipients are all physiologically tolerable solid inert substances. Those used are inorganic and organic substances. Inorganic substances are, for example, sodium chloride, carbonates such as calcium carbonate, hydrogencarbonates, aluminium oxides, titanium oxide, silicic acids, argillaceous earths, precipitated or colloidal silica, or phosphates. Organic substances are, for example, sugar, cellulose, foodstuffs and feeds such as milk powder, animal meal, grain meals and shreds, starches.

Suitable auxiliaries are preservatives, antioxidants, and/or colorants which have been mentioned above.

Other suitable auxiliaries are lubricants and glidants such as magnesium stearate, stearic acid, talc, bentonites, disintegration-promoting substances such as starch or crosslinked polyvinylpyrrolidone, binders such as starch, gelatin or linear polyvinylpyrrolidone, and dry binders such as microcrystalline cellulose.

In general, "parasiticidally effective amount" means the amount of active ingredient 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 parasiticidally effective amount can vary for the various compounds/mixtures/compositions used in the invention. A parasiticidally effective amount of the compositions will also vary according to the prevailing conditions such as desired parasiticidal effect and duration, target species, mode of application, and the like.

The compositions which can be used in the invention can comprise generally from about 0.001 to 95% of the the mixture according to the invention.

Generally it is favorable to apply the mixture according to the invention in total amounts of 0.5 mg/kg to 100 mg/kg per day, preferably 1 mg/kg to 50 mg/kg per day.

Ready-to-use preparations contain the compounds acting against parasites, preferably ectoparasites, in concentrations of 10 ppm to 80 per cent by weight, preferably from 0.1 to 65 per cent by weight, more preferably from 1 to 50 per cent by weight, most preferably from 5 to 40 per cent by weight.

Preparations which are diluted before use contain the compounds acting against ectoparasites in concentrations of 0.5 to 90 per cent by weight, preferably of 1 to 50 per cent by weight.

Furthermore, the preparations comprise the mixtures according to the invention against endoparasites in concentrations of 10 ppm to 2 per cent by weight, preferably of 0.05 to 0.9 per cent by weight, very particularly preferably of 0.005 to 0.25 per cent by weight.

In a preferred embodiment of the present invention, the compositions comprising the mixtures according to the inventionare applied dermally / topically.

In a further preferred embodiment, the topical application is conducted in the form of compound-containing shaped articles such as collars, medallions, ear tags, bands for fixing at body parts, and adhesive strips and foils.

Generally it is favorable to apply solid formulations which release the active compounds in total amounts of 10 mg/kg to 300 mg/kg, preferably 20 mg/kg to 200 mg/kg, most preferably 25 mg/kg to 160 mg/kg body weight of the treated animal in the course of three weeks.

For the preparation of the shaped articles, thermoplastic and flexible plastics as well as elastomers and thermoplastic elastomers are used. Suitable plastics and elastomers are polyvinyl resins, polyurethane, polyacrylate, epoxy resins, cellulose, cellulose derivatives, polyamides and polyester which are sufficiently compatible with the active compounds. A detailed list of plastics and elastomers as well as preparation procedures for the shaped articles is given e.g. in WO 03/086075.

Examples

The present invention is now illustrated in further detail by the following examples.

The compounds I of formula I can be accomplished according to standard methods of organic chemistry, e.g. by the methods or working examples described in WO 2007/006670, PCT/EP2012/065650, PCT/EP2012/065651.

The characterization can be done by coupled High Performance Liquid Chromatography / mass spectrometry (HPLC/MS), by NMR or by their melting points.

A group of especially preferred compounds of formula I are compounds of formula IA-1 as listed in table C above.

Method A: Analytical HPLC column: RP-18 column Chromolith Speed ROD from Merck KgaA (Germany). Elution: acetonitrile + 0.1% trifluoroacetic acid (TFA) / water + 0.1% trifluoroacetic acid (TFA) in a ratio of from 5:95 to 95:5 in 5 minutes at 40 °C.

Method B: Analytical UPLC column: Phenomenex Kinetex 1,7 µm XB-C18 100A; 50 x 2.1 mm; mobile phase: A: water + 0.1% trifluoroacetic acid (TFA); B: acetonitrile + 0.1% TFA; gradient: 5-100% B in 1.50 minutes; 100% B 0.20 min; flow: 0,8-1,0mL/min in 1,50 minutes at 60°C.

MS-method: ESI positive.

^{1}H-NMR. The signals are characterized by chemical shift (ppm) vs. tetramethylsilane, by their multiplicity and by their integral (relative number of hydrogen atoms given). The following abbreviations are used to characterize the multiplicity of the signals: m = multiplett, q = quartett, t = triplett, d = doublet and s = singulett.

Preparation Examples:

logP determinations were performed via capillary electrophorese on a cePro9600™ from CombiSep.

Starting materials

6,8-dichloro-1H-benzo[d][1,3]oxazine-2,4-dione and 6-chloro-8-methyl-1H-3,1-benzoxazine-2,4-dione were prepared according to WO 2007/43677.

S,S-Diisopropyl-S-aminosulfonium 2,4,6-trimethylphenylsulfonat was prepared according to Y. Tamura et al, Tetrahedron 1975, 31, 3035-3040.

2-(3-Chloropyridin-2-yl)-5-bromo-2H-pyrazole-3-carbonyl chloride was prepared according to WO 2007/24833.

Preparation Examples P.1 to P.4

Example P.1: S,S-Dimethyl sulfinium sulfate

To a solution of sodium methylate (15.76 g of a 30% solution in methanol, 87.54 mmol, 1.100 equiv.) in methanol (60 mL) was added dimethyl sulphide (5.44 g, 6.40 mL, 87.6 mmol, 1.10 equiv.) at -5-0°C. To this mixture was added a pre-cooled solution (-20°C) of hydroxylamine-O-sulfonic acid (9.00 g, 79.6 mmol) in methanol (60 mL) and the internal temperature was maintained at -5-0°C. After stirring at room temperature overnight, all solids were removed by filtration. The filtrate was concentrated in vacuo and the residue was triturated with acetonitrile (50 mL) to yield the title compound (7.88 g, 39%).

The following compounds were prepared by analogy to example P.1:
S,S-diethyl sulfinium sulfate
S-ethyl-S-isopropyl sulfinium sulfate
S,S-diisopropyl sulfinium sulfate
S,S-bis(2-cyclopropylmethyl) sulfinium sulfate
S,S-bis(2-cyclopropylethyl) sulfinium sulfate
S,S-bis(cyclobutylmethyl) sulfinium sulfate
S,S-bis(cyclopentylmethyl) sulfinium sulfate
S-cyclopropylmethyl-S-ethyl sulfinium sulfate
S-(2-cyclopropylethyl)-S-ethyl sulfinium sulfate
S-(2-cyclopropylethyl)-S-isopropyl sulfinium sulfate
S-(1-cyclopropylethyl)-S-isopropyl sulfinium sulfate
S-cyclobutylmethyl-S-ethyl sulfinium sulfate
S-cyclopentylmethyl-S-ethyl sulfinium sulfate
S-cyclopropylmethyl-S-isopropyl sulfinium sulfate
S-cyclobutylmethyl-S-isopropyl sulfinium sulfate
S-cyclopentylmethyl-S-isopropyl sulfinium sulfate
S,S-di-n-propyl sulfinium sulfate
S-vinyl-S-ethyl sulfinium sulfate

Example P.2: 8-Bromo-6-chloro-1H-benzo[d][1,3]oxazine-2,4-dione
To a solution of 2-amino-3-bromo-5-chlorobenzoic acid (10.0 g, 39.9 mmol) in dioxane (170 mL) was added phosgene (20% in toluene, 42.0 mL, 79.9 mmol) over a period of 15 mins. The reaction was stirred at ambient temperature for 48 h and then concentrated in vacuo. The resulting solid was crushed and further dried in vacuo to yield the desired product (12.6 g, 114%) which was used in the subsequent step without further purification.

The following compounds were prepared by analogy to example P.2:
6,8-dichloro-1H-benzo[d][1,3]oxazine-2,4-dione,
6,8-dibromo-1H-benzo[d][1,3]oxazine-2,4-dione,

6-Bromo-8-chloro-1H-benzo[d][1,3]oxazine-2,4-dione,
8-Bromo-6-chloro-1H-benzo[d][1,3]oxazine-2,4-dione,
6-chloro-8-methyl-1H-benzo[d][1,3]oxazine-2,4-dione,
6-bromo-8-methyl-1H-benzo[d][1,3]oxazine-2,4-dione,
6-cyano-8-methyl-1H-benzo[d][1,3]oxazine-2,4-dione,
6-chloro-8-trifluoromethyl-1H-benzo[d][1,3]oxazine-2,4-dione,
8-chloro-6-trifluoromethyl-1H-benzo[d][1,3]oxazine-2,4-dione,
6-bromo-8-trifluoromethyl-1H-benzo[d][1,3]oxazine-2,4-dione,
8-bromo-6-trifluoromethyl-1H-benzo[d][1,3]oxazine-2,4-dione,
8-chloro-6-cyano-1H-benzo[d][1,3]oxazine-2,4-dione,
6-chloro-8-methoxy-1H-benzo[d][1,3]oxazine-2,4-dione,
6-chloro-8-cyclopropyl-1H-benzo[d][1,3]oxazine-2,4-dione,
6-chloro-8-ethyl-1H-benzo[d][1,3]oxazine-2,4-dione,
6-difluoromethoxy-8-methyl-1H-benzo[d][1,3]oxazine-2,4-dione,
6-cyano-8-methoxy-1H-benzo[d][1,3]oxazine-2,4-dione,
6-fluoro-8-methyl-1H-benzo[d][1,3]oxazine-2,4-dione,
6-iodo-8-methyl-1H-benzo[d][1,3]oxazine-2,4-dione,
6-nitro-8-methyl-1H-benzo[d][1,3]oxazine-2,4-dione,
6-(5-chloro-2-thienyl)-8-methyl-1H-benzo[d][1,3]oxazine-2,4-dione,
6-(3-pyrazol-1H-yl)-8-methyl-1H-benzo[d][1,3]oxazine-2,4-dione,
6-(3-isoxazolyl)-8-methyl-1H-benzo[d][1,3]oxazine-2,4-dione,
6-(hydroxyiminomethyl)-8-methyl-1H-benzo[d][1,3]oxazine-2,4-dione,
6-(methoxyiminomethyl)-8-methyl-1H-benzo[d][1,3]oxazine-2,4-dione,
6-(dimethylhydrazonomethyl)-8-methyl-1H-benzo[d][1,3]oxazine-2,4-dione and
6-(2,2,2-trifluoroethylhydrazonomethyl)-8-methyl-1H-benzo[d][1,3]oxazine-2,4-dione.

