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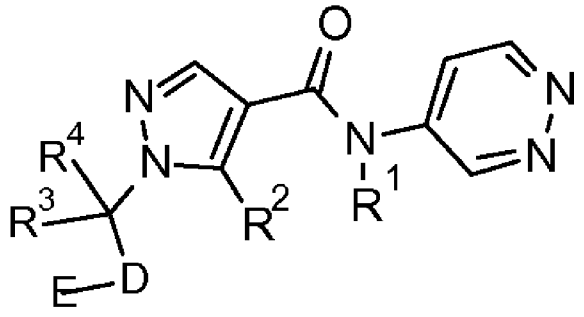
(54) **Title**: SUBSTITUTED PESTICIDAL PYRAZOLE COMPOUNDS



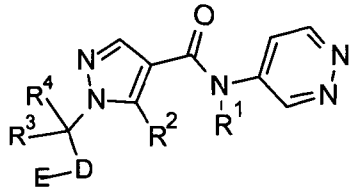
(I)

(57) **Abstract**: The present invention relates to substituted pyrazoles of formula (I), wherein the variables have the meaning as defined in the description, combinations of these compounds and other pesticides, methods and use of these compounds and combinations for combating invertebrate pests such as insects, arachnids or nematodes in and on plants, and for protecting such plants being infested with pests, especially also for protecting plant propagation material as like seeds.

Substituted pesticidal pyrazole compounds

Description

The present invention relates to substituted pyrazoles of formula I



I

wherein

R^1 is H, C_1-C_2-alkyl, or C_1-C_2-alkoxy-C_1-C_2-alkyl;

R^2 is CH_3, or halomethyl;

R^3 CN, C_1-C_2-alkyl, C_1-C_2-haloalkyl, or cyclopropyl;

R^4 H, CN, C_1-C_2-alkyl, or C_1-C_2-haloalkyl;

D is a direct bond, C_1-C_6-alkylene, C_2-C_6-alkenylene, or C_2-C_6-alkynylene, which carbon chains can be partially or fully substituted R^a;

E is a non-aromatic 3- to 12-membered carbo- or heterocycle, which may contain 1, 2, 3, or 4 heteroatoms selected from N-R^c, O, and S, wherein S may be oxidised, which carbo- or heterocycle may be partially or fully substituted by R^a;

R^a is halogen, CN, NO_2, C_1-C_2-alkyl, C_1-C_2-haloalkyl, C_2-C_6-alkenyl, C_2-C_6-alkynyl, C_3-C_6-cycloalkyl, C_3-C_6-cycloalkenyl, C_1-C_4-alkoxy, C_1-C_2-haloalkoxy, C_1-C_2-alkyliden, =O, =S, =NR^b, =NOR^b, =NSR^b, or S(O)$_n$$R^b$, wherein n is 0, 1, or 2, two adjacent groups R^a may form together with the atoms to which they are bonded a 3- to 8-membered carbo- or heterocycle, which may contain 1, 2, 3, or 4 heteroatoms selected from N-R^c, O, and S, wherein S may be oxidised, which cyclic R^a moieties may be substituted by halogen, R^b, or R^c;

R^b is H, C_1-C_2-alkyl, C_1-C_2-haloalkyl, C_3-C_6-cycloalkyl, or C_1-C_4-alkoxy,

R^c is H, C_1-C_2-alkyl, C_1-C_2-haloalkyl, C_1-C_2-alkylcarbonyl, or C_1-C_2-alkoxycarbonyl;

and the stereoisomers, salts, tautomers and N-oxides thereof.

Moreover, the invention relates to processes and intermediates for preparing the pyrazoles of formula I, and also to active compound combinations comprising them, to compositions comprising them and to their use for combating invertebrate pests. Furthermore, the invention relates to methods of applying such compounds.

Further embodiments of the present invention can be found in the claims, the description and the examples. It is to be understood that the features mentioned above and those still to be illustrated below of the subject matter of the invention can be applied not only in the respective given combination but also in other combinations without leaving the scope of the invention.

WO 2009/027393, WO 2010/034737, WO 2010/034738, and WO 2010/112177 describe derivatives of N-arylamides, derived from pyrazole carboxylic acids. These compounds are mentioned to be useful for combating invertebrate pests.

Invertebrate pests and in particular arthropods and nematodes destroy growing and harvested crops and attack wooden dwelling and commercial structures, thereby causing large economic loss to the food supply and to property. There is an ongoing need for new agents for combating invertebrate pests such as insects, arachnids and nematodes. It is therefore an object of the present invention to provide compounds having a good pesticidal activity and showing a broad activity spectrum against a large number of different invertebrate pests, especially against difficult to control pests, such as insects.

It has been found that these objectives can be achieved by compounds of formula I, as defined in the outset, and by their stereoisomers, salts, tautomers and N-oxides, in particular their agriculturally acceptable salts.

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.

Another problem underlying the present invention is the desire for compositions that improve plants, a process which is commonly and hereinafter referred to as "plant health". For example, advantageous properties that may be mentioned are improved crop characteristics including: emergence, crop yields, protein content, more developed root system, tillering increase, increase in plant height, bigger leaf blade, less dead basal leaves, stronger tillers, greener leaf color, pigment content, photosynthetic activity, less fertilizers needed, less seeds needed, more productive tillers, earlier flowering, early grain maturity, less plant verse (lodging), increased shoot growth, enhanced plant vigor, increased plant stand and early germination; or any other advantages familiar to a person skilled in the art. Methods for improving the health of plants by applying active compounds to the plants or the locus are a general need.

The combating of harmful phytopathogenic fungi is in many regions not the only problem the farmer has to face. Invertebrate pests and in particular arthropods and nematodes destroy growing and harvested crops and attack wooden dwelling and commercial structures, thereby causing large economic loss to the food supply and to property. There is an ongoing need for new agents for combating invertebrate pests such as insects, arachnids and nematodes. It is therefore an object of the present invention to provide compounds having a good pesticidal activity and showing a broad activity spectrum against a large number of different invertebrate pests, especially against difficult to control pests, such as insects.

An efficient combination of fungicidal and insecticidal activity is also desirable. Thus, it is a further object of the present invention to provide a mixture which, on the one hand, has good fungicidal activity, and, on the other hand, good insecticidal activity, resulting in a broader pesticidal spectrum of action.

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.

WO 2009/027393, WO 2010/034737, WO 2010/034738, and WO 2010/112177 describe derivatives of N-(het)arylamides, derived from pyrazole carboxylic acids. These compounds are mentioned to be useful for combating invertebrate pests.

PCT/EP2012/056875 describes N-pyridazinyl carboxamide compounds derived from pyrazole carboxylic acids. These compounds are mentioned to be useful for combating invertebrate pests. However, this document does not describe compounds having the characteristic substituents as claimed in the present invention.

PCT/EP2011/072854 relates to pesticidal mixtures comprising N-pyridazinyl carboxamide compounds derived from pyrazole carboxylic acids. These compounds are mentioned to be useful for combating invertebrate pests and/or for controlling phytopathogenic harmful fungi. However, this document does not describe N-pyridazinyl carboxamide compounds having the characteristic substituents as claimed in the present invention.

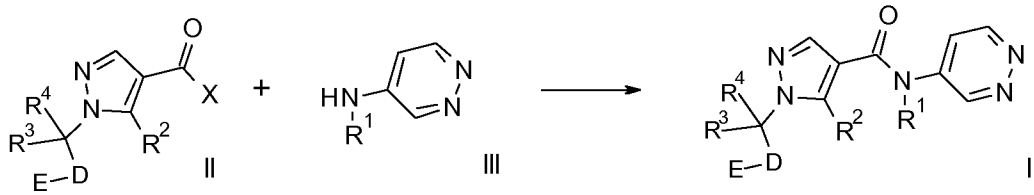
It is therefore an object of the present invention to provide pesticidal mixtures and/or compounds which solves at least one of the discussed problems as reducing the dosage rate, enhancing the spectrum of activity or combining knock-down activity with prolonged control or as to resistance management.

It as been found that at least one of these objectives is achieved by the combination of active compounds defined in the outset or by the pyrazole compounds defined below.

Moreover, it has also been found that simultaneous, that is joint or separate, application of one or more active compounds A and one or more active compounds B or successive application of one or more active compounds A and one or more active compounds B allows enhanced control of pests compared to the control rates that are possible with the individual compounds.

The compounds according to the invention can be prepared analogously to the synthesis routes described in WO 2009/027393 and WO 2010/034737 according to standard processes of organic chemistry, for example according to the following synthesis route:

Compounds of formula I, can be prepared e.g. by reacting activated pyrazole carboxylic acid derivative II with a 4-aminopyridazine of formula III (e.g. Houben-Weyl: "Methoden der organ. Chemie" [Methods of Organic Chemistry], Georg-Thieme-Verlag, Stuttgart, New York 1985, Volume E5, pp. 941-1045).

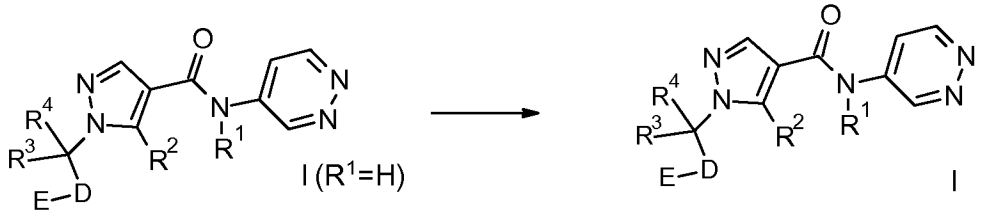


II III I

Activated pyrazole carboxylic acid derivatives II are preferably halides, activated esters, anhydrides, azides, for example chlorides, fluorides, bromides, para-nitrophenyl esters, pentafluorophenyl esters, N-hydroxysuccinimides, hydroxybenzotriazol-1-yl esters.