Example P.3: 1-(3-chloro-2-pyridyl)-3-trifluoromethyl-1H-pyrazol

a) 2.71 kg of 1,1,1-trifluoro-4-methoxy-but-3-en-2-one, 2,44 kg of ethanol and 3.10 kg of water were charged into a reaction vessel. 20 ml of concentrated hydrochloric acid and 0,80 kg of hydrazine hydrate were successively added and the mixture was heated to reflux for 4 h. The mixtures was allowed to cool and neutralized by addition of 10 % aqueous NaOH to about pH 4-5. Then the mixture was evaporated. Toluene was added and the mixture was again evaporated to yield 2 kg of raw 3-trifluoromethylpyrazole with a purity of > 85 %.

b) 1.72 kg (10.75 mol) of the raw 3-trifluoromethylpyrazole obtained in step a), 1.75 kg (11.83 mol) of 2,3-dichloropyridine and 4.73 kg of dimethyl formamide were charged to a reaction vessel. 2.97 kg (21.50 mol) of potassium carbonate were added, the mixture was heated to 120°C with stirring and kept at 120-125°C for further 3 h. The reaction mixtures was cooled to 25°C and poured into 20 l of water. The thus obtained mixture was extracted twice with 5 L of tert.-butylmethyl ether. The combined organic phases were washed with 4 l of water and then evaporated to dryness. Toluene was added and the mixture was again evaporated to dryness.

Thereby, the 2.7 kg of the title compound was obtained (purity > 75% as determined by GC; yield 81.5%). The product can be purified by distillation.
^{1}H-NMR (400 MHz, $CDCl_3$): δ [delta] = 6.73 (d, 1H), 7.38 (d, 1H), 7.95 (m, 1H), 8.14 (m, 1H), 8.46 (m, 1H).

Example P.4: 2-(3-Chloropyridin-2-yl)-5-trifluoromethyl-2H-pyrazole-3-carbonyl chloride
In a reaction vessel equipped with a thermometer, septum, nitrogen inlet and stirring bar, 10.0 g (40.4 mmol) of 1-(3-chloro-2-pyridyl)-3-trifloromethyl-1H-pyrazole were dissolved in 50 ml of dry dimethoxyethane. By means of a syringe, 40.4 ml of a 2 M solution (80.8 mmol, 2.0 equiv.) of isopropyl magnesium chloride in tetrahydrofuran were added dropwise with stirring, while cooling the vessel with an ice bath and keeping the internal temperature at about 5°C. The mixture was stirred for further 2 hours at 5°C. Then the ice-bath was removed and carbon dioxide was bubbled through mixture causing an increase of the temperature up to 28°C. After 10 minutes, the exothermic reaction has ceased, and, the mixture was cooled and all volatiles were removed by evaporation. The residue containing the carboxylate compound I-A was taken up in 50 mL of dichloromethane and one drop of dry DMF was added. To this mixture, 14.41 g (121.2 mmol, 3.0 equiv.) of thionyl chloride were added and heated to reflux for 3 hours. After cooling, the resulting precipitate was removed by filtration and the mother liquid was concentrated in vacuum to obtain 13.0 g of the title compound (purity >85%, yield 100%) which was used in the next step without further purification.
^{1}H-NMR (400 MHz, $CDCl_3$): δ[delta] = 7.43-7.54 (m, 2H), 7.93 (d, 1H), 8.52 (m, 1H).

Example P.5: 2-amino-5-chloro-N-(dimethyl-λ^4-sulfanylidene)-3-methyl-benzamide
To a solution of 6-chloro-8-methyl-1H-3,1-benzoxazine-2,4-dione (3.00 g, 12.8 mmol) in dichloromethane (40 mL) was added dimethyl sulfinium sulfate (2.25 g, 8.93 mmol, 0.70 equiv.) and potassium tert-butylate (1.58 g, 14.0 mmol, 1.10 equiv.) at room temperature. The mixture was stirred for 1.5 h, upon which water was added and the layers were separated. The aqueous layer was extracted with dichloromethane, combined organic layers were dried over sodium sulphate and concentrated in vacuo. The residue was purified by flash-chromatography on silica gel to yield the title compound (2.63 g, 84%).
Characterization by HPLC-MS: 1.855 min, M = 245.00.

Example P.6: 2-amino-5-chloro-N-(bis-2-methylpropyl-λ^4-sulfanylidene)-3-methyl-benzamide
To a solution of 6-chloro-8-methyl-1H-3,1-benzoxazine-2,4-dione (3.00 g, 12.8 mmol) in dichloromethane (40 mL) was added bis-2-methylpropyl sulfinium sulfate (3.76 g, 8.93 mmol, 0.70 equiv.) and potassium tert-butylate (1.58 g, 14.0 mmol, 1.10 equiv.) at room temperature. The mixture was stirred for 1.5 h, upon which water was added and the layers were separated. The aqueous layer was extracted with dichloromethane, combined organic layers were dried over sodium sulphate and concentrated in vacuo. The residue was purified by flash-chromatography on silica gel to yield the title compound (2.89 g, 69%).

Characterization by ^{1}H-NMR (400 MHz, DMSO-d_6): δ[delta] = 1.04 (m, 12 H), 2.06 (s, 3H), 2.96 (m, 2H), 3.01 (m, 2H), 6.62 (br. s, 2H), 7.03 (s, 1H), 7.72 (s, 1H).

Example P.7: 2-amino-5-chloro-N-(diethyl-λ^4-sulfanylidene)-3-methyl-benzamide
To a solution of 6-chloro-8-methyl-1H-3,1-benzoxazine-2,4-dione (2 g, 0.01 mol) in anhydrous propylene carbonate (30 mL) was added bis-2-ethyl sulfinium sulfate (2.04 g, 0.01 mol, 0.70 equiv.) and triethyl amine (1.38 mL, 1.0 g g, 0.01 mol, 1.05 equiv.) at room temperature. The mixture was stirred for 4.5 h, and then added dropwise to ice-water. The mixture was extracted with dichloromethane and the combined organic layers were dried over sodium sulphate and concentrated in vacuo. The residue was triturated with ether to yield the title compound (1.43 g, 55%).
Characterization by ^{1}H-NMR (400 MHz, $CDCl_3$): δ[delta] = 1.39 (t, 6 H), 2.13 (s, 3H), 3.02 (q, 4H), 5.95 (br. S, 2H), 7.01 (s, 1H), 7.98 (s, 1H).

Example P.8: 2-amino-3,5-dichloro-N-(bis-2-methylpropyl-λ^4-sulfanylidene)-benzamide
The title compound was prepared by analogy to the method of example P.6
Yield: 60%
Characterization by ^{1}H-NMR (400 MHz, DMSO-d_6): δ[delta] = 1.23 (d, 6H), 1.38 (d, 6H), 3.42 (m, 2H), 7.02 (br. s, 2H), 7.41 (s, 1H), 7.95 (s, 1H).

Example P.9: 2-amino-3,5-dibromo-N-(bis-2-methylpropyl-λ^4-sulfanylidene)-benzamide
The title compound was prepared by analogy to the method of example P.6
Yield: 66%
Characterization by HPLC-MS: 3.409 min, m/z = 410.90 (Method A)

Preparation of the compounds of formula IA-1 (Examples 1 to 4)

Example 1: 2-(3-chloro-2-pyridyl)-N-[2,4-dichloro-6-[(diethyl-λ^4-sulfanylidene)carbamoyl]phenyl]-5-(trifluoromethyl)pyrazole-3-carboxamide (Compound I-16)
To a suspension of potassium carbonate (8.08 g, 58.5 mmol, 1.50 equiv) and 2-amino-3,5-dichloro-N-(diethyl-λ^4-sulfanylidene)benzamide (11.43 g, 38.98 mmol) in acetonitrile (100 mL) was added a solution of 2-(3-chloro-2-pyridyl)-5-(trifluoromethyl)pyrazole-3-carbonyl chloride (15.8 g, 43.31 mmol, 1.10 equiv.) in acetonitrile (50 mL) at room temperature. After 6 h at this temperature, the solids were filtered off. The resulting filtrate was washed with water and dried over Na_2SO_4. After filtration, the filtrate was concentrated in vacuum and the resulting solids were crystallized from diisopropyl ether to yield the title compound (19.53 g, 88%).
Characterization by ^{1}H-NMR (400 MHz, DMSO-d_6):
δ[delta] = 1.13 (t, 6H), 2.91 (m, 2H), 3.08 (m, 2H), 7.67 (dd, 1H), 7.77 (s, 2H), 7.89 (s, 1H), 8.22 (d, 1H), 8.51 (d, 1H), 10.73 (s, 1H).

Example 2: Synthesis of 2-(3-chloro-2-pyridyl)-N-[2,4-dichloro-6-[(bis-2-propyl-λ^4-sulfanylidene)carbamoyl]phenyl]-5-(trifluoromethyl)pyrazole-3-carboxamide (Compound (I-26)

To a suspension of potassium carbonate (0.892 g, 6.46 mmol, 1.10 equiv) and 2-amino-3,5-dichloro-N-(bis-2-propyl-λ^4-sulfanylidene)benzamide (2.05 g, 5.87 mmol) in toluene (30 mL) was added a solution of 2-(3-chloro-2-pyridyl)-5-(trifluoromethyl)pyrazole-3-carbonyl chloride (2.02 g, 5.87 mmol, 1.00 equiv.) in toluene (20 mL) at 60°C. After 45 min at this temperature, the mixture was cooled and water was added. The resulting precipitate was collected by filtration, washed with water and toluene and dried to obtain the title compound (3.07 g, 84%).

Characterization by HPLC-MS: 1.395 min, M = 602.1 (Method B)

Characterization by ^{1}H-NMR (400 MHz, DMSO-d_6):

δ[delta] = 1.18 (d, 6H), 1.22 (d, 6H), 3.30 (m, 2H), 7.68 (dd, 1H), 7.75 (m, 2H), 7.81 (s, 1H), 8.21 (d, 1H), 8.54 (d, 1H), 10.76 (s, 1H).

Example 3: Synthesis of 2-(3-chloro-2-pyridyl)-N-[2-methyl-4-chloro-6-[(bis-2-propyl-λ^4-sulfanylidene)carbamoyl]phenyl]-5-(trifluoromethyl)pyrazole-3-carboxamide (Compound I-21)

To a suspension of potassium carbonate (126.01 g, 911.76 mmol, 1.30 equiv) and 2-amino-3-methyl-5-chloro-N-(bis-2-propyl-λ^4-sulfanylidene)benzamide (211 g, 701 mmol) in dichloromethane (300 mL) was added a solution of 2-(3-chloro-2-pyridyl)-5-(trifluoromethyl)pyrazole-3-carbonyl chloride (256.78 g, 771.49 mmol, 1.10 equiv.) in dichloromethane (200 mL) at room temperature. After 2 h at this temperature, the solids were filtered off. The resulting filtrate was washed with water and dried over Na_2SO_4. After filtration, the filtrate was concentrated in vacuum and the resulting solids were crystallized from diisopropyl ether to yield the title compound (344.2 g, 85%).

Characterization by HPLC-MS: 1.303 min, M= 574.3 (Method B)

Characterization by ^{1}H-NMR (400 MHz, DMSO-d_6): δ[delta] = 1.20 (d, 6H), 1.30 (d, 6H), 2.15 (s, 3H), 3.30 (m, 2H), 7.41 (s, 1H), 7.62 (m, 2H), 7.80 (s, 1H), 8.22 (d, 1H), 8.52(d, 1H), 10.88 (s, 1H).