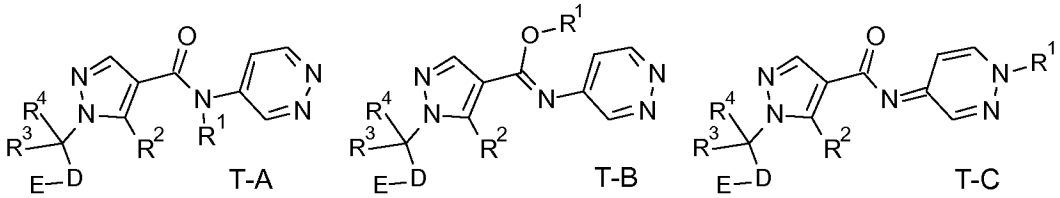
In formulae II and III, the radicals have the meanings mentioned above for formula I and in particular the meanings mentioned as being preferred, X is a suitable leaving group such as halogen, N_3, p-nitrophenoxy or pentafluorophenoxy and the like.

Compounds of formula I wherein R^1 is different from hydrogen can also be prepared by alkylating the amides I, in which R^1 is hydrogen, using suitable alkylating agents in the presence of bases. The alkylation can be effected under standard conditions known from literature.



I (R^1=H) I

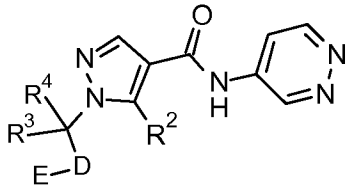
Formula I compounds may be present in three isomeric forms, hence formula I encompasses all tautomers T-A, T-B, and T-C:



T-A T-B T-C

For reasons of clarity it is referred to isomer T-A only throughout the specification, but its description embraces disclosure of the other isomers as well.

Isomer T-C can be obtained by alkylation of compounds I wherein R^1 is hydrogen. The reaction can be performed by analogy to known N-alkylation of pyridazines. N-Alkylation of Pyridazines is known in literature and can be found in e.g.: J. Chem. Soc., Perkin Trans. Vol. 1, p. 401 (1988), and J. Org. Chem. Vol. 46, p. 2467 (1981).



I.1 (R^1=H)

The compounds II and III are known in the art or are commercially available or can be prepared by methods known from the literature (cf. WO 05/040169; WO 08/074824; Journal of Fluorine chemistry 132(11), p.995 (2011)).

N-oxides of the compounds of formula I, can be prepared by oxidation of compounds I according to standard methods of preparing heteroaromatic N-oxides, e.g. by the method described in Journal of Organometallic Chemistry 1989, 370, 17-31.

If individual compounds cannot be prepared via the above-described routes, they can be prepared by derivatization of other compounds I or by customary modifications of the synthesis routes described. For example, in individual cases, certain compounds I can advantageously be prepared from other compounds I by ester hydrolysis, amidation, esterification, ether cleavage, olefination, reduction, oxidation and the like.

The reaction mixtures are worked up in the customary manner, for example by mixing with water, separating the phases, and, if appropriate, purifying the crude products by chromatography, for example on alumina or on silica gel. Some of the intermediates and end products may be obtained in the form of colorless or pale brown viscous oils which are freed or purified from volatile components under reduced pressure and at moderately elevated temperature. If the inter-

mediates and end products are obtained as solids, they may be purified by recrystallization or trituration.

The term “compound(s) according to the invention”, or “compounds of formula I” comprises the compound(s) as defined herein as well as a stereoisomer, salt, tautomer or N-oxide thereof. The term “compound(s) of the present invention” is to be understood as equivalent to the term “compound(s) according to the invention”, therefore also comprising a stereoisomer, salt, tautomer or N-oxide thereof.

The radicals attached to the backbone of formula I may contain one or more centers of chirality. In this case the compounds of formula I are present in the form of different enantiomers or diastereomers, depending on the substituents. The present invention relates to every possible stereoisomer of the formula I, i.e. to single enantiomers or diastereomers, as well as to mixtures thereof.

The compounds of formula I may be amorphous or may exist in one or 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 relates to amorphous and crystalline compounds of formula I, mixtures of different crystalline states of the respective compound I, as well as amorphous or crystalline salts thereof.

Salts of the compounds of the formula I are preferably agriculturally acceptable salts. They can be formed in a customary manner, e.g. by reacting the compound with an acid of the anion in question if the compound of formula I has a basic functionality.

Agriculturally useful salts of the compounds of formula I encompass especially the acid addition salts of those acids whose cations and anions, respectively, have no adverse effect on the pesticidal action of the compounds of formula I.

Anions of useful acid addition salts are primarily chloride, bromide, fluoride, hydrogensulfate, sulfate, dihydrogenphosphate, hydrogenphosphate, phosphate, nitrate, bicarbonate, 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 compounds of formula I with an acid of the corresponding anion, preferably of hydrochloric acid, hydrobromic acid, sulfuric acid, phosphoric acid or nitric acid.

The term "N-oxide" includes any compound of formula I which has at least one tertiary nitrogen atom that is oxidized to an N-oxide moiety.

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 "alkyl" as used herein and in the alkyl moieties of alkoxy, alkylcarbonyl, alkylthio, alkylsulfinyl, alkylsulfonyl and alkoxyalkyl denotes in each case a straight-chain or branched alkyl group having usually from 1 to 6 carbon atoms, preferably 1 to 4 carbon atoms and in particular from 1 to 3 carbon atoms. Examples of an alkyl group are methyl, ethyl, n-propyl, iso-propyl, n-butyl, 2-butyl, iso-butyl, tert-butyl, 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.

The term "haloalkyl" as used herein and in the haloalkyl moieties of haloalkoxy, haloalkylthio, haloalkylcarbonyl, haloalkylsulfonyl and haloalkylsulfinyl, denotes in each case a straight-chain or branched alkyl group having usually from 1 to 6 carbon atoms, frequently from 1 to 4 carbon atoms, wherein the hydrogen atoms of this group are partially or totally replaced with halogen atoms. Preferred haloalkyl moieties are selected from C_1-C_2-haloalkyl, in particular from C_1-C_2-fluoroalkyl such as fluoromethyl, difluoromethyl, trifluoromethyl, 1-fluoroethyl, 2-fluoroethyl, 2,2-difluoroethyl, 2,2,2-trifluoroethyl, pentafluoroethyl, and the like.

The term "alkoxy" as used herein denotes in each case a straight-chain or branched alkyl group which is bound via an oxygen atom and has usually from 1 to 6 carbon atoms, preferably 1 to 4 carbon atoms. Examples of an alkoxy group are methoxy, ethoxy, n-propoxy, iso-propoxy, n-butyloxy, 2-butyloxy, iso-butyloxy, tert.-butyloxy, and the like.

The term "cycloalkyl" as used herein and in the cycloalkyl moieties of cycloalkoxy and cycloalkylmethyl denotes in each case a monocyclic cycloaliphatic radical having usually from 3 to 6 carbon atoms, such as cyclopropyl, cyclobutyl, cyclopentyl, and cyclohexyl.

The term "alkenyl" as used herein denotes in each case a singly unsaturated hydrocarbon radical having usually 2 to 6, preferably 2 to 4 carbon atoms, e.g. vinyl, allyl (2-propen-1-yl), 1-propen-1-yl, 2-propen-2-yl, methallyl (2-methylprop-2-en-1-yl), 2-buten-1-yl, 3-buten-1-yl, 2-penten-1-yl, 3-penten-1-yl, 4-penten-1-yl, 1-methylbut-2-en-1-yl, 2-ethylprop-2-en-1-yl and the like.

The term "alkynyl" as used herein denotes in each case a singly unsaturated hydrocarbon radical having usually 2 to 6, preferably 2 to 4 carbon atoms, e.g. ethynyl, propargyl (2-propyn-1-yl), 1-propyn-1-yl, 1-methylprop-2-yn-1-yl), 2-butyn-1-yl, 3-butyn-1-yl, 1-pentyn-1-yl, 3-pentyn-1-yl, 4-pentyn-1-yl, 1-methylbut-2-yn-1-yl, 1-ethylprop-2-yn-1-yl and the like.

The term "alkoxyalkyl" as used herein refers to alkyl usually comprising 1 to 2 carbon atoms, wherein 1 carbon atom carries an alkoxy radical usually comprising 1 or 2 carbon atoms as defined above. Examples are CH_2OCH_3, CH_2-OC_2H_5, 2-(methoxy)ethyl, and 2-(ethoxy)ethyl.

The term "heterocyclyl" includes in general 5-, or 6-membered, in particular 6-membered monocyclic heterocyclic non-aromatic radicals. The heterocyclic non-aromatic radicals usually comprise 1, 2, or 3 heteroatoms selected from N, O and S as ring members, where S-atoms as ring members may be present as S, SO or SO_2.

Examples of 5-, or 6-membered heterocyclic radicals comprise saturated or unsaturated, non-aromatic heterocyclic rings, such as oxiranyl, oxetanyl, thietanyl, thietanyl-S-oxid (S-oxothietanyl), thietanyl-S-dioxid (S-dioxothiethanyl), pyrrolidinyl, pyrrolinyl, pyrazolinyl, tetrahydrofuranyl, dihydrofuranyl, 1,3-dioxolanyl, thiolanyl, S-oxothiolanyl, S-dioxothiolanyl, dihydrothienyl, S-oxodihydrothienyl, S-dioxodihydrothienyl, oxazolidinyl, oxazolinyl, thiazolinyl, oxathiolanyl, piperidinyl, piperazinyl, pyranyl, dihydropyranyl, tetrahydropyranyl, 1,3- and 1,4-dioxanyl, thiopyranyl, S.oxothiopyranyl, S-dioxothiopyranyl, dihydrothiopyranyl, S-oxodihydrothiopyranyl, S-dioxodihydrothiopyranyl, tetrahydrothiopyranyl, S-oxotetrahydrothiopyranyl, S-dioxotetrahydrothiopyranyl, morpholinyl, thiomorpholinyl, S-oxothiomorpholinyl, S-dioxothiomorpholinyl, thia-

zinyl and the like. Examples for heterocyclic ring also comprising 1 or 2 carbonyl groups as ring members comprise pyrrolidin-2-onyl, pyrrolidin-2,5-dionyl, imidazolidin-2-onyl, oxazolidin-2-onyl, thiazolidin-2-onyl and the like.

With respect to the variables, the particularly preferred embodiments of the intermediates correspond to those of the groups of the formula I.

In a particular embodiment, the variables of the compounds of the formula I have the following meanings, these meanings, both on their own and in combination with one another, being particular embodiments of the compounds of the formula I:

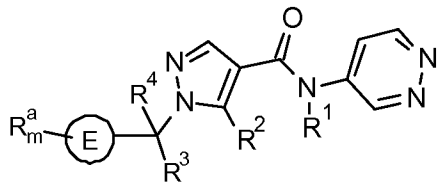
In one embodiment onf the invention non-aromatic carbo- or heterocycle E is a saturated heterocycle, preferably a 3- to 6-membered heterocycle, such as tetrahydropyranyl, piperidinyl, thianyl, 1,1-dioxo-thianyl, thiethanyl, 1-oxo-thietanyl, oxiranyl, oxetan-2-yl, tetrahydrofuran-2-yl, oxetan-3-yl, tetrahydrofuran-3-yl, tetrahydrothiopyranyl, 1,3-dioxan-5-yl.

In another embodiment of the invention non-aromatic carbo- or heterocycle E is a unsaturated heterocycle, preferably a 5- or 6-membered heterocycle, such as 3,4-dihydro-2H-pyran-4-yl, 2,5-dihydrofuranyl, 2,2-dihydrofuranyl, 2,5-dihydrothiophenyl, 2,3-dihydrothiophenyl, 3,6-dihydro-2H-pyranyl, preferably 3,4-dihydro-2H-pyran-4-yl.

R^a groups bonded to an aliphatic carbon chain or carbocycle are preferably halogen, CN, alkyl, cycloalkyl, haloalkyl, alkoxy, cyclic acetales.

R^a groups bonded to a heterocycle are preferably halogen, CN, alkyl, haloalkyl, alkylcarbonyl, oxo, alkoxy.

One embodiment of the invention relates to compounds of formula I, wherein D is a direct bond. These compounds correspond to formula I.A.



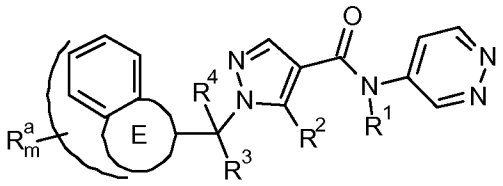
I.A

E is as defined above, the index m is zero, or a number from 1 to the maximum possible value, usually 0, 1, or 2.

Saturated heterocyclic groups E, particularly in formula I.A, are preferably tetrahydropyranyl, piperidinyl, tetrahydrothiopyranyl, thianyl, 1,1-dioxo-thianyl, thiethanyl, 1-oxo-thietanyl, oxazolidinyl, 1,4-dithianyl, oxethanyl, 1,3-dioxanyl, 1,3-oxathiolanyl, and oxiranyl, or tetrahydrofuran-2-yl, pyrrolidinyl, or tetrahydrothiophenyl.

Unsaturated heterocyclic groups E, particularly in formula I.A, are preferably 3,4-dihydro-2H-pyranyl, or a heterocycle selected from 2,5-dihydrofuranyl, 2,2-dihydrofuranyl, 2,5-dihydrothiophenyl, 2,3-dihydrothiophenyl, and 3,6-dihydro-2H-pyranyl.

In one embodiment another ring is annelated to the ring E, e.g. a phenyl ring. Such compounds correspond to formula I.Aa:



I.Aa

In a first embodiment, R^1 is H.

In a further embodiment, R^1 is C_1-C_2-alkyl, preferably CH_3.

In a further embodiment, R^1 is CH_2CH_3.

In a further embodiment, R^1 is C_1-C_2-alkoxy-C_1-C_2-alkyl, preferably C_1-C_2-alkoxy-methyl, particularly CH_2OCH_3.

In a first embodiment, R^2 is CH_3.

In a further embodiment, R^2 is halomethyl, preferably fluoromethyl, particularly CHF_2, or CF_3.

In another preferred embodiment, D is C_1-C_4-alkylene, preferably C_1-C_2-alkylene, particularly CH_2.

In a first preferred embodiment R^3 is C_1-C_4-alkyl, preferably C_1-C_2-alkyl, particularly CH_3.

In another preferred embodiment R^4 is C_1-C_6-haloalkyl, preferably C_1-C_2-alkyl, particularly halomethyl, such as CF_3.

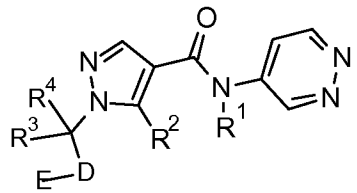
In a further embodiment R^3 is C_3-C_6-cycloalkyl, preferably cyclopropyl, which may be substituted, preferably by halogen or cyano. Substituents are preferably in 1- or in 2,2-position.

In a first preferred embodiment, R^4 is hydrogen.

In another preferred embodiment, R^4 is CN or NO_2, preferably CN.

In another preferred embodiment, R^4 is C_1-C_4-alkyl, preferably C_1-C_2-alkyl, particularly CH_3.

In particular with a view to their use, preference is given to the compounds of the formula I compiled in the tables below, which compounds correspond to the formula I. Each of the groups mentioned for a substituent in the tables is furthermore per se, independently of the combination in which it is mentioned, a particularly preferred aspect of the substituent in question.



I

Table 1

Compounds of the formula I in which R^1 is H, R^2 is CH_3 and the combination of D, E, R^3 and R^4 for a compound corresponds in each case to one row of Table A

Table 2

Compounds of the formula I in which R^1 is H, R^2 is CHF_2 and the combination of D, E, R^3 and R^4 for a compound corresponds in each case to one row of Table A

Table 3

Compounds of the formula I in which R^1 is H, R^2 is CF_3 and the combination of D, E, R^3 and R^4 for a compound corresponds in each case to one row of Table A

Table 4

Compounds of the formula I in whichR^1 and R^2 are CH_3 and the combination of D, E, R^3 and R^4 for a compound corresponds in each case to one row of Table A

Table 5

Compounds of the formula I in which R^1 is CH_3, R^2 is CHF_2 and the combination of D, E, R^3 and R^4 for a compound corresponds in each case to one row of Table A

Table 6

Compounds of the formula I in which R^1 is CH_3, R^2 is CF_3 and the combination of D, E, R^3 and R^4 for a compound corresponds in each case to one row of Table A

Table 7

Compounds of the formula I in which R^1 is CH_2CH_3, R^2 is CH_3 and the combination of D, E, R^3 and R^4 for a compound corresponds in each case to one row of Table A

Table 8

Compounds of the formula I in which R^1 is CH_2CH_3, R^2 is CHF_2 and the combination of D, E, R^3 and R^4 for a compound corresponds in each case to one row of Table A

Table 9

Compounds of the formula I in which R^1 is CH_2CH_3, R^2 is CF_3 and the combination of D, E, R^3 and R^4 for a compound corresponds in each case to one row of Table A

Table 10

Compounds of the formula I in which R^1 is CH_2OCH_3, R^2 is CH_3 and the combination of D, E, R^3 and R^4 for a compound corresponds in each case to one row of Table A

Table 11

Compounds of the formula I in which R^1 is CH_2OCH_3, R^2 is CHF_2 and the combination of D, E, R^3 and R^4 for a compound corresponds in each case to one row of Table A

Table 12

Compounds of the formula I in which R^1 is CH_2OCH_3, R^2 is CF_3 and the combination of D, E, R^3 and R^4 for a compound corresponds in each case to one row of Table A

Table 13

Compounds of the formula I in which R^1 is $CH_2OCH_2CH_3$, R^2 is CH_3 and the combination of D, E, R^3 and R^4 for a compound corresponds in each case to one row of Table A

Table 14

Compounds of the formula I in which R^1 is $CH_2OCH_2CH_3$, R^2 is CHF_2 and the combination of D, E, R^3 and R^4 for a compound corresponds in each case to one row of Table A

Table 15

Compounds of the formula I in which R^1 is $CH_2OCH_2CH_3$, R^2 is CF_3 and the combination of D, E, R^3 and R^4 for a compound corresponds in each case to one row of Table A