Example 4a: 2-(3-chloro-2-pyridyl)-N-[2-methyl-4-chloro-6-[(diethyl-λ^4-sulfanylidene)carbamoyl]phenyl]-5-(trifluoromethyl)pyrazole-3-carboxamide (Compound I-11)

To a suspension of potassium carbonate (0.71 g, 10 mmol, 1.3 equiv) and 2-amino-3-methyl-5-chloro-N-(diethyl-λ^4-sulfanylidene)benzamide (1.42 g, 3.96 mmol) in propylene carbonate (20 mL) was added a solution of 2-(3-chloro-2-pyridyl)-5-(trifluoromethyl)pyrazole-3-carbonyl chloride (1.35 g, 4.35 mmol, 1.10 equiv.) in propylene carbonate (10 mL) at room temperature. After 24 h at this temperature, the mixture was poured onto water and spiked with ethanol under vigorous stirring. The resulting solids were collected by filtration and contained pure title compound (1.57 g, 73%).

Characterization by HPLC-MS: 1.19 min, m/z 546.1 $(M+H)^+$; (Method B)

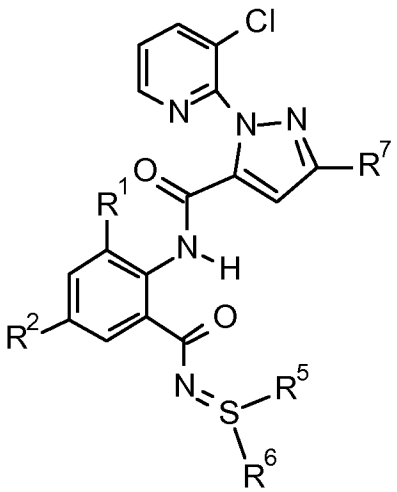
Characterization by ^{1}H-NMR (500 MHz, DMSO) [delta]: 10.87 (s, 1H), 8.53 (d, 1H), 8.22 (d, 1H), 7.75 (s, 1H), 7.65 (m, 2H), 7.40 (s, 1H), 3.09 (m, 2H), 2.92 (m, 2H) 1.15 (m, 6H).

Example 4b: 2-(3-chloro-2-pyridyl)-N-[2-methyl-4-chloro-6-[(diethyl-λ⁴-sulfanylidene)carbamoyl]phenyl]-5-(trifluoromethyl)pyrazole-3-carboxamide (Compound I-11)

To a solution of 2-(3-chloro-2-pyridyl)-5-(trifluoromethyl)pyrazole-3-carbonyl chloride (150 g, 435 mmol) in acetonitrile (900 mL) at room temperature was added potassium carbonate (59 g, 427 mmol). A solution of 2-amino-5-chloro-N-(diethyl-sulfanylidene)-3-methyl-benzamide (117 g, 427 mmol) in acetonitrile (100 mL) was added dropwise within 1 hour while maintaining a reaction temperature of 25-28°C with occasional cooling (slightly exothermic reaction). The mixture was stirred for 16 hours at room temperature. The reaction mixture was then poured on ice-water mixture (5 L) and the pH was adjusted to 7-8 with concentrated HCl. The mixture stirred for an additional 2 hours. The light brown solid was filtered, washed with water and dried under air to give the crude product (229 g).

3 combined batches of crude product (789 g) were suspended in acetonitrile (2.6 L) and dissolved upon heating at 60°C. After 1 hour of stirring at 60°C the solution was cooled by means of an ice-bath and the thereby formed solid was filtered off. The mother-liquor was concentrated to 300 mL and cooled with ice-bath. Thereby additional solid formed was filtered. The combined solids were washed with cold acetonitrile and dried at 50°C in a vacuum-oven over night to give the title product (703 g, 89%) as a crystalline white solid.

By the methods described in examples 1 to 4 or analogy therof, the compounds of formula (IA-1) summarized in table C were prepared:



(IA-1)

Table C

	R^1	R^2	R^7	R^5	R^6	MS	RT[min]	m/z
I-1	Me	Cl	CF_3	CH_3	CH_3	logP: 2.9 [pH=10.0] ; m.p: 182°C		
I-2	Me	Cl	CHF_2	CH_3	CH_3	B	1.06	500.2
I-3	Me	Cl	Br	CH_3	CH_3	A	3.067	529.95
I-4	Me	Cl	Cl	CH_3	CH_3			
I-5	Me	Cl	CN	CH_3	CH_3			

	R^1	R^2	R^7	R^5	R^6	MS	RT[min]	m/z
I-6	Cl	Cl	CF_3	CH_3	CH_3	A	3.372	539.95
I-7	Cl	Cl	CHF_2	CH_3	CH_3	B	1.062	520.2
I-8	Cl	Cl	Br	CH_3	CH_3	A	3.015	549.80
I-9	Cl	Cl	Cl	CH_3	CH_3			
I-10	Cl	Cl	CN	CH_3	CH_3			
I-11	Me	Cl	CF_3	C_2H_5	C_2H_5	B	1.207	546.1
I-12	Me	Cl	CHF_2	C_2H_5	C_2H_5	B	1.134	528.2
I-13	Me	Cl	Br	C_2H_5	C_2H_5	A	3.309	557.95
I-14	Me	Cl	Cl	C_2H_5	C_2H_5			
I-15	Me	Cl	CN	C_2H_5	C_2H_5	B	1.098	503.3
I-16	Cl	Cl	CF_3	C_2H_5	C_2H_5	A	3.450	565.90
I-17	Cl	Cl	CHF_2	C_2H_5	C_2H_5	B	1.144	549.9
I-18	Cl	Cl	Br	C_2H_5	C_2H_5			
I-19	Cl	Cl	Cl	C_2H_5	C_2H_5			
I-20	Cl	Cl	CN	C_2H_5	C_2H_5	B	1.119	524.9
I-21	Me	Cl	CF_3	$CH(CH_3)_2$	$CH(CH_3)_2$	B	1.303	574.3
I-22	Me	Cl	CHF_2	$CH(CH_3)_2$	$CH(CH_3)_2$	B	1.225	556.3
I-23	Me	Cl	Br	$CH(CH_3)_2$	$CH(CH_3)_2$	logP: 2.9 [pH=10.0]		
I-24	Me	Cl	Cl	$CH(CH_3)_2$	$CH(CH_3)_2$			
I-25	Me	Cl	CN	$CH(CH_3)_2$	$CH(CH_3)_2$	B	1.19	531.3
I-26	Cl	Cl	CF_3	$CH(CH_3)_2$	$CH(CH_3)_2$	A	3.835	596.05
I-27	Cl	Cl	CHF_2	$CH(CH_3)_2$	$CH(CH_3)_2$	B	1.24	578
I-28	Cl	Cl	Br	$CH(CH_3)_2$	$CH(CH_3)_2$	A	3.538	605.80
I-29	Cl	Cl	Cl	$CH(CH_3)_2$	$CH(CH_3)_2$			
I-30	Cl	Cl	CN	$CH(CH_3)_2$	$CH(CH_3)_2$	B	1.209	553.1
I-31	Br	Br	CF_3	C_2H_5	C_2H_5	B	1.218	655.9
I-32	Br	Br	CHF_2	C_2H_5	C_2H_5	B	1.171	638.1
I-33	Br	Br	Br	C_2H_5	C_2H_5			
I-34	Br	Br	Cl	C_2H_5	C_2H_5			
I-35	Br	Br	CN	C_2H_5	C_2H_5			
I-36	Br	Br	CF_3	$CH(CH_3)_2$	$CH(CH_3)_2$	A	3.665	683.90
I-37	Br	Br	CHF_2	$CH(CH_3)_2$	$CH(CH_3)_2$	B	1.245	666.1
I-38	Br	Br	Br	$CH(CH_3)_2$	$CH(CH_3)_2$			
I-39	Br	Br	Cl	$CH(CH_3)_2$	$CH(CH_3)_2$			
I-40	Br	Br	CN	$CH(CH_3)_2$	$CH(CH_3)_2$			
I-41	Cl	CN	CF_3	$CH(CH_3)_2$	$CH(CH_3)_2$			

B. Biology

Synergism can be described as an interaction where the combined effect of two or more compounds is greater than the sum of the individual effects of each of the compounds. The presence of a synergistic effect in terms of percent control, between two mixing partners (X and Y) can be calculated using the Colby equation (Colby, S. R., 1967, Calculating Synergistic and Antagonistic Responses in Herbicide Combinations, *Weeds*, 15, 20-22):

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

When the observed combined control effect is greater than the expected combined control effect (E), then the combined effect is synergistic.

The following tests demonstrate the control efficacy of compounds, mixtures or compositions of this invention on specific pests. However, the pest control protection afforded by the compounds, mixtures or compositions is not limited to these species. In certain instances, combinations of a compound of this invention with other invertebrate pest control compounds or agents are found to exhibit synergistic effects against certain important invertebrate pests.

The analysis of synergism or antagonism between the mixtures or compositions was determined using Colby's equation.

Biological Examples

B.1. Pesticidal activity against invertebrate pests
The following tests can demonstrate the control efficacy of mixtures or compositions of this invention on specific pests. However, the pest control protection afforded by the mixtures or compositions is not limited to these species. The mixtures of the invention are found to exhibit synergistic effects against certain important invertebrate pests

B.1.1 Vetch Aphid (*Megoura viciae*)

For evaluating control of vetch aphid (*Megoura viciae*) through contact or systemic means the test unit consists of 24-well-microtiter plates containing broad bean leaf disks.
The compounds or mixtures are formulated using a solution containing 75% water (v/v) and 25% DMSO (v/v). Different concentrations of formulated compounds or mixtures are sprayed onto the leaf disks at 2.5µl, using a custom built micro atomizer, at two replications.
For experimental mixtures in these tests identical volumes of both mixing partners at the desired concentrations respectively, are mixed together.
After application, the leaf disks are air-dried and 5 – 8 adult aphids placed on the leaf disks inside the microtiter plate wells. The aphids are then allowed to suck on the treated leaf disks and incubated at 23 ± 1°C, 50 ± 5 % RH for 5 days. Aphid mortality and fecundity is then visually assessed.

B.1.2 Green peach aphid (*Myzus persicae*)

For evaluating control of green peach aphid (*Myzus persicae*) through systemic means the test unit consisted of 96-well-microtiter plates containing liquid artificial diet under an artificial membrane.

The compounds or mixtures were formulated using a solution containing 75% water (v/v) and 25% DMSO (v/v). Different concentrations of formulated compounds or mixtures were pipetted into the aphid diet, using a custom built pipetter, at two replications.

For experimental mixtures in these tests identical volumes of both mixing partners at the desired concentrations respectively, were mixed together.

After application, 5 – 8 adult aphids were placed on the artificial membrane inside the microtiter plate wells. The aphids were then allowed to suck on the treated aphid diet and incubated at 23 ± 1°C, 50 ± 5 % RH for 3 days. Aphid mortality and fecundity was then visually assessed.