Table A

No.	D-E-$(R^a)_m$	R^3	R^4
A-1	tetrahydropyran-4-yl	CH_3	H
A-2	1,3-dithian-2-yl	CH_3	H
A-3	2-CH_3-1,3,-oxathiolan-2-yl	CH_3	H
A-4	tetrahydropyran-2-yl	CH_3	H
A-5	2,2-$(CH_3)_2$-1,3-dioxolan-4-yl	CH_3	H
A-6	oxiranyl	CH_3	H

No.	D-E-(R^a)$_m$	R^3	R^4
A-7	2,2-(CH_3)$_2$-oxiran-3-yl	CH_3	H
A-8	1,3-dioxolan-2-yl	CH_3	H
A-9	1,3-dioxan-2-yl	CH_3	H
A-10	tetrahydropyran-4-yl	CH_2CH_3	H
A-11	1,3-dithian-2-yl	CH_2CH_3	H
A-12	2-CH_3-1,3,-oxathiolan-2-yl	CH_2CH_3	H
A-13	tetrahydropyran-2-yl	CH_2CH_3	H
A-14	2,2-(CH_3)$_2$-1,3-dioxolan-4-yl	CH_2CH_3	H
A-15	oxiranyl	CH_2CH_3	H
A-16	2,2-(CH_3)$_2$-oxiran-3-yl	CH_2CH_3	H
A-17	1,3-dioxolan-2-yl	CH_2CH_3	H
A-18	1,3-dioxan-2-yl	CH_2CH_3	H
A-19	tetrahydropyran-4-yl	CF_3	H
A-20	1,3-dithian-2-yl	CF_3	H
A-21	2-CH_3-1,3,-oxathiolan-2-yl	CF_3	H
A-22	tetrahydropyran-2-yl	CF_3	H
A-23	2,2-(CH_3)$_2$-1,3-dioxolan-4-yl	CF_3	H
A-24	oxiranyl	CF_3	H
A-25	2,2-(CH_3)$_2$-oxiran-3-yl	CF_3	H
A-26	1,3-dioxolan-2-yl	CF_3	H
A-27	1,3-dioxan-2-yl	CF_3	H
A-28	tetrahydropyran-4-yl	CH_3	CH_3
A-29	1,3-dithian-2-yl	CH_3	CH_3
A-30	2-CH_3-1,3,-oxathiolan-2-yl	CH_3	CH_3
A-31	tetrahydropyran-2-yl	CH_3	CH_3
A-32	2,2-(CH_3)$_2$-1,3-dioxolan-4-yl	CH_3	CH_3
A-33	oxiranyl	CH_3	CH_3
A-34	2,2-(CH_3)$_2$-oxiran-3-yl	CH_3	CH_3
A-35	1,3-dioxolan-2-yl	CH_3	CH_3
A-36	1,3-dioxan-2-yl	CH_3	CH_3
A-37	tetrahydropyran-4-yl	CH_2CH_3	CH_3
A-38	1,3-dithian-2-yl	CH_2CH_3	CH_3
A-39	2-CH_3-1,3,-oxathiolan-2-yl	CH_2CH_3	CH_3
A-40	tetrahydropyran-2-yl	CH_2CH_3	CH_3
A-41	2,2-(CH_3)$_2$-1,3-dioxolan-4-yl	CH_2CH_3	CH_3
A-42	oxiranyl	CH_2CH_3	CH_3
A-43	2,2-(CH_3)$_2$-oxiran-3-yl	CH_2CH_3	CH_3
A-44	1,3-dioxolan-2-yl	CH_2CH_3	CH_3
A-45	1,3-dioxan-2-yl	CH_2CH_3	CH_3

No.	D-E-$(R^a)_m$	R^3	R^4
A-46	tetrahydropyran-4-yl	CF_3	CH_3
A-47	1,3-dithian-2-yl	CF_3	CH_3
A-48	2-CH_3-1,3,-oxathiolan-2-yl	CF_3	CH_3
A-49	tetrahydropyran-2-yl	CF_3	CH_3
A-50	2,2-$(CH_3)_2$-1,3-dioxolan-4-yl	CF_3	CH_3
A-51	oxiranyl	CF_3	CH_3
A-52	2,2-$(CH_3)_2$-oxiran-3-yl	CF_3	CH_3
A-53	1,3-dioxolan-2-yl	CF_3	CH_3
A-54	1,3-dioxan-2-yl	CF_3	CH_3
A-55	tetrahydropyran-4-yl	CF_3	CF_3
A-56	1,3-dithian-2-yl	CF_3	CF_3
A-57	2-CH_3-1,3,-oxathiolan-2-yl	CF_3	CF_3
A-58	tetrahydropyran-2-yl	CF_3	CF_3
A-59	2,2-$(CH_3)_2$-1,3-dioxolan-4-yl	CF_3	CF_3
A-60	oxiranyl	CF_3	CF_3
A-61	2,2-$(CH_3)_2$-oxiran-3-yl	CF_3	CF_3
A-62	1,3-dioxolan-2-yl	CF_3	CF_3
A-63	1,3-dioxan-2-yl	CF_3	CF_3
A-64	tetrahydropyran-4-yl	CH_2CH_3	CH_2CH_3
A-65	1,3-dithian-2-yl	CH_2CH_3	CH_2CH_3
A-66	2-CH_3-1,3,-oxathiolan-2-yl	CH_2CH_3	CH_2CH_3
A-67	tetrahydropyran-2-yl	CH_2CH_3	CH_2CH_3
A-68	2,2-$(CH_3)_2$-1,3-dioxolan-4-yl	CH_2CH_3	CH_2CH_3
A-69	oxiranyl	CH_2CH_3	CH_2CH_3
A-70	2,2-$(CH_3)_2$-oxiran-3-yl	CH_2CH_3	CH_2CH_3
A-71	1,3-dioxolan-2-yl	CH_2CH_3	CH_2CH_3
A-72	1,3-dioxan-2-yl	CH_2CH_3	CH_2CH_3

Due to their excellent activity, the compounds of the present invention may be used for controlling invertebrate pests.

Accordingly, the present invention also provides a method for controlling invertebrate pests which method comprises treating the pests, their food supply, their habitat or their breeding ground or a cultivated plant, plant propagation materials (such as seed), soil, area, material or environment in which the pests are growing or may grow, or the materials, cultivated plants, plant propagation materials (such as seed), soils, surfaces or spaces to be protected from pest attack or infestation with a pesticidally effective amount of a compound of the present invention or a composition as defined above.

The present invention also relates to a method for protecting growing plants from attack or infestation by invertebrate pests, preferably of the group of insects, which method comprises contacting a plant, or soil or water in which the plant is growing or may grow, with a pesti-

cidally effective amount of at least one compound according to the invention including a stereoisomer, salt, tautomer or N-oxide thereof or a composition according to the invention.

Preferably, the method of the invention serves for protecting plant propagation material (such as seed) and the plant which grows therefrom from invertebrate pest attack or infestation and comprises treating the plant propagation material (such as seed) with a pesticidally effective amount of a compound of the present invention as defined above or with a pesticidally effective amount of an agricultural composition as defined above and below. The method of the invention is not limited to the protection of the "substrate" (plant, plant propagation materials, soil material etc.) which has been treated according to the invention, but also has a preventive effect, thus, for example, according protection to a plant which grows from a treated plant propagation materials (such as seed), the plant itself not having been treated.

In the sense of the present invention, "invertebrate pests" are preferably selected from arthropods and nematodes, more preferably from harmful insects, arachnids and nematodes, and even more preferably from insects, acarids and nematodes. In the sense of the present invention, "invertebrate pests" are most preferably insects.

The compounds of the present invention, including their salts, stereoisomers and tautomers, are in particular suitable for efficiently controlling arthropodal pests such as arachnids, myriapedes and insects as well as nematodes, especially insects. They are especially suitable for efficiently combating or controlling the following pests:

Insects from the order of the lepidopterans (Lepidoptera), for example Agrotis ypsilon, Agrotis segetum, Alabama argillacea, Anticarsia gemmatalis, Argyresthia conjugella, Autographa gamma, Bupalus piniarius, Cacoecia murinana, Capua reticulana, Cheimatobia brumata, 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, Tortrix viridana, Trichoplusia ni and Zeiraphera canadensis;

beetles (Coleoptera), for example Agrilus sinuatus, Agriotes lineatus, Agriotes obscurus, Amphimallus solstitialis, Anisandrus dispar, Anthonomus grandis, Anthonomus pomorum, Aphthona euphoridae, Athous haemorrhoidalis, Atomaria linearis, Blastophagus piniperda,

Blitophaga undata, Bruchus rufimanus, Bruchus pisorum, Bruchus lentis, Byctiscus betulae, Cassida nebulosa, Cerotoma trifurcata, Cetonia aurata, Ceuthorrhynchus assimilis, Ceuthorrhynchus napi, 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;

flies, mosquitoes (Diptera), e.g. Aedes aegypti, Aedes albopictus, Aedes vexans, Anastrepha ludens, Anopheles maculipennis, Anopheles crucians, Anopheles albimanus, Anopheles gambiae, Anopheles freeborni, Anopheles leucosphyrus, Anopheles minimus, Anopheles quadrimaculatus, Calliphora vicina, Ceratitis capitata, Chrysomya bezziana, Chrysomya hominivorax, Chrysomya macellaria, Chrysops discalis, Chrysops silacea, Chrysops atlanticus, Cochliomyia hominivorax, Contarinia sorghicola Cordylobia anthropophaga, Culicoides furens, Culex pipiens, 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;

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

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

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

bugs, aphids, leafhoppers, whiteflies, scale insects, cicadas (Hemiptera), e.g. Acrosternum hilare, Blissus leucopterus, Cyrtopeltis notatus, Dysdercus cingulatus, Dysdercus intermedi-

us, Eurygaster integriceps, Euschistus impictiventris, Leptoglossus phyllopus, Lygus lineolaris, Lygus pratensis, Nezara viridula, Piesma quadrata, Solubea insularis, Thyanta perditor, 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, Bemisia argentifolii, 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, Myzus persicae, Myzus ascalonicus, Myzus cerasi, Myzus varians, Nasonovia ribis-nigri, Nilaparvata lugens, Pemphigus bursarius, Perkinsiella saccharicida, Phorodon humuli, Psylla mali, Psylla piri, Rhopalomyzus ascalonicus, Rhopalosiphum maidis, Rhopalosiphum padi, Rhopalosiphum insertum, Sappaphis mala, Sappaphis mali, Schizaphis graminum, Schizoneura lanuginosa, Sitobion avenae, Trialeurodes vaporariorum, Toxoptera aurantiiand, Viteus vitifolii, Cimex lectularius, Cimex hemipterus, Reduvius senilis, Triatoma spp., and Arilus critatus;

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

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

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

silverfish, firebrat (Thysanura), e.g. Lepisma saccharina and Thermobia domestica,

centipedes (Chilopoda), e.g. Scutigera coleoptrata,

millipedes (Diplopoda), e.g. Narceus spp.,

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

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

Collembola (springtails), e.g. Onychiurus ssp..

The compounds of the present invention, including their salts, stereoisomers and tautomers, are particularly useful for controlling insects, preferably sucking or piercing insects such as insects from the genera Thysanoptera, Diptera and Hemiptera, 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.

The compounds of the present invention, including their salts, stereoisomers and tautomers, are particularly useful for controlling insects of the orders Hemiptera and Thysanoptera.

The invention also relates to agrochemical compositions comprising an auxiliary and at least one compound I according to the invention.

An agrochemical composition comprises a pesticidally effective amount of a compound I. The term "effective amount" denotes an amount of the composition or of the compounds I, which is sufficient for controlling harmful fungi 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 pests to be controlled, the treated cultivated plant or material, the climatic conditions and the specific compound I used.

The compounds I, their N-oxides and salts 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; polysaccharide powders, 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 alkylnaphthalenes, sulfosuccinates or sulfosuccinamates. Examples of sulfates are sulfates of fatty acids and oils, of ethoxylated alkylphenols, of alcohols, of ethoxylated alcohols, or of fatty acid esters. Examples of phosphates are phosphate esters. Examples of carboxylates are alkyl carboxylates, and carboxylated alcohol or alkylphenol ethoxylates.

Suitable nonionic surfactants are 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 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 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 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 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 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 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 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 applianc-

es (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 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 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.

iv) Microemulsion (ME)

5-20 wt% of a compound I 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.

iv) Microcapsules (CS)

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), 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.

ix) Dustable powders (DP, DS)

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

x) Granules (GR, FG)

0.5-30 wt% of a compound I 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.

xi) Ultra-low volume liquids (UL)

1-50 wt% of a compound I 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.

In the methods and uses of this invention, the compounds according to the invention may be applied with other active ingredients, for example with other pesticides, insecticides, herbicides, fertilizers such as ammonium nitrate, urea, potash, and superphosphate, phytotoxicants and plant growth regulators, safeners and nematicides. 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.

Moreover, it has also been found that simultaneous, that is joint or separate, application of one or more active compounds A of formula I and one or more active compounds B or successive application of one or more active compounds A and one or more active compounds B allows enhanced control of pests compared to the control rates that are possible with the individual compounds.

1) at least one pyrazole compound A selected from the compounds of formula I as defined and preferred in the outset

and

2) at least one further compound B selected from the compounds of the following groups A.1, A.2, A.3, A.4, A.5, A.6, A.7, A.8, A.9, A.10, A.11, A.12, A.13, A.14, A.15, A.16, A.17, F.1, F.2, F.3, F.4, F.5, F.6, F.7, F.8, F.9, F.10, and F.11:

A.1 Carbamate compounds, selected from the group consisting of methiocarb and thiodicarb;

A.2 Pyrethroid compounds, selected from the group consisting of 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, permethrin, phenothrin, prallethrin, profluthrin, pyrethrin (pyrethrum), resmethrin, silafluofen, tefluthrin, tetramethylfluthrin, tetramethrin, tralomethrin and transfluthrin;

A.3 Nicotinic receptor agonists/antagonists compounds, selected from the group consisting of acetamiprid, bensultap, cartap hydrochloride, clothianidin, dinotefuran, imidacloprid, thiamethoxam, nitenpyram, spinosad (allosteric agonist), spinetoram (allosteric agonist), thiacloprid, thiocyclam and thiosultap-sodium;

A.4 GABA gated chloride channel antagonist compounds, selected from the group consisting of acetoprole, ethiprole and fipronil;

A.5 Chloride channel activators, selected from the group consisting of abamectin, emamectin benzoate, milbemectin and lepimectin;

A.6 Uncouplers of oxidative phosphorylation, namely chlorfenapyr;

A.7 Synergists, namely piperonyl butoxide;

A.8 Selective feeding blockers, selected from the group consisting of pymetrozine and flonicamid;

A.9 Chitin synthesis inhibitors, selected from the group consisting of teflubenzuron and novaluron;

A.10 Lipid biosynthesis inhibitors, selected from the group consisting of spirodiclofen, spiromesifen and spirotetramat;

A.11 Diamide-type Ryanodine receptor modulators - Phthalamides, selected from the group consisting of flubendiamide and (R)-, (S)-3-chloro-N1-{2-methyl-4-[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]phenyl}-N2-(1-methyl-2-methylsulfonylethyl)phthalamide (A11.1);

A.12 Isoxazoline compounds, selected from the group consisting of 4-[5-(3,5-dichloro-phenyl)-5-trifluoromethyl-4,5-dihydro-isoxazol-3-yl]-2-methyl-N-pyridin-2-ylmethyl-benzamide (A12.1), 4-[5-(3,5-dichloro-phenyl)-5-trifluoromethyl-4,5-dihydro-isoxazol-3-yl]-2-methyl-N-(2,2,2-trifluoroethyl)-benzamide (A12.2), 4-[5-(3,5-dichloro-phenyl)-5-trifluoromethyl-4,5-dihydroisoxazol-3-yl]-2-methyl-N-[(2,2,2-trifluoro-ethylcarbamoyl)-methyl]-benzamide (A12.3), 4-[5-(3,5-dichloro-phenyl)-5-trifluoromethyl-4,5-dihydro-isoxazol-3-yl]-naphthalene-1-carboxylic acid [(2,2,2-trifluoro-ethylcarbamoyl)-methyl]-amide (A12.4), 4-[5-(3-chloro-5-trifluoromethyl-phenyl)-5-trifluoromethyl-4,5-dihydro-isoxazol-3-yl]-2-methyl-N-[(2,2,2-trifluoro-ethylcarbamoyl)-methyl]-benzamide (A12.5), 4-[5-(3-chloro-5-trifluoromethylphenyl)-5-trifluoromethyl-4,5-dihydro-isoxazol-3-yl]-naphthalene-1-carboxylic acid [(2,2,2-trifluoroethylcarbamoyl)-methyl]-amide (A12.6), 5-[5-(3,5-dichloro-4-fluorophenyl)-5-trifluoromethyl-4,5-dihydro-isoxazol-3-yl]-2-[1,2,4]triazol-1-yl-benzonitrile (A12.7) and 5-[5-(3,5-dichloro-phenyl)-5-trifluoromethyl-4,5-dihydro-isoxazol-3-yl]-2-[1,2,4]triazol-1-yl-benzonitrile (A12.8);

A.13 Diamide-type Ryanodine receptor modulators - Anthranilamide compounds, selected from the group consisting of chloranthraniliprole (rynaxypyr), cyantraniliprole, 5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carboxylic acid [4-cyano-2-(1-cyclopropyl-ethylcarbamoyl)-6-methyl-phenyl]-amide (A13.1), 5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carboxylic acid [2-chloro-4-cyano-6-(1-cyclopropyl-ethylcarbamoyl)-phenyl]-amide (A13.2), 5-bromo-2-(3-chloropyridin-2-yl)-2H-pyrazole-3-carboxylic acid [2-bromo-4-cyano-6-(1-cyclopropyl-ethylcarbamoyl)-phenyl]-amide(A13.3), 5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carboxylic acid [2-bromo-4-chloro-6-(1-cyclopropyl-ethylcarbamoyl)-phenyl]-amide (A13.4), 5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carboxylic acid [2,4-dichloro-6-(1-cyclopropyl-ethylcarbamoyl)-phenyl]-amide (A13.5), 5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carboxylic acid [4-chloro-2-(1-cyclopropyl-ethylcarbamoyl)-6-methyl-phenyl]-amide (A13.6), N'-(2-{[5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carbonyl]-amino}-5-chloro-3-methyl-benzoyl)-hydrazinecarboxylic acid methyl ester (A13.7), N'-(2-{[5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carbonyl]-amino}-5-chloro-3-methyl-benzoyl)-N'-methyl-hydrazinecarboxylic acid methyl ester (A13.8), N'-(2-{[5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carbonyl]-amino}-5-chloro-3-methyl-benzoyl)-N,N'-dimethyl-hydrazinecarboxylic acid methyl ester (A13.9), N'-(3,5-dibromo-2-{[5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carbonyl]-amino}-benzoyl)-hydrazinecarboxylic acid

methyl ester (A13.10), N'-(3,5-dibromo-2-{[5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carbonyl]-amino}-benzoyl)-N'-methyl-hydrazine carboxylic acid methyl ester (A13.11) and N'-(3,5-dibromo-2-{[5-bromo-2-(3-chloropyridin-2-yl)-2H-pyrazole-3-carbonyl]-amino}-benzoyl)-N,N'-dimethyl-hydrazinecarboxylic acid methyl ester (A13.12);