For the mixture tested the results were as follows:

Green Peach Aphid	ppm	Average Control %
Pyraclostrobin + I-21	0+5	0
	100+0	25
	100+5	100*
Trifloxystrobin + I-21	0+5	0
	100+0	25
	100+5	100*

*synergistic control effect according to Colby's equation

B.1.3 Boll weevil (*Anthonomus grandis*)

For evaluating control of boll weevil (*Anthonomus grandis*) the test unit consists of 24-well-microtiter plates containing an insect diet and 20-30 *A. grandis* eggs.

The compounds or mixtures are formulated using a solution containing 75% water and 25% DMSO. Different concentrations of formulated compounds or mixtures are sprayed onto the insect diet at 20µl, using a custom built micro atomizer, at two replications.

For experimental mixtures in these tests identical volumes of both mixing partners at the desired concentrations respectively, are mixed together.

After application, microtiter plates are incubated at 23 ± 1°C, 50 ± 5 % RH for 5 days. Egg and larval mortality is then visually assessed.

B.1.4 Mediterranean fruitfly (*Ceratitis capitata*)

For evaluating control of Mediterranean fruitfly (*Ceratitis capitata*) the test unit consisted of 96-well-microtiter plates containing an insect diet and 50-80 *C. capitata* eggs.

The compounds or mixtures were formulated using a solution containing 75% water and 25% DMSO. Different concentrations of formulated compounds or mixtures were sprayed onto the insect diet at 5µl, using a custom built micro atomizer, at two replications.

For experimental mixtures in these tests identical volumes of both mixing partners at the desired concentrations respectively, were mixed together.

After application, microtiter plates were incubated at 28 ± 1°C, 80 ± 5 % RH for 5 days. Egg and larval mortality was then visually assessed.

For the mixture tested the results were as follows:

Mediterranean fruitfly	ppm	Average (Control %)
Pyraclostrobin+ I-31	0+0.2	0
	500+0	0
	500+0.2	75*
Metconazol+ I-11	0+1	0
	1500+0	0
	1500+1	75*

*synergistic control effect according to Colby's equation

B.1.5 Tobacco budworm (*Heliothis virescens*)

For evaluating control of tobacco budworm (*Heliothis virescens*) the test unit consisted of 96-well-microtiter plates containing an insect diet and 15-25 *H. virescens* eggs.

The compounds or mixtures were formulated using a solution containing 75% water (v/v) and 25% DMSO (v/v). Different concentrations of formulated compounds or mixtures were sprayed onto the insect diet at 10µl, using a custom built micro atomizer, at two replications.

For experimental mixtures in these tests identical volumes of both mixing partners at the desired concentrations respectively, were mixed together.

After application, microtiter plates were incubated at 28 ± 1°C, 80 ± 5 % RH for 5 days. Egg and larval mortality was then visually assessed.

Tobacco budworm	ppm	Average (Control %)
Pyraclostrobin+ I-16	0+1	0
	500+0	0
	500+1	50*
Trifloxystrobin + I-21	0+0.2	0
	20+0	0
	20+1	75*

*synergistic control effect according to Colby's equation

B.1.6 Cowpea aphid (*aphis craccivora*)

Potted cowpea plants colonized with approximately 100 - 150 aphids of various stages are sprayed after the pest population has been recorded. Population reduction is assessed after 24, 72, and 120 hours.

B.1.7 Diamond back moth (*plutella xylostella*)

The active compound is dissolved at the desired concentration in a mixture of 1:1 (vol/vol) distilled water : aceteone. Surfactant (Alkamuls® EL 620) is added at a rate of 0.1% (vol/vol).The test solution is prepared at the day of use.

Leaves of cabbage are dipped in test solution and air-dried. Treated leaves are placed in petri dishes lined with moist filter paper and inoculated with ten 3rd instar larvae. Mortality is recorded 72 hours after treatment. Feeding damages are also recorded using a scale of 0-100%.

B.1.8 Orchid thrips (*dichromothrips corbetti*)

Dichromothrips corbetti adults used for bioassay are obtained from a colony maintained continuously under laboratory conditions. For testing purposes, the test compound is diluted to a concentration of 300 ppm (wt compound: vol diluent) in a 1:1 mixture of acetone:water (vol:vol), plus 0.01% vol/vol Kinetic® surfactant.

Thrips potency of each compound is evaluated by using a floral-immersion technique. Plastic petri dishes are used as test arenas. All petals of individual, intact orchid flowers are dipped into treatment solution and allowed to dry. Treated flowers are placed into individual petri dishes along with 10 - 15 adult thrips. The petri dishes are then covered with lids. All test arenas are held under continuous light and a temperature of about 28°C for duration of the assay. After 4 days, the numbers of live thrips are counted on each flower, and along inner walls of each petri dish. The level of thrips mortality is extrapolated from pre-treatment thrips numbers.

B.1.9 Silverleaf whitefly (*Bemisia argentifolii*)

The active compounds are formulated in cyclohexanone as a 10,000 ppm solution supplied in tubes. The tubes are inserted into an automated electrostatic sprayer equipped with an atomizing nozzle and they serve as stock solutions for which lower dilutions are made in 50% acetone:50% water (v/v). A nonionic surfactant (Kinetic®) is included in the solution at a volume of 0.01% (v/v).

Cotton plants at the cotyledon stage (one plant per pot) are sprayed by an automated electrostatic plant sprayer equipped with an atomizing spray nozzle. The plants are dried in the sprayer fume hood and then removed from the sprayer. Each pot is placed into a plastic cup and about 10 to 12 whitefly adults (approximately 3-5 days old) are introduced. The insects are collected using an aspirator and a nontoxic Tygon® tubing connected to a barrier pipette tip. The tip, containing the collected insects, is then gently inserted into the soil containing the treated plant, allowing insects to crawl out of the tip to reach the foliage for feeding. Cups are covered with a reusable screened lid. Test plants are maintained in a growth room at about 25°C and about 20-40% relative humidity for 3 days, avoiding direct exposure to fluorescent light (24 hour photoperiod) to prevent trapping of heat inside the cup. Mortality is assessed 3 days after treatment, compared to untreated control plants.

B.1.10 Southern armyworm (*Spodoptera eridania)*

The active compounds are formulated in cyclohexanone as a 10,000 ppm solution supplied in tubes. The tubes are inserted into an automated electrostatic sprayer equipped with an

atomizing nozzle and they serve as stock solutions for which lower dilutions are made in 50% acetone:50% water (v/v). A nonionic surfactant (Kinetic®) is included in the solution at a volume of 0.01% (v/v).

Lima bean plants (variety Sieva) are grown 2 plants to a pot and selected for treatment at the 1st true leaf stage. Test solutions are sprayed onto the foliage by an automated electrostatic plant sprayer equipped with an atomizing spray nozzle. The plants are dried in the sprayer fume hood and then removed from the sprayer. Each pot is placed into perforated plastic bags with a zip closure. About 10 to 11 armyworm larvae are placed into the bag and the bags zipped closed. Test plants are maintained in a growth room at about 25°C and about 20-40% relative humidity for 4 days, avoiding direct exposure to fluorescent light (24 hour photoperiod) to prevent trapping of heat inside the bags. Mortality and reduced feeding are assessed 4 days after treatment, compared to untreated control plants.

B.1.11 Red spider Mite (*Tetranychus kanzawai*)

The active compound is dissolved at the desired concentration in a mixture of 1:1 (vol:vol) distilled water : acetone. Add surfactant (Alkamuls® EL 620) at the rate of 0.1% (vol/vol).The test solution is prepared at the day of use.

Potted cowpea beans of 7-10 days of age are cleaned with tap water and sprayed with 5 ml of the test solution using air driven hand atomizer. The treated plants are allowed to air dry and afterwards inculated with 20 or more mites by clipping a cassava leaf section with known mite population. Treated plants are placed inside a holding room at about 25-27°C and about 50-60% relative humidity.

Percent mortality is assessed 72 hours after treatment..

B.1.12 Rice green leafhopper (*Nephotettix virescens*)

Rice seedlings are cleaned and washed 24 hours before spraying. The active compounds are formulated in 50:50 acetone:water (vol:vol), and 0.1% vol/vol surfactant (EL 620) is added. Potted rice seedlings are sprayed with 5 ml test solution, air dried, placed in cages and inoculated with 10 adults. Treated rice plants are kept at about 28-29°C and relative humidity of about 50-60%. Percent mortality is recorded after 72 hours.

B13. Rice brown plant hopper (*Nilaparvata lugens*)

Rice seedlings are cleaned and washed 24 hours before spraying. The active compounds are formulated in 50:50 acetone:water (vol:vol) and 0.1% vol/vol surfactant (EL 620) is added. Potted rice seedlings are sprayed with 5 ml test solution, air dried, placed in cages and inoculated with 10 adults. Treated rice plants are kept at about 28-29°C and relative humidity of about 50-60%. Percent mortality is recorded after 72 hours.

B.1.14 Colorado Potato Beetle (*Leptinotarsa decemlineata*)

The active compounds are formulated in cyclohexanone as a 10,000 ppm solution supplied in tubes. The tubes are inserted into an automated electrostatic sprayer equipped with an atomizing nozzle and they serve as stock solutions for which lower dilutions are made in 50%

acetone:50% water (v/v). A nonionic surfactant (Kinetic®) is included in the solution at a volume of 0.01% (v/v).

Eggplants are grown 2 plants to a pot and are selected for treatment at the 1st true leaf stage. Test solutions are sprayed onto the foliage by an automated electrostatic plant sprayer equipped with an atomizing spray nozzle. The plants are dried in the sprayer fume hood and then removed from the sprayer. The treated foliage is then cut and removed from the pot and placed in a Petri dish lined with moistened filter pa-per. Five beetle larvae are introduced into each Petri dish and the dish is covered by a Petri dish lid. Petri dishes are maintained in a growth room at about 25°C and about 20-40% relative humidity for 4 days, avoiding direct exposure to fluorescent light (24 hour photoperiod) to prevent trapping of heat inside the dishes. Mortality and reduced feeding are assessed 4 days after treatment, compared to untreated control plants.

B.2. Pesticidal activity against fungi

The following tests can be used to demonstrate and evaluate the fungicidal action of mixtures or compositions of this invention on specific fungi. However, the fungicidal control protection afforded by the mixtures or compositions is not limited to these fungi. The combinations of the invention are found to exhibit synergistic effects against certain important fungi.

If not otherwise specified. the active substances are formulated separately as a stock solution in dimethyl sulfoxide (DMSO) at a concentration of 10 000 ppm.

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.

B.2.1 Activity against the grey mold Botrytis cinerea in the microtiterplate test (Botrci)

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 Botrci cinerea in an aqueous biomalt or yeast-bactopeptone-sodiumacetate 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.

Active compound / active mixture	Concentration (ppm)	Mixture	Observed efficacy	Calculated efficacy according to Colby (%)	Synergism (%)
I-21	16 4	- -	4 0		
Epoxiconazol	0.25	-	59		
Prochloraz	0.016	-	14		

I-21 Epoxiconazol	16 0.25	63 : 1	82	61	21
I-21 Prochloraz	4 0.016	250 : 1	37	14	23

B.2.2. 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 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.