A.14 Malononitrile compounds, selected from the group consisting of 2-(2,2,3,3,4,4,5,5-octafluoropentyl)-2-(3,3,3-trifluoropropyl) malononitrile (CF_2H-CF_2-CF_2-CF_2-CH_2-$C(CN)_2$-CH_2-CH_2-CF_3) (A14.1) and 2-(2,2,3,3,4,4,5,5-octafluoropentyl)-2-(3,3,4,4,4-pentafluorobutyl)-malonodinitrile (CF_2HCF_2-CF_2-CF_2-CH_2-$C(CN)_2$-CH_2-CH_2-CF_2-CF_3) (A14.2);

A.15 Microbial disruptors, selected from the group consisting of Bacillus thuringiensis subsp. Israelensi, Bacillus sphaericus, Bacillus thuringiensis subsp. Aizawai, Bacillus thuringiensis subsp. Kurstaki and Bacillus thuringiensis subsp. Tenebrionis;

A.16 Aminofuranone compounds, selected from the group consisting of 4-{[(2-chloro1,3-thiazolo-5-yl)methyl](2-fluoroethyl)amino}furan-2(5H)-on (A16.1), 4-{[(6-chloropyrid-3-yl)methyl](2-fluoroethyl)amino}furan-2(5H)-on (A16.2), 4-{[(6-chloropyrid-3-yl)methyl](2,2-difluoroethyl)amino}furan-2(5H)-on (A16.3), 4-{[(6-chloro-5-fluoropyrid-3-yl)methyl](methyl)amino}furan-2(5H)-on (A16.4), 4-{[(6-chloro-5-fluoropyrid-3-yl)methyl](cyclopropyl)amino}furan-2(5H)-on (A16.5), 4-{[(6-chloropyrid-3-yl)methyl](cyclopropyl)amino}furan-2(5H)-on (A16.6) and 4-{[(6-chloropyrid-3-yl)methyl](methyl)amino}furan-2(5H)-on (A16.7);

A.17 Various compounds, selected from the group consisting of aluminium phosphide, amidoflumet, benclothiaz, benzoximate, bifenazate, borax, bromopropylate, cryolite, cyanide, cyenopyrafen, cyflumetofen, chinomethionate, dicofol, fluensulfone, fluoroacetate, phosphine, pyridalyl, pyrifluquinazon, sulfur, organic sulfur compounds, tartar emetic, sulfoxaflor, afidopyropen (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), 4-but-2-ynyloxy-6-(3,5-dimethyl-piperidin-1-yl)-2-fluoro-pyrimidine (A17.1), and 8-(2-cyclopropylmethoxy-4-trifluoromethyl-phenoxy)-3-(6-trifluoromethyl-pyridazin-3-yl)-3-aza-bicyclo[3.2.1]octane (A17.2);

F.1 Respiration inhibitors selected from the following groups a), b), c) and d):

a) Inhibitors of complex III at Q_o site (e.g. strobilurins), selected from the group consisting of azoxystrobin, coumethoxystrobin, coumoxystrobin, dimoxystrobin, enestroburin, fenaminstrobin, fenoxystrobin / flufenoxystrobin, fluoxastrobin, kresoxim-methyl, metominostrobin, orysastrobin, picoxystrobin, pyraclostrobin, pyrametostrobin, pyraoxystrobin, 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, pyribencarb, triclopyricarb/chlorodincarb, famoxadone and fenamidone;

b) inhibitors of complex III at Q_i site, selected from the group consisting of cyazofamid and amisulbrom;

c) inhibitors of complex II (e. g. carboxamides), selected from the group consisting of benodanil, bixafen, boscalid, carboxin, fenfuram, fluopyram, flutolanil, fluxapyroxad, furametpyr, isopyrazam, mepronil, oxycarboxin, penflufen, penthiopyrad, sedaxane, tecloftalam, thifluzamide, N-(4'-trifluoromethylthiobiphenyl-2-yl)-3-difluoromethyl-1-methyl-1H-pyrazole-4-carboxamide and N-(2-(1,3,3-trimethylbutyl)-phenyl)-1,3-dimethyl-5-fluoro-1H-pyrazole-4-carboxamide;

d) other respiration inhibitors (e.g. complex I, uncouplers), selected from the group consisting of diflumetorim; the nitrophenyl derivatives: binapacryl, dinobuton, dinocap and fluazinam; ferimzone; fentin salts, such as fentin-acetate, fentin chloride or fentin hydroxide; ametoctradin; and silthiofam;

F.2 Sterol biosynthesis inhibitors (SBI fungicides) selected from the following groups a), b) and c):

a) C14 demethylase inhibitors (DMI fungicides), selected from the group consisting of the following triazoles: azaconazole, bitertanol, bromuconazole, cyproconazole, difenoconazole, diniconazole, diniconazole-M, epoxiconazole, fenbuconazole, fluquinconazole, flusilazole, flutriafol, hexaconazole, imibenconazole, ipconazole, metconazole, myclobutanil, oxpoconazole, paclobutrazole, penconazole, propiconazole, prothioconazole, simeconazole, tebuconazole, tetraconazole, triadimefon, triadimenol, triticonazole and uniconazole; the following imidazoles: imazalil, pefurazoate, prochloraz and triflumizol; and the following pyrimidines, pyridines and piperazines: fenarimol, nuarimol, pyrifenox and triforine;

b) Delta14-reductase inhibitors, selected from the group consisting of aldimorph, dodemorph, dodemorph-acetate, fenpropimorph, tridemorph, fenpropidin, piperalin and spiroxamine;

c) Inhibitors of 3-keto reductase: fenhexamid;

F.3 Nucleic acid synthesis inhibitors selected from the following groups a) and b):

a) phenylamides or acyl amino acid fungicides, selected from the group consisting of benalaxyl, benalaxyl-M, kiralaxyl, metalaxyl, metalaxyl-M (mefenoxam), ofurace and oxadixyl;

b) other nucleic acid synthesis inhibitors, selected from the group consisting of hymexazole, octhilinone, oxolinic acid and bupirimate;

F.4 Inhibitors of cell division and cytoskeleton selected from the following groups a) and b):

a) tubulin inhibitors, selected from the group consisting of benzimidazoles or thiophanates such as benomyl, carbendazim, fuberidazole, thiabendazole or thiophanate-methyl; and triazolopyrimidines such as 5-chloro-7-(4-methylpiperidin-1-yl)-6-(2,4,6-trifluorophenyl)-[1,2,4]triazolo[1,5-a]pyrimidine;

b) other cell division inhibitors, selected from the group consisting of diethofencarb, ethaboxam, pencycuron, fluopicolide, zoxamide, metrafenone and pyriofenone;

F.5 Inhibitors of amino acid and protein synthesis selected from the following groups a) and b):

a) methionine synthesis inhibitors (anilino-pyrimidines), selected from the group consisting of cyprodinil, mepanipyrim and pyrimethanil;

b) protein synthesis inhibitors, selected from the group consisting of blasticidin-S, kasugamycin, kasugamycin hydrochloride-hydrate, mildiomycin, streptomycin, oxytetracyclin, polyoxine and validamycin A;

F.6 Signal transduction inhibitors selected from the following groups a) and b):

a) MAP / histidine kinase inhibitors, selected from the group consisting of fluoroimid, iprodione, procymidone, vinclozolin, fenpiclonil and fludioxonil;

b) G protein inhibitors which is quinoxyfen;

F.7 Lipid and membrane synthesis inhibitors selected from the following groups a), b), c) and d):

a) Phospholipid biosynthesis inhibitors, selected from the group consisting of edifenphos, iprobenfos, pyrazophos and isoprothiolane;

b) compounds affecting lipid peroxidation, selected from the group consisting of dicloran, quintozene, tecnazene, tolclofos-methyl, biphenyl, chloroneb and etridiazole;

c) compounds affecting phospholipid biosynthesis and cell wall deposition, selected from the group consisting of dimethomorph, flumorph, mandipropamid, pyrimorph, benthiavalicarb, iprovalicarb, valifenalate and N-(1-(1-(4-cyanophenyl)ethanesulfonyl)-but-2-yl) carbamic acid-(4-fluorophenyl) ester;

d) compounds affecting cell membrane permeability and fatty acids selected from the group consisting of propamocarb and propamocarb-hydrochlorid;

F.8 Inhibitors with multi site action selected from the following groups a), b), c) and d):

a) inorganic active substances selected from the group consisting of Bordeaux mixture, copper acetate, copper hydroxide, copper oxychloride, basic copper sulfate and sulfur;

b) thio- and dithiocarbamates selected from the group consisting of ferbam, mancozeb, maneb, metam, metiram, propineb, thiram, zineb and ziram;

c) organochlorine compounds (e.g. phthalimides, sulfamides, chloronitriles) selected from the group consisting of anilazine, chlorothalonil, captafol, captan, folpet, dichlofluanid, dichlorophen, flusulfamide, hexachlorobenzene, pentachlorphenole and its salts, phthalide, tolylfluanid and N-(4-chloro-2-nitro-phenyl)-N-ethyl-4-methyl-benzenesulfonamide;

d) guanidines and others selected from the group consisting of guanidine, dodine, dodine free base, guazatine, guazatine-acetate, iminoctadine, iminoctadine-triacetate, iminoctadine-tris(albesilate) and dithianon;

F.9 Cell wall synthesis inhibitors selected from the following groups a) and b):

a) inhibitors of glucan synthesis selected from the group consisting of validamycin and polyoxin B;

b) melanin synthesis inhibitors selected from the group consisting of pyroquilon, tricyclazole, carpropamid, dicyclometa and fenoxanil;

F.10 Plant defence inducers selected from the following groups a) and b):

a) the group of acibenzolar-S-methyl, probenazole, isotianil, tiadinil and prohexadione-calcium;

b) phosphonates selected from the group consisting of fosetyl, fosetyl-aluminum, phosphorous acid and its salts;

F.11 Fungicides having an unknown mode of action selected from the group consisting of bronopol, chinomethionat, cyflufenamid, cymoxanil, dazomet, debacarb, diclomezine, difenzoquat, difenzoquat-methylsulfate, diphenylamin, fenpyrazamine, flumetover, flusulfamide, flutianil, methasulfocarb, nitrapyrin, nitrothal-isopropyl, 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)-Nethyl-N-methyl formamidine, N'-(4-(4-fluoro-3-trifluoromethyl-phenoxy)-2,5-dimethylphenyl)-N-ethyl-N-methyl formamidine, N'-(2-methyl-5-trifluoromethyl-4-(3-trimethyl-silanyl-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, 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-methyl-phenyl)-2,3-dimethyl-isoxazolidin-3-yl]-pyridine, 3-[5-(4-chloro-phenyl)-2,3-dimethyl-isoxazolidin-3-yl]-pyridine (pyrisoxazole), N-(6-methoxy-pyridin-3-yl) cyclopropanecarboxylic acid amide, 5-chloro-1-(4,6-dimethoxy-pyrimidin-2-yl)-2-methyl-1Hbenzoimidazole, 2-(4-chloro-phenyl)-N-[4-(3,4-dimethoxy-phenyl)-isoxazol-5-yl]-2-prop-2-ynyloxy-acetamide.

Further especially preferred embodiments of the invention are pesticidal combinations wherein in each case the pyrazole compound A selected from compounds of formula I as defined in the outset, and especially those compounds preferred.

One embodiment of the invention relates to pesticidal mixtures of at least a compound of formula I with at least one compound B from the groups A.1 to A.17.

A preferred embodiment of the invention relates to pesticidal mixtures of a compound of formula I with one compound B from the groups A.1 to A.17.

A further embodiment of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group A.1.

A further embodiment of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group A.2.

A further embodiment of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group A.3.

A further embodiment of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group A.4.

A further embodiment of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group A.5.

A further embodiment of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group A.6.

A further embodiment of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group A.7.

A further embodiment of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group A.8.

A further embodiment of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group A.9.

A further embodiment of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group A.10.

A further embodiment of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group A.11.

A further embodiment of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group A.12.

A further embodiment of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group A.13.

A further embodiment of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group A.14.

A further embodiment of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group A.15.

A further embodiment of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group A.16.

A further embodiment of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group A.17.

Binary mixtures of a compound of formula I and a compound B from the groups A.1 to A.17 are one preferred embodiment of the invention.

Ternary mixtures of a compound of formula I and two compounds B from the groups A.1 to A.17 are another preferred embodiment of the invention.

With respect to their use in the pesticidal mixtures of the present invention, particular preference is given to the compounds B from the groups A.1 to A.17 as listed in the paragraphs below:

The compound B selected from group A.2 as defined above is preferably acrinathrin, bifenthrin, cyfluthrin, lambda-cyhalothrin, cypermethrin, alpha-cypermethrin, beta-cypermethrin, zeta-cypermethrin, deltamethrin, esfenvalerate, etofenprox, fenpropathrin, flucythrinate, tau-fluvalinate, silafluofen or tralomethrin.

The compound B selected from group A.3 as defined above is preferably acetamiprid, clothianidin, dinotefuran, imidacloprid, thiamethoxam, nitenpyram or thiacloprid.

The compound B selected from group A.4 as defined above is preferably ethiprole or fipronil, particularly fipronil.

The compound B selected from group A.5 as defined above is preferably abamectin, emamectin benzoate or lepimectin.

The compound B selected from group A.6 as defined above is preferably chlorfenapyr.

The compound B selected from group A.8 as defined above is preferably flonicamid or pymetrozine.

The compound B selected from group A.10 as defined above is preferably spiromesifen or spirotetramat,

The compound B selected from group A.11 as defined above is preferably flubendiamide.

The compound B selected from group A.13 as defined above is preferably chloranthraniliprole (rynaxypyr) or cyantraniliprole.

The compound B selected from group A.16 as defined above is preferably4-{[(6-chloropyrid-3-yl)methyl](2,2-difluoroethyl)amino}furan-2(5H)-on (A16.3).

The compound B selected from group A.17 is preferably pyrifluquinazon, sulfoxaflor or afidopyropen (cyclopropaneacetic acid, [(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).

A particular group of embodiments of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group consisting of fipronil, alpha-cypermethrin, thiamethoxam, abamectin, spirotetramat, imidacloprid, flonicamid, chloranthraniliprole, pymetrozine, sulfoxaflor and afidopyropen.

Especially preferred are inventive mixtures wherein the compound B is fipronil and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is alpha-cypermethrin and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is thiamethoxam and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is abamectin and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is spirotetramat and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is imidacloprid and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is flonicamid and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is chloranthraniliprole (rynaxypyr) and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is pymetrozine and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is sulfoxaflor and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is afidopyren and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

A further embodiment of the invention relates to mixtures of at least a compound of formula I with at least one compound B from the groups F.1 to F.11.

Binary mixtures of a compound of formula I and a compound B from the groups F.1 to F.11 are one preferred embodiment of the invention.

Ternary mixtures of a compound of formula I and two compounds B from the groups F.1 to F.11 are another preferred embodiment of the invention.

Ternary mixtures of a compound of formula I and a compound B from each of the groups A.1 to A.17 and F.1 to F.11 are another preferred embodiment of the invention.

A further embodiment of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.1a), preferably from azoxystrobin, pyraclostrobin, fluoxastrobin, picoxystrobin and trifloxystrobin.

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group of the F.1b), preferably cyazofamid.

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.1c), preferably from boscalid, fluopyram, fluxapyroxad, penthiopyrad, and sedaxane.

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.1d), preferably selected from silthiofam and ametoctradin.

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.2a), preferably from difenoconazole, epoxiconazole, fluquinconazole, ipconazole, prothioconazole, tebuconazole, triticonazole, and prochloraz.

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.2b).

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.2c), preferably fenhexamid.

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.3a), preferably from metalaxyl, and metalaxyl-M.

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.3b).

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.4a), preferably from carbendazim, and thiophanate-methyl.

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.4b).

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.5a), preferably selected from cyprodinil and pyrimethanil.

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.5b).

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.6a), preferably iprodione.

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.6b).

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.7a).

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.7b).

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.7c), preferably selected from benthiavalicarb and iprovalicarb.

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.7d).

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.8a).

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.8b), preferably selected from thiram and mancozeb.

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.8c), preferably chlorothalonil.

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.8d).

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.9.

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.10.

A further embodiment relates to mixtures of a compound of the formula I with at least one active compound B selected from the group F.11 of fungicides of unknown mode of action.

A particular group of embodiments of relates to mixtures of a compound of the formula I with at least one active compound B selected from the group consisting of azoxystrobin, fluoxastrobin, picoxystrobin, pyraclostrobin, trifloxystrobin, fluxapyroxad, benthiavalicarb, iprovalicarb, fenhexamid, boscalid, mancozeb, ametoctradin, metalalxyl-m, pyrimethanil, cyprodinil, carbendazim, iprodion, cyazofamid, prochloraz, chlorothalonil, penthiopyrad, difenoconazole, epoxiconazole, ipconazole, prothioconazole and tebuconazole.

Especially preferred are inventive mixtures wherein the compound B is azoxystrobin and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is fluoxastrobin and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is picoxystrobin and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is pyraclostrobin and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is trifloxystrobin and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is fluoxapyroxad and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is benthiavalicarb and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is iprovalicarb and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is fenhexamid and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is boscalid and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is mancozeb and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is ametoctradin and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is metalalxyl-m and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is pyrimethanil and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is cyprodinil and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is carbendazim and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is iprodion and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is cyazofamid and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is prochloraz and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is chlorothalonil and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is penthiopyrad and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is difenoconazole and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is epoxiconazole and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is ipconazole and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is prothioconazole and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

Especially preferred are inventive mixtures wherein the compound B is tebuconazole and the compound I of formula I is a compound of Tables 1 to 15, and Table I.

The following Table M-I represents preferred combinations of the active compounds I of formula I as defined in Tables I, and 1 to 15, and the active compounds B in mixtures according to the invention. Compounds of Table I are particularly preferred.