Active compound / active mixture	**Concentration (ppm)**	**Mixture**	**Observed efficacy**	**Calculated efficacy according to Colby (%)**	**Synergism (%)**
I-16	63 4	- -	17 16		
I-21	4	-	12		
I-31	16 4	- -	12 11		
Fluoxastrobin	0.25	-	70		
Prothioconazol	0.063	-	62		
Trifloxystrobin	0.016	-	62		
Picoxystrobin	0.063	-	53		
Mancozeb	4	-	48		
I-16 Fluoxastrobin	63 0.25	250 : 1	99	75	24
I-16 Prothioconazol	4 0.063	63 : 1	98	69	29
I-21 Trifloxystrobin	4 0.016	250 : 1	85	66	19
I-31 Trifloxystrobin	4 0.016	250 : 1	84	66	18
I-31 Picoxystrobin	4 0.063	63 : 1	78	58	20
I-31 Mancozeb	16 4	4 : 1	93	54	39

B.2.3. 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.

Active compound / active mixture	Concentration (ppm)	Mixture	Observed efficacy	Calculated efficacy according to Colby (%)	Synergism (%)
I-11	63	-	10		
	4	-	3		
	1	-	0		
I-16	4	-	4		
	1	-	3		
I-21	4	-	0		
	1	-	0		
I-31	16	-	0		
	4	-	0		
Trifloxystrobin	0.063	-	29		
	0.016	-	29		
Pyraclostrobin	0.016	-	49		
	0.004	-	39		
Picoxystrobin	0.063	-	72		
Boscalid	16	-	10		
Azoxystrobin	0.016	-	38		
I-11 Trifloxystrobin	4 0.016	250 : 1	54	31	23
I-11 Picoxystrobin	4 0.063	63 : 1	91	73	18
I-11 Pyraclostrobin	1 0.004	250 : 1	61	39	22
I-11 Boscalid	63 16	4 :1	62	19	43
I-16 Trifloxystrobin	4 0.016	250 : 1	60	32	28
I-16 Pyraclostrobin	1 0.004	250 : 1	61	41	20
I-21 Pyraclostrobin	4 0.016	250 : 41	76	49	27
I-21 Azoxystrobin	1 0.016	63 : 1	57	38	19
I-31 Trifloxystrobin	16 0.063	250 : 1	51	29	22
I-31 Pyraclostrobin	4 0.016	250 : 1	72	49	23

B.2.4.Activity against the late blight pathogen Phytophthora infestans in the microtiter test (Phytin)

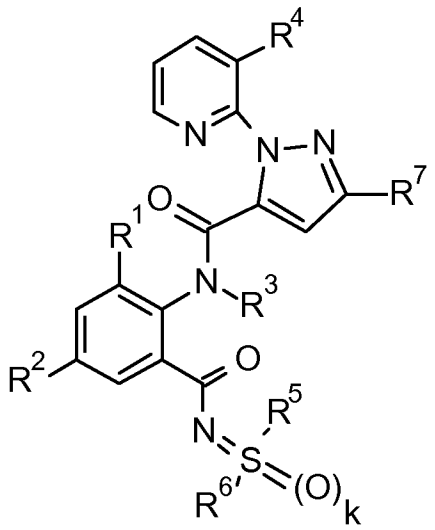
The stock solutions were mixed according to the ratio, pipetted onto a micro titer plate (MTP) and diluted with water to the stated concentrations. A spore suspension of Phytophtora infestans containing a pea juice-based aqueous nutrient medium or DDC medium was then added. The plates were placed in 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.

Active compound / active mixture	**Concentration (ppm)**	**Mixture**	**Observed efficacy**	**Calculated efficacy according to Colby (%)**	**Synergism (%)**
I-16	16	-	23		
Pyraclostrobin	0.063	-	10		
I-16 Pyraclostrobin	16 0.063	250 : 1	48	30	18

Claims

1. Pesticidal mixtures comprising as active compounds

1) at least one pesticidally active anthranilamide compound of formula (I):



(I)

wherein

R^1 is selected from the group consisting of halogen, methyl and halomethyl;

R^2 is selected from the group consisting of hydrogen, halogen, halomethyl and cyano;

R^3 is selected from hydrogen, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_2-C_6-alkenyl, C_2-C_6-haloalkenyl, C_2-C_6-alkinyl, C_2-C_6-haloalkinyl, C_3-C_8-cycloalkyl, C_3-C_8-halocycloalkyl, C_1-C_4-alkoxy-C_1-C_4-alkyl, C_1-C_4-haloalkoxy-C_1-C_4-alkyl, $C(=O)R^a$, $C(=O)OR^b$ and $C(=O)NR^cR^d$;

R^4 is hydrogen or halogen;

R^5, R^6 are selected independently of one another from the group consisting of hydrogen, C_1-C_{10}-alkyl, C_3-C_8-cycloalkyl, C_2-C_{10}-alkenyl, C_2-C_{10}-alkynyl, wherein the aforementioned aliphatic and cycloaliphatic radicals may be substituted with 1 to 10 substituents R^e, and phenyl, which is unsubstituted or carries 1 to 5 substituents R^f; or

R^5 and R^6 together represent a C_2-C_7-alkylene, C_2-C_7-alkenylene or C_6-C_9-alkynylene chain forming together with the sulfur atom to which they are attached a 3-, 4-, 5-, 6-, 7-, 8-, 9- or 10-membered saturated, partially unsaturated or fully unsaturated ring, wherein 1 to 4 of the CH_2 groups in the C_2-C_7-alkylene chain or 1 to 4 of any of the CH_2 or CH groups in the C_2-C_7-alkenylene chain or 1 to 4 of any of the CH_2 groups in the C_6-C_9-alkynylene chain may be replaced by 1 to 4

groups independently selected from the group consisting of C=O, C=S, O, S, N, NO, SO, SO_2 and NH, and wherein the carbon and/or nitrogen atoms in the C_2-C_7-alkylene, C_2-C_7-alkenylene or C_6-C_9-alkynylene chain may be substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, C_1-C_6-alkyl, C_1-C_6-haloalkyl, C_1-C_6-alkoxy, C_1-C_6-haloalkoxy, C_1-C_6-alkylthio, C_1-C_6-haloalkylthio, C_3-C_8-cycloalkyl, C_3-C_8-halocycloalkyl, C_2-C_6-alkenyl, C_2-C_6-haloalkenyl, C_2-C_6-alkynyl and C_2-C_6-haloalkynyl; said substituents being identical or different from one another if more than one substituent is present;

R^7 is selected from the group consisting of bromo, chloro, difluoromethyl, trifluoromethyl, nitro, cyano, OCH_3, $OCHF_2$, OCH_2F, OCH_2CF_3, $S(=O)_nCH_3$, and $S(=O)_nCF_3$;

R^a is selected from the group consisting of C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkinyl, C_3-C_8-cycloalkyl, C_1-C_6-alkoxy, C_1-C_6-alkylthio, C_1-C_6-alkylsulfinyl, C_1-C_6-alkylsulfonyl, wherein one or more CH_2 groups of the aforementioned radicals may be replaced by a C=O group, and/or the aliphatic and cycloaliphatic moieties of the aforementioned radicals may be unsubstituted, partially or fully halogenated and/or may carry 1 or 2 substituents selected from C_1-C_4 alkoxy;
phenyl, benzyl, pyridyl and phenoxy, wherein the last four radicals may be unsubstituted, partially or fully halogenated and/or carry 1, 2 or 3 substituents selected from C_1-C_6-alkyl, C_1-C_6-haloalkyl, C_1-C_6-alkoxy, C_1-C_6-haloalkoxy, (C_1-C_6-alkoxy)carbonyl, C_1-C_6-alkylamino and di-(C_1-C_6-alkyl)amino,

R^b is selected from the group consisting of C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkinyl, C_3-C_8-cycloalkyl, C_1-C_6-alkoxy, C_1-C_6-alkylthio, C_1-C_6-alkylsulfinyl, C_1-C_6-alkylsulfonyl, wherein one or more CH_2 groups of the aforementioned radicals may be replaced by a C=O group, and/or the aliphatic and cycloaliphatic moieties of the aforementioned radicals may be unsubstituted, partially or fully halogenated and/or may carry 1 or 2 substituents selected from C_1-C_4-alkoxy;
phenyl, benzyl, pyridyl and phenoxy, wherein the last four radicals may be unsubstituted, partially or fully halogenated and/or carry 1, 2 or 3 substituents selected from C_1-C_6-alkyl, C_1-C_6-haloalkyl, C_1-C_6-alkoxy, C_1-C_6-haloalkoxy and (C_1-C_6-alkoxy)carbonyl;

R^c, R^d are, independently from one another and independently of each occurrence, selected from the group consisting of hydrogen, cyano, C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkinyl, C_3-C_8-cycloalkyl, wherein one or more CH_2 groups of the aforementioned radicals may be replaced by a C=O group, and/or the aliphatic and cycloaliphatic moieties of the aforementioned radicals may be unsubstituted, partially or fully halogenated and/or may carry 1 or 2 radicals selected from C_1-C_4-alkoxy;
C_1-C_6-alkoxy, C_1-C_6-haloalkoxy, C_1-C_6-alkylthio, C_1-C_6-alkylsulfinyl, C_1-C_6-alkylsulfonyl, C_1-C_6-haloalkylthio, phenyl, benzyl, pyridyl and phenoxy, wherein the four last mentioned radicals may be unsubstituted, partially or fully halogenated

and/or carry 1, 2 or 3 substituents selected from C_1-C_6-alkyl, C_1-C_6-haloalkyl, C_1-C_6-alkoxy, C_1-C_6 haloalkoxy and (C_1-C_6-alkoxy)carbonyl; or

R^c and R^d, together with the nitrogen atom to which they are bound, may form a 3-, 4-, 5-, 6- or 7-membered saturated, partially unsaturated or fully unsaturated heterocyclic ring which may additionally contain 1 or 2 further heteroatoms or heteroatom groups selected from N, O, S, NO, SO and SO_2, as ring members, where the heterocyclic ring may optionally be substituted with halogen, C_1-C_4-haloalkyl, C_1-C_4-alkoxy or C_1-C_4-haloalkoxy;

R^e is independently selected from the group consisting of halogen, cyano, nitro, -OH, -SH, -SCN, C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkinyl, C_3-C_8-cycloalkyl, wherein one or more CH_2 groups of the aforementioned radicals may be replaced by a C=O group, and/or the aliphatic and cycloaliphatic moieties of the aforementioned radicals may be unsubstituted, partially or fully halogenated and/or may carry 1 or 2 radicals selected from C_1-C_4 alkoxy;

C_1-C_6-alkoxy, C_1-C_6-haloalkoxy, C_1-C_6-alkylthio, C_1-C_6-alkylsulfinyl, C_1-C_6-alkylsulfonyl, C_1-C_6-haloalkylthio, $-OR^a$, $-NR^cR^d$, $-S(O)_nR^a$, $-S(O)_nNR^cR^d$, $-C(=O)R^a$, $-C(=O)NR^cR^d$, $-C(=O)OR^b$, $-C(=S)R^a$, $-C(=S)NR^cR^d$, $-C(=S)OR^b$, $-C(=S)SR^b$, $-C(=NR^c)R^b$, $-C(=NR^c)NR^cR^d$, phenyl, benzyl, pyridyl and phenoxy, wherein the last four radicals may be unsubstituted, partially or fully halogenated and/or carry 1, 2 or 3 substituents selected from C_1-C_6-alkyl, C_1-C_6-haloalkyl, C_1-C_6-alkoxy and C_1-C_6-haloalkoxy; or

two vicinal radicals R^e together form a group =O, =CH(C_1-C_4-alkyl), =C(C_1-C_4-alkyl)C_1-C_4-alkyl, =N(C_1-C_6-alkyl) or =NO(C_1-C_6-alkyl);

R^f is independently selected from the group consisting of halogen, cyano, nitro, -OH, -SH, -SCN, C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkinyl, C_3-C_8-cycloalkyl, wherein one or more CH_2 groups of the aforementioned radicals may be replaced by a C=O group, and/or the aliphatic and cycloaliphatic moieties of the aforementioned radicals may be unsubstituted, partially or fully halogenated and/or may carry 1 or 2 radicals selected from C_1-C_4 alkoxy;

C_1-C_6-alkoxy, C_1-C_6-haloalkoxy, C_1-C_6-alkylthio, C_1-C_6-alkylsulfinyl, C_1-C_6-alkylsulfonyl, C_1-C_6-haloalkylthio, $-OR^a$, $-NR^cR^d$, $-S(O)_nR^a$, $-S(O)_nNR^cR^d$, $-C(=O)R^a$, $-C(=O)NR^cR^d$, $-C(=O)OR^b$, $-C(=S)R^a$, $-C(=S)NR^cR^d$, $-C(=S)OR^b$, $-C(=S)SR^b$, $-C(=NR^c)R^b$, and $-C(=NR^c)NR^cR^d$;

k is 0 or 1;

n is 0, 1 or 2;

or a stereoisomer, salt, tautomer or N-oxide, or a polymorphic crystalline form, a co-crystal or a solvate of a compound or a stereoisomer, salt, tautomer or N-oxide thereof;

and

2) at least one pesticidally active compound II selected from group FI consisting of

F.I) Respiration Inhibitors

F.I-1) Inhibitors of complex III at Qo site selected from the group of strobilurins including azoxystrobin, coumethoxystrobin, coumoxystrobin, dimoxystrobin, enestroburin, fluoxastrobin, kresoxim-methyl, mandestrobin, metominostrobin, orysastrobin, picoxystrobin, pyraclostrobin, pyrametostrobin, pyraoxystrobin, pyribencarb, triclopyricarb/chlorodincarb, trifloxystrobin, 2-[2-(2,5-dimethyl-phenoxymethyl)-phenyl]-3-methoxy-acrylic acid methyl ester and 2 (2-(3-(2,6-dichlorophenyl)-1-methyl-allylideneaminooxymethyl)-phenyl)-2-methoxyimino-N methyl-acetamide;
oxazolidinediones and imidazolinones selected from famoxadone, fenamidone;

F.I-2) Inhibitors of complex II selected from the group of carboxamides, including carboxanilides selected from benodanil, benzovindiflupyr, bixafen, boscalid, carboxin, fenfuram, fenhexamid, fluopyram, flutolanil, furametpyr, isofetamid, isopyrazam, isotianil, mepronil, oxycarboxin, penflufen, penthiopyrad, sedaxane, tecloftalam, thifluzamide, tiadinil, 2-amino-4 methyl-thiazole-5-carboxanilide, fluxapyroxad (N-(3',4',5' trifluorobiphenyl-2 yl)-3-difluoromethyl-1-methyl-1H-pyrazole-4 carboxamide), N-(4'-trifluoromethylthiobiphenyl-2-yl)-3 difluoromethyl-1-methyl-1H pyrazole-4-carboxamide, N-(2-(1,3,3-trimethyl-butyl)-phenyl)-1,3-dimethyl-5 fluoro-1H-pyrazole-4 carboxamide, 3-(difluoromethyl)-1-methyl-N-(1,1,3-trimethylindan-4-yl)pyrazole-4-carboxamide, 3-(trifluoromethyl)-1-methyl-N-(1,1,3-trimethylindan-4-yl)pyrazole-4-carboxamide, 1,3-dimethyl-N-(1,1,3-trimethylindan-4-yl)pyrazole-4-carboxamide, 3-(trifluoromethyl)-1,5-dimethyl-N-(1,1,3-trimethylindan-4-yl)-pyrazole-4-carboxamide, 3-(difluoromethyl)-1,5-dimethyl-N-(1,1,3-trimethylindan-4-yl)pyrazole-4-carboxamide, 3-(trifluorometh¬yl)-1,5-dimethyl-N-(1,1,3-trimethylindan-4-yl)¬pyrazole-4-carboxamide, 1,3,5-trimethyl-N-(1,1,3-trimethylindan-4-yl)pyrazole-4-carboxamide, N-(7-fluoro-1,1,3-trimethyl-indan-4-yl)-1,3-dimethyl-pyrazole-4-carbox¬amide , N-[2-(2,4-dichlorophenyl)-2-methoxy-1-methyl-ethyl]-3-(difluoromethyl)-1-methyl-pyrazole-4-carboxamide ;

F.I-3) Inhibitors of complex III at Qi site including cyazofamid, amisulbrom, [(3S,6S,7R,8R)-8-benzyl-3-[(3-acetoxy-4-methoxy-pyridine-2-carbonyl)amino]-6-methyl-4,9-dioxo-1,5-dioxonan-7-yl] 2-methylpropanoate, [(3S,6S,7R,8R)-8-benzyl-3-[[3-(acetoxymethoxy)-4-methoxy-pyridine-2-carbonyl]amino]-6-methyl-4,9-dioxo-1,5-dioxonan-7-yl] 2-methylpropanoate, [(3S,6S,7R,8R)-8-benzyl-3-[(3-isobutoxycarbonyloxy-4-methoxy-pyridine-2-carbonyl)amino]-6-methyl-4,9-dioxo-1,5-dioxonan-7-yl] 2-methylpropanoate, [(3S,6S,7R,8R)-8-benzyl-3-[[3-(1,3-benzodioxol-5-ylmethoxy)-4-methoxy-pyridine-2-car-

bonyl]amino]-6-methyl-4,9-dioxo-1,5-dioxonan-7-yl] 2-methylpropanoate, 3*S*,6*S*,7*R*,8*R*)-3-[[(3-hydroxy-4-methoxy-2-pyridinyl)carbonyl]amino]-6-methyl-4,9-dioxo-8-(phenylmethyl)-1,5-dioxonan-7-yl 2-methylpropanoate;

F.I-4) Other respiration inhibitors (complex I uncouplers), including diflumetorim; (5,8-difluoro¬quinazolin-4-yl)-{2-[2-fluoro-4-(4-trifluoromethylpyridin-2-yloxy)-phenyl]-ethyl}-amine; tecnazen; ametoctradin; silthiofam;
and including nitrophenyl derivates selected from binapacryl, dinobuton, dinocap, fluazinam, ferimzone; nitrthal-isopropyl,
and including organometal compounds selected from fentin salts, including fentin-acetate, fentin chloride or fentin hydroxide;

F.II) Sterol biosynthesis inhibitors (SBI fungicides)

F.II-1) C14 demethylase inhibitors,
including triazoles selected from azaconazole, bitertanol, bromuconazole, cyproconazole, difenoconazole, diniconazole, diniconazole-M, epoxiconazole, fenbuconazole, fluquinconazole, flusilazole, flutriafol, hexaconazole, imibenconazole, ipconazole, metconazole, myclobutanil, paclobutrazole, penconazole, propiconazole, prothioconazole, simeconazole, tebuconazole, tetraconazole, triadimefon, triadimenol, triticonazole, uniconazole, 1-[*rel*-(2*S*;3*R*)-3-(2-chlorophenyl)-2-(2,4-difluorophenyl)-oxiranylmethyl]-5-thiocyanato-1H-[1,2,4]triazole, 2-[*rel*-(2*S*;3*R*)-3-(2-chlorophenyl)-2-(2,4-difluorophenyl)-oxiranylmethyl]-2H-[1,2,4]triazole-3-thiol, 2-[2-chloro-4-(4-chlorophenoxy)phenyl]-1-(1,2,4-triazol-1-yl)pentan-2-ol, 1-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-cyclopropyl-2-(1,2,4-triazol-1-yl)ethanol, 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1,2,4-triazol-1-yl)butan-2-ol, 2-[2-chloro-4-(4-chlorophenoxy)phenyl]-1-(1,2,4-triazol-1-yl)butan-2-ol, 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-3-methyl-1-(1,2,4-triazol-1-yl)butan-2-ol, 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1,2,4-triazol-1-yl)propan-2-ol, 2-[2-chloro-4-(4-chlorophenoxy)phenyl]-3-methyl-1-(1,2,4-triazol-1-yl)butan-2-ol, 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1,2,4-triazol-1-yl)pentan-2-ol, 2-[4-(4-fluorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1,2,4-triazol-1-yl)propan-2-ol;
and including imidazoles selected from imazalil, pefurazoate, oxpoconazole, prochloraz, triflumizole;
and including pyrimidines, pyridines and piperazines selected from fenarimol, nuarimol, pyrifenox, triforine, [3-(4-chloro-2-fluoro-phenyl)-5-(2,4-difluorophenyl)isoxazol-4-yl]-(3-pyridyl)methanol;

F.II-2) Delta14-reductase inhitors,
including morpholines selected from aldimorph, dodemorph, dodemorph-acetate, fenpropimorph, tridemorph;
and including piperidines selected from fenpropidin, piperalin;
and including spiroketalamines selected from spiroxamine;

F.II-3) Inhibitors of 3-keto reductase including hydroxyanilides selected from fenhexamid;

F.III) Nucleic acid synthesis inhibitors

F.III-1) RNA, DNA synthesis inhibitors,
including phenylamides or acyl amino acid fungicides selected from benalaxyl, benalaxyl-M, kiralaxyl, metalaxyl, metalaxyl-M (mefenoxam), ofurace, oxadixyl;
and including isoxazoles and iosothiazolones selected from hymexazole, octhilinone;

F.III-2) DNA topisomerase inhibitors selected from oxolinic acid;

F.III-3) Nucleotide metabolism inhibitors including hydroxy (2-amino)-pyrimidines selected from bupirimate;

F.IV) Inhibitors of cell division and or cytoskeleton

F.IV-1) Tubulin inhibitors:
including benzimidazoles and thiophanates selected from benomyl, carbendazim, fuberidazole, thiabendazole, thiophanate-methyl;
and including triazolopyrimidines selected from 5-chloro-7 (4-methylpiperidin-1-yl)-6-(2,4,6-trifluorophenyl)-[1,2,4]triazolo[1,5 a]pyrimidine

F.IV-2) Other cell division inhibitors
including benzamides and phenyl acetamides selected from diethofencarb, ethaboxam, pencycuron, fluopicolide, zoxamide;