Table M-I:

No.	Comp. I	Comp. B
M.1	I-3	acrinathrin
M.2	I-9	acrinathrin
M.3	I-15	acrinathrin
M.4	I-3	bifenthrin
M.5	I-9	bifenthrin
M.6	I-15	bifenthrin
M.7	I-3	cyfluthrin
M.8	I-9	cyfluthrin
M.9	I-15	cyfluthrin
M.10	I-3	lambda-cyhalothrin
M.11	I-9	lambda-cyhalothrin
M.12	I-15	lambda-cyhalothrin
M.13	I-3	cypermethrin
M.14	I-9	cypermethrin
M.15	I-15	cypermethrin
M.16	I-3	alpha-cypermethrin
M.17	I-9	alpha-cypermethrin
M.18	I-15	alpha-cypermethrin
M.19	I-3	beta-cypermethrin
M.20	I-9	beta-cypermethrin
M.21	I-15	beta-cypermethrin
M.22	I-3	zeta-cypermethrin
M.23	I-9	zeta-cypermethrin
M.24	I-15	zeta-cypermethrin
M.25	I-3	deltamethrin
M.26	I-9	deltamethrin
M.27	I-15	deltamethrin
M.28	I-3	esfenvalerate
M.29	I-9	esfenvalerate
M.30	I-15	esfenvalerate
M.31	I-3	etofenprox
M.32	I-9	etofenprox
M.33	I-15	etofenprox
M.34	I-3	fenpropathrin

No.	Comp. I	Comp. B
M.35	I-9	fenpropathrin
M.36	I-15	fenpropathrin
M.37	I-3	flucythrinate
M.38	I-9	flucythrinate
M.39	I-15	flucythrinate
M.40	I-3	tau-fluvalinate
M.41	I-9	tau-fluvalinate
M.42	I-15	tau-fluvalinate
M.43	I-3	silafluofen
M.44	I-9	silafluofen
M.45	I-15	silafluofen
M.46	I-3	tralomethrin
M.47	I-9	tralomethrin
M.48	I-15	tralomethrin
M.49	I-3	acetamiprid
M.50	I-9	acetamiprid
M.51	I-15	acetamiprid
M.52	I-3	clothianidin
M.53	I-9	clothianidin
M.54	I-15	clothianidin
M.55	I-3	dinotefuran
M.56	I-9	dinotefuran
M.57	I-15	dinotefuran
M.58	I-3	imidacloprid
M.59	I-9	imidacloprid
M.60	I-15	imidacloprid
M.61	I-3	thiamethoxam
M.62	I-9	thiamethoxam
M.63	I-15	thiamethoxam
M.64	I-3	nitenpyram
M.65	I-9	nitenpyram
M.66	I-15	nitenpyram
M.67	I-3	thiacloprid
M.68	I-9	thiacloprid

No.	Comp. I	Comp. B
M.69	I-15	thiacloprid
M.70	I-3	ethiprole
M.71	I-9	ethiprole
M.72	I-15	ethiprole
M.73	I-3	fipronil
M.74	I-9	fipronil
M.75	I-15	fipronil
M.76	I-3	abamectin
M.77	I-9	abamectin
M.78	I-15	abamectin
M.79	I-3	emamectin benzoate
M.80	I-9	emamectin benzoate
M.81	I-15	emamectin benzoate
M.82	I-3	lepimectin
M.83	I-9	lepimectin
M.84	I-15	lepimectin
M.85	I-3	chlorfenapyr
M.86	I-9	chlorfenapyr
M.87	I-15	chlorfenapyr
M.88	I-3	flonicamid
M.89	I-9	flonicamid
M.90	I-15	flonicamid
M.91	I-3	pymetrozine
M.92	I-9	pymetrozine
M.93	I-15	pymetrozine
M.94	I-3	spiromesifen

No.	Comp. I	Comp. B
M.95	I-9	spiromesifen
M.96	I-15	spiromesifen
M.97	I-3	spirotetramat
M.98	I-9	spirotetramat
M.99	I-15	spirotetramat
M.100	I-3	flubendiamide
M.101	I-9	flubendiamide
M.102	I-15	flubendiamide
M.103	I-3	chloranthraniliprole
M.104	I-9	chloranthraniliprole
M.105	I-15	chloranthraniliprole
M.106	I-3	cyantraniliprole
M.107	I-9	cyantraniliprole
M.108	I-15	cyantraniliprole
M.109	I-3	A16.3
M.110	I-9	A16.3
M.111	I-15	A16.3
M.112	I-3	pyrifluquinazon
M.113	I-9	pyrifluquinazon
M.114	I-15	pyrifluquinazon
M.115	I-3	sulfoxaflor
M.116	I-9	sulfoxaflor
M.117	I-15	sulfoxaflor
M.118	I-3	afidopyropen
M.119	I-9	afidopyropen
M.120	I-15	afidopyropen

The following Table M-F represents preferred combinations of the active compounds I of formula I as defined in Tables I, and 1 to 15, and the active compounds B of groups F.1 to F.11 in mixtures according to the invention. Compounds of Table I are particularly preferred.

Table M-F:

No.	Comp. I	Comp. B
M.121	I-3	pyraclostrobin
M.122	I-9	pyraclostrobin
M.123	I-15	pyraclostrobin
M.124	I-3	trifloxystrobin
M.125	I-9	trifloxystrobin
M.126	I-15	trifloxystrobin

No.	Comp. I	Comp. B
M.127	I-3	fluoxastrobin
M.128	I-9	fluoxastrobin
M.129	I-15	fluoxastrobin
M.130	I-3	picoxystrobin
M.131	I-9	picoxystrobin
M.132	I-15	picoxystrobin

No.	Comp. I	Comp. B
M.133	I-3	azoxystrobin
M.134	I-9	azoxystrobin
M.135	I-15	azoxystrobin
M.136	I-3	cyazofamid
M.137	I-9	cyazofamid
M.138	I-15	cyazofamid
M.139	I-3	boscalid
M.140	I-9	boscalid
M.141	I-15	boscalid
M.142	I-3	fluopyram
M.143	I-9	fluopyram
M.144	I-15	fluopyram
M.145	I-3	fluxapyroxad
M.146	I-9	fluxapyroxad
M.147	I-15	fluxapyroxad
M.148	I-3	penthiopyrad
M.149	I-9	penthiopyrad
M.150	I-15	penthiopyrad
M.151	I-3	sedaxane
M.152	I-9	sedaxane
M.153	I-15	sedaxane
M.154	I-3	silthiofam
M.155	I-9	silthiofam
M.156	I-15	silthiofam
M.157	I-3	ametoctradin
M.158	I-9	ametoctradin
M.159	I-15	ametoctradin
M.160	I-3	epoxiconazol
M.161	I-9	epoxiconazol
M.162	I-15	epoxiconazol
M.163	I-3	difenoconazol
M.164	I-9	difenoconazol
M.165	I-15	difenoconazol
M.166	I-3	ipconazole
M.167	I-9	ipconazole
M.168	I-15	ipconazole
M.169	I-3	prothioconazole
M.170	I-9	prothioconazole
M.171	I-15	prothioconazole

No.	Comp. I	Comp. B
M.172	I-3	tebuconazole
M.173	I-9	tebuconazole
M.174	I-15	tebuconazole
M.175	I-3	fluquinconazole
M.176	I-9	fluquinconazole
M.177	I-15	fluquinconazole
M.178	I-3	triticonazole
M.179	I-9	triticonazole
M.180	I-15	triticonazole
M.181	I-3	prochloraz
M.182	I-9	prochloraz
M.183	I-15	prochloraz
M.184	I-3	fenhexamid
M.185	I-9	fenhexamid
M.186	I-15	fenhexamid
M.187	I-3	metalaxyl
M.188	I-9	metalaxyl
M.189	I-15	metalaxyl
M.190	I-3	metalaxyl-M
M.191	I-9	metalaxyl-M
M.192	I-15	metalaxyl-M
M.193	I-3	carbendazim
M.194	I-9	carbendazim
M.195	I-15	carbendazim
M.196	I-3	thiophanate-methyl
M.197	I-9	thiophanate-methyl
M.198	I-15	thiophanate-methyl
M.199	I-3	cyprodinil
M.200	I-9	cyprodinil
M.201	I-15	cyprodinil
M.202	I-3	pyrimethanil
M.203	I-9	pyrimethanil
M.204	I-15	pyrimethanil
M.205	I-3	iprodione
M.206	I-9	iprodione
M.207	I-15	iprodione
M.208	I-3	benthiavalicarb
M.209	I-9	benthiavalicarb
M.210	I-15	benthiavalicarb

No.	Comp. I	Comp. B
M.211	I-3	iprovalicarb
M.212	I-9	iprovalicarb
M.213	I-15	iprovalicarb
M.214	I-3	thiram
M.215	I-9	thiram
M.216	I-15	thiram
M.217	I-3	mancozeb

No.	Comp. I	Comp. B
M.218	I-9	mancozeb
M.219	I-15	mancozeb
M.220	I-3	chlorothalonil
M.221	I-9	chlorothalonil
M.222	I-15	chlorothalonil

The mixtures of the present invention have excellent activity against a broad spectrum of phytopathogenic fungi and animal pests.

The inventive compounds and the mixtures of the present invention have excellent activity against a broad spectrum of animal pests.

They are in particular suitable for efficiently controlling invertebrate pests. Particularier, they are suitable for efficiently controlling arthropodal pests such as arachnids, myriapedes and insects as well as nematodes.

The mixtures of at least a compound of formula I and a fungicidal compound have excellent activity against a broad spectrum of phytopathogenic