F.IV-3) Actin inhibitors including benzophenones selected from metrafenone; pyriofenone;

F.V) Inhibitors of amino acid and protein synthesis

F.V-1) Methionine synthesis inhibitors including anilino-pyrimidines selected from cyprodinil, mepanipyrim, nitrapyrin, pyrimethanil;

F.V-2) Protein synthesis inhibitors including antibiotics selected from blasticidin-S, kasugamycin, kasugamycin hydrochloride-hydrate, mildiomycin, streptomycin, oxytetracyclin, polyoxine, validamycin A;

F.VI) Signal transduction inhibitors

F.VI-1) MAP / Histidine kinase inhibitors including dicarboximides selected from fluoroimid, iprodione, procymidone, vinclozolin;
and including phenylpyrroles selected from fenpiclonil, fludioxonil;

F.VI-2) G protein inhibitors including quinolines selected from quinoxyfen;

F.VII) Lipid and membrane synthesis inhibitors

F.VII-1) Phospholipid biosynthesis inhibitors including organophosphorus compounds selected from edifenphos, iprobenfos, pyrazophos;
and including dithiolanes selected from isoprothiolane;

F.VII-2) Lipid peroxidation
including aromatic hydrocarbons selected from dicloran, quintozene, tecnazene, tolclofos-methyl, biphenyl, chloroneb, etridiazole;

F.VII-3) Carboxyl acid amides (CAA fungicides)
including cinnamic or mandelic acid amides selected from dimethomorph, flumorph, mandiproamid, pyrimorph;
and including valinamide carbamates selected from benthiavalicarb, iprovali-

carb, pyribencarb, valifenalate and N-(1-(1-(4-cyano-phenyl)ethanesulfonyl)-but-2-yl) carbamic acid-(4-fluorophenyl) ester;

F.VII-4) Compounds affecting cell membrane permeability and fatty acides including carbamates selected from propamocarb, propamocarb-hydrochlorid;

F.VII-5) fatty acid amide hydrolase inhibitors: 1-[4-[4-[5-(2,6-difluorophenyl)-4,5-dihydro-3 isoxazolyl]-2-thiazolyl]-1-piperidinyl]-2-[5-methyl-3-(trifluoromethyl)-1H-pyrazol-1 yl]ethanone;

F.VIII) Inhibitors with Multi Site Action

F.VIII-1) Inorganic active substances selected from Bordeaux mixture, copper acetate, copper hydroxide, copper oxychloride, basic copper sulfate, sulfur;

F.VIII-2) Thio- and dithiocarbamates selected from ferbam, mancozeb, maneb, metam, methasulphocarb, metiram, propineb, thiram, zineb, ziram;

F.VIII-3) Organochlorine compounds including phthalimides, sulfamides, chloronitriles selected from anilazine, chlorothalonil, captafol, captan, folpet, dichlofluanid, dichlorophen, flusulfamide, hexachlorobenzene, pentachlorphenole and its salts, phthalide, tolylfluanid, N-(4-chloro-2-nitro-phenyl)-N-ethyl-4-methyl-benzenesulfonamide;

F.VIII-4) Guanidines selected from guanidine, dodine, dodine free base, guazatine, guazatine-acetate, iminoctadine, iminoctadine-triacetate, iminoctadine-tris(albesilate), dithianon, 2,6-dimethyl-1H,5H-[1,4]dithiino[2,3-c:5,6-c']dipyrrole-1,3,5,7(2H,6H)-tetraone;

F.VIII-5) Ahtraquinones selected from dithianon;

F.IX) Cell wall synthesis inhibitors

F.IX-1) Inhibitors of glucan synthesis selected from validamycin, polyoxin B;

F.IX-2) Melanin synthesis inhibitors selected from pyroquilon, tricyclazole, carpropamide, dicyclomet, fenoxanil;

F.X) Plant defence inducers

F.X-1) Salicylic acid pathway selected from acibenzolar-S-methyl;

F.X-2) Others selected from probenazole, isotianil, tiadinil, prohexadione-calcium; including phosphonates selected from fosetyl, fosetyl-aluminum, phosphorous acid and its salts;

F.XI) Unknown mode of action:
bronopol, chinomethionat, cyflufenamid, cymoxanil, dazomet, debacarb, diclomezine, difenzoquat, difenzoquat-methylsulfate, diphenylamin, fenpyrazamine, flumetover, flusulfamide, flutianil, methasulfocarb, nitrapyrin, nitrothal-isopropyl, oxathiapiprolin, tolprocarb, 2-[3,5-bis(difluoromethyl)-1H-pyrazol-1-yl]-1-[4-(4-{5-[2-(prop-2-yn-1-yloxy)phenyl]-4,5-dihydro-1,2-oxazol-3-yl}-1,3-thiazol-2-yl)piperidin-1-yl]ethanone, 2-[3,5-bis(difluoromethyl)-1H-pyrazol-1-yl]-1-[4-(4-{5-[2-fluoro-6-(prop-2-yn-1-yl-oxy)phenyl]-4,5-dihydro-1,2-oxazol-3-yl}-1,3-thi¬azol-2-yl)piperidin-1-yl]ethanone, 2 [3,5-bis(difluoromethyl)-1H-pyrazol-1-yl]-1-[4-(4-{5-[2-chloro-6-(prop-2-yn-1-yl-oxy)phenyl]-4,5-dihydro-1,2-oxazol-3-yl}-1,3-thiazol-2 yl)piperidin-1-yl]ethanone, oxin-copper, proquinazid, tebufloquin, tecloftalam, triazoxide, 2-butoxy-6-iodo-3-propylchromen-4-one,

N-(cyclopropylmethoxyimino-(6-difluoro-methoxy-2,3-difluoro-phenyl)-methyl)-2-phenyl acetamide, N'-(4-(4-chloro-3-trifluoromethyl-phenoxy)-2,5-dimethyl-phenyl)-N-ethyl-N methyl formamidine, N' (4-(4-fluoro-3-trifluoromethyl-phenoxy)-2,5-dimethyl-phenyl)-N-ethyl-N-methyl formamidine, N'-(2-methyl-5-trifluoromethyl-4-(3-trimethylsilanyl-propoxy)-phenyl)-N-ethyl-N-methyl formamidine, N'-(5-difluoromethyl-2 methyl-4-(3-trimethylsilanyl-propoxy)-phenyl)-N-ethyl-N-methyl formamidine, 2-{1-[2-(5-methyl-3-trifluoromethyl-pyrazole-1-yl)-acetyl]-piperidin-4-yl}-thiazole-4-carboxylic acid methyl-(1,2,3,4-tetrahydro-naphthalen-1-yl)-amide, 2-{1-[2-(5-methyl-3-trifluoromethyl-pyrazole-1-yl)-acetyl]-piperidin-4-yl}-thiazole-4-carboxylic acid methyl-(R)-1,2,3,4-tetrahydro-naphthalen-1-yl-amide, methoxy-acetic acid 6-tert-butyl-8-fluoro-2,3-dimethyl-quinolin-4-yl ester and N-Methyl-2-{1-[(5-methyl-3-trifluoro-methyl-1H-pyrazol-1-yl)-acetyl]-piperidin-4-yl}-N-[(1R)-1,2,3,4-tetrahydronaphthalen-1-yl]-4-thiazolecarboxamide, 3-[5-(4-chloro-phenyl)-2,3-dimethyl-isoxazolidin-3 yl]-pyridine, pyrisoxazole, 5-amino-2-isopropyl-3-oxo-4-ortho-tolyl-2,3-dihydro-pyrazole-1 carbothioic acid S-allyl ester, N-(6-methoxy-pyridin-3-yl) cyclopropanecarboxylic acid amide, 5-chloro-1 (4,6-dimethoxy-pyrimidin-2-yl)-2-methyl-1H-benzoimidazole, 2-(4-chloro-phenyl)-N-[4-(3,4-dimethoxy-phenyl)-isoxazol-5-yl]-2-prop-2-ynyloxy-acetamide; ethyl (Z)-3-amino-2-cyano-3-phenyl-prop-2-enoate, tert-butyl N-[6-[[(Z)-[(1-methyltetrazol-5-yl)-phenyl-methylene]amino]oxymethyl]-2-pyridyl]carbamate (picarbutrazox), pentyl N-[6-[[(Z)-[(1-methyltetrazol-5-yl)-phenyl-methylene]amino]oxymethyl]-2-pyridyl]carbamate, 2-[2-[(7,8-difluoro-2-methyl-3-quinolyl)oxy]-6-fluoro-phenyl]propan-2-ol, 2-[2-fluoro-6-[(8-fluoro-2-methyl-3-quinolyl)oxy]phenyl]propan-2-ol, 3-(5-fluoro-3,3,4,4-tetramethyl-3,4-dihydroiso-quinolin-1-yl)quinoline, 3-(4,4-difluoro-3,3-dimethyl-3,4-dihydroisoquinolin-1-yl)quinoline, 3-(4,4,5-trifluoro-3,3-dimethyl-3,4-dihydroisoquinolin-1-yl)quinoline;

F.XII) Growth regulators:

abscisic acid, amidochlor, ancymidol, 6-benzylaminopurine, brassinolide, butralin, chlormequat (chlormequat chloride), choline chloride, cyclanilide, daminozide, dikegulac, dimethipin, 2,6-dimethylpuridine, ethephon, flumetralin, flurprimidol, fluthiacet, forchlorfenuron, gibberellic acid, inabenfide, indole-3-acetic acid , maleic hydrazide, mefluidide, mepiquat (mepiquat chloride), naphthaleneacetic acid, N 6 benzyladenine, paclobutrazol, prohexadione (prohexadione-calcium), prohydrojasmon, thidiazuron, triapenthenol, tributyl phosphorotrithioate, 2,3,5 tri iodobenzoic acid , trinexapac-ethyl and uniconazole;

F.XIII) Biopesticides:

F.XIII-1) Microbial pesticides with fungicidal, bactericidal, viricidal and/or plant defense activator activity: Ampelomyces quisqualis, Aspergillus flavus, Aureobasidium pullulans, Bacillus amyloliquefaciens, B. mojavensis, B. pumilus, B. simplex, B. solisalsi, B. subtilis, B. subtilis var. amyloliquefaciens, Candida oleophila, C.

saitoana, Clavibacter michiganensis (bacteriophages), Coniothyrium minitans, Cryphonectria parasitica, Cryptococcus albidus, Fusarium oxysporum, Clonostachys rosea f. catenulate (also named Gliocladium catenulatum), Gliocladium roseum, Metschnikowia fructicola, Microdochium dimerum, Paenibacillus polymyxa, Pantoea agglomerans, Phlebiopsis gigantea, Pseudozyma flocculosa, Pythium oligandrum, Sphaerodes mycoparasitica, Streptomyces lydicus, S. violaceusniger, Talaromyces flavus, Trichoderma asperellum, T. atroviride, T. fertile, T. gamsii, T. harmatum; mixture of T. harzianum and T. viride; mixture of T. polysporum and T. harzianum; T. stromaticum, T. virens (also named Gliocladium virens), T. viride, Typhula phacorrhiza, Ulocladium oudema, U. oudemansii, Verticillium dahlia, zucchini yellow mosaic virus (avirulent strain);

F.XIII-2) Biochemical pesticides with fungicidal, bactericidal, viricidal and/or plant defense activator activity: chitosan (hydrolysate), jasmonic acid or salts or derivatives thereof, laminarin, Menhaden fish oil, natamycin, Plum pox virus coat protein, Reynoutria sachlinensis extract, salicylic acid, tea tree oil;

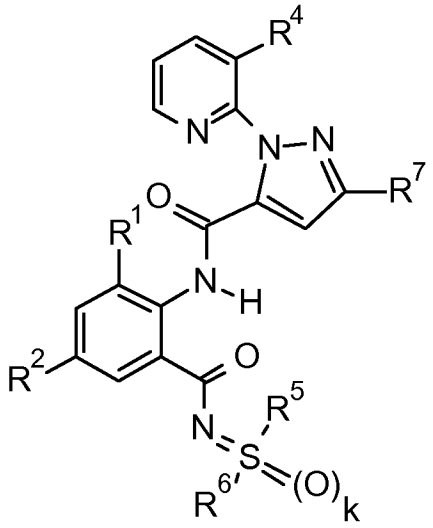
F.XIII-3) Microbial pesticides with plant stress reducing, plant growth regulator, plant growth promoting and/or yield enhancing activity: Azospirillum amazonense A. brasilense, A. lipoferum, A. irakense, A. halopraeferens, Bradyrhizobium sp., B. japonicum, Glomus intraradices, Mesorhizobium sp., Paenibacillus alvei, Penicillium bilaiae, Rhizobium leguminosarum bv. phaseolii, R. l. trifolii, R. l. bv. viciae, Sinorhizobium meliloti;

F.XIII-4) Biochemical pesticides with plant stress reducing, plant growth regulator and/or plant yield enhancing activity: abscisic acid, aluminium silicate (kaolin), 3-decen-2-one, homobrassinlide, humates, lysophosphatidyl ethanolamine, polymeric polyhydroxy acid, Ascophyllum nodosum (Norwegian kelp, Brown kelp) extract and Ecklonia maxima (kelp) extract,

in synergistically effective amounts.

2. Pesticidal mixtures according to claim 1, comprising a compound of formula I and a compound II in a weight ratio of from 500:1 to 1:100.

3. Pesticidal mixtures according to claim 1 or 2, in which the compound of formula I is a compound of formula IA:

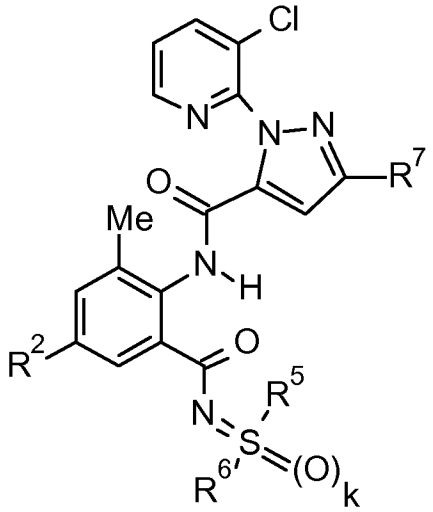


(IA)

wherein

R^4 is halogen.

4. Pesticidal mixtures according to claim 1, 2 or 3, in which the compound of formula I is a compound of formula IB:



(IB)

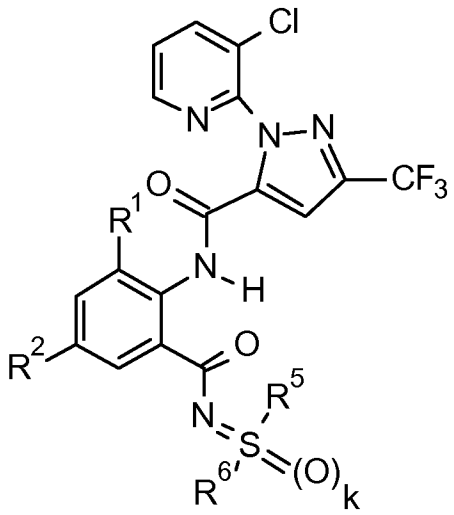
wherein

R^2 is selected from the group consisting of bromo, chloro, cyano;

R^7 is selected from the group consisting of bromo, chloro, trifluoromethyl, $OCHF_2$;

R^5 and R^6 are as defined in claim 1, 2 or 3.

5. Pesticidal mixtures according to claim 1, 2 or 3, in which the compound of formula I is a compound of formula IC:



(IC)

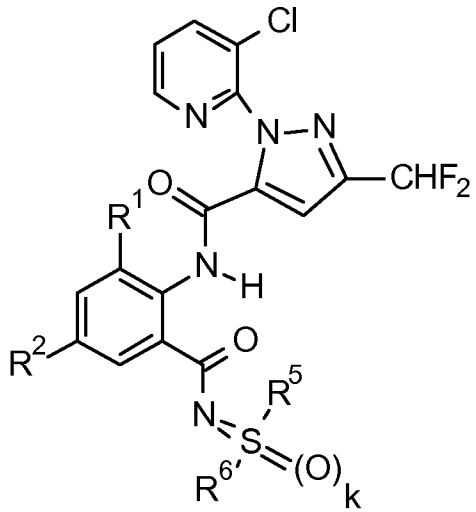
wherein

R^1 is selected from the group consisting of halogen and halomethyl;

R^2 is selected from the group consisting of bromo, chloro and cyano;

R^5 and R^6 are as defined in claim 1, 2 or 3.

6. Pesticidal mixtures according to claim 1, 2 or 3, in which the compound of formula I is a compound of formula ID:



(ID)

wherein

R^1 is selected from the group consisting of halogen, methyl and halomethyl;

R^2 is selected from the group consisting of bromo, chloro and cyano.

7. Pesticidal mixtures according to any of claims 1 to 6, in which in the compound of formula I

R^5 and R^6 are selected from methyl, ethyl, isopropyl, n-propyl, n-butyl, isobutyl, tert-butyl, cyclopropyl, cyclopropylmethyl.

8. Pesticidal mixtures according to any of claims 1 to 7, in which in the compound of formula I

R^5 and R^6 are identical.

9. Pesticidal mixtures according to any of claims 1 to 8, comprising a compound II which is an azole.

10. Pesticidal mixtures according to claim 9, comprising a compound II which is selected from the group of prothioconazole, epoxiconazole, fluquinconazole, flutriafol, flusilazole, metconazole, prochloraz, tebuconazole, triticonazole,.

11. Pesticidal mixtures according to any of claims 1 to 8, comprising a compound II which is a strobilurin.

12. Pesticidal mixtures according to claim 11, comprising a compound II which is pyraclostrobin.

13. Pesticidal mixtures according to claim 11, comprising a compound II which is trifloxystrobin.

14. Pesticidal mixtures according to any of claims 1 to 8, comprising a compound II which is an inhibitor of complex II.

15. Pesticidal mixtures according to claim 14, comprising a compound II which is a carboxanilide.

16. Pesticidal mixtures according to claim 14, comprising a compound II which is selected from the group of fluxapyroxad (N-(3',4',5' trifluorobiphenyl-2 yl)-3-difluoromethyl-1-methyl-1H-pyrazole-4 carboxamide), bixafen, penflufen, sedaxane, isopyrazam.

17. Pesticidal mixtures according to claim 14, comprising a compound II which is fluxapyroxad (N-(3',4',5' trifluorobiphenyl-2 yl)-3-difluoromethyl-1-methyl-1H-pyrazole-4 carboxamide).

18. A method for controlling insects, acarids or nematodes comprising contacting an insect, acarid or nematode or their food supply, habitat, breeding grounds or their locus with a mixture according to any of claims 1 to 17 in pesticidally effective amounts.

19. A method of protecting plants from attack or infestation by 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 a mixture according to any of claims 1 to 17.

20. A method for protection of plant propagation material comprising contacting the plant propagation material with a mixture as defined in any of claims 1 to 17 in pesticidally effective amounts.

21. Seed, comprising the mixture according to any of claims 1 to 17 in an amount of from 0.1 g to 10 kg per 100 kg of seeds.

22. Use of a mixture as defined in any of claims 1 to 17 for combating invertebrate pests.

23. Use of a mixture as defined in any of claims 1 to 17 for combating phytopathogenic fungi,

24. Use of a mixture as defined in any of claims 1 to 17 for protecting plants against attack and/or infestation by invertebrate pests or against infection by phytopathogenic fungi.

25. Use of a mixture as defined in any of claims 1 to 17 for improving the health of plants and/or increasing crop yield.

26. A method for controlling phytopathogenic harmful fungi, wherein the fungi, their habitat, or their locus are treated with an effective amount of a mixture according to any of claims 1 to 17.

27. A method for improving the health of plants and/or increasing the yield, 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 effective amount of a mixture according to any of claims 1 to 17.

28. A pesticidal composition, comprising a liquid or solid carrier and a mixture according to any of claims 1 to 17.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2013/070160

A. CLASSIFICATION OF SUBJECT MATTER
INV. A01N43/56 A01P5/00 A01P3/00 A01P7/02 A01P7/004
ADD.

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.
X	WO 2007/006670 A1 (BASF AG [DE]; SCHMIDT THOMAS [DE]; PUHL MICHAEL [DE]; DICKHAUT JOACHIM) 18 January 2007 (2007-01-18) claims 1, 4, 6 pages 110-147; table C pages 203-207; table IV page 185, line 4 - page 187, line 5 -----	1-28
X,P	WO 2013/113789 A1 (BASF SE [DE]; BASF SCHWEIZ AG [CH]) 8 August 2013 (2013-08-08) claim 1 page 41, line 25 - page 49, line 9 ----- -/--	1-28

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

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"E" earlier application or patent but published on or after the international filing date

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"P" document published prior to the international filing date but later than the priority date claimed

"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

"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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
8 January 2014	20/01/2014

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Panday, Narendra

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Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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X,P	WO 2013/024008 A1 (BASF SE [DE]; KOERBER KARSTEN [DE]; DESHMUKH PRASHANT [DE]; KAISER FLO) 21 February 2013 (2013-02-21) page 68, line 6 - page 76, line 2 page 114, line 25 - page 123, line 5	1-28
X,P	WO 2013/024009 A1 (BASF SE [DE]; KAISER FLORIAN [DE]; KOERBER KARSTEN [DE]; DESHMUKH PRAS) 21 February 2013 (2013-02-21) claim 1 page 49, line 23 - page 55, line 39	1-28
X,P	WO 2013/024010 A1 (BASF SE [DE]; KAISER FLORIAN [DE]; KOERBER KARSTEN [DE]; DESHMUKH PRAS) 21 February 2013 (2013-02-21) claim 1 page 48, line 12 - page 54, line 31	1-28
X,P	WO 2013/092868 A1 (BASF SE [DE]) 27 June 2013 (2013-06-27) claim 1 page 51, line 1 - page 57, line 36	1-28

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2013/070160

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WO 2013092868 A1	27-06-2013	NONE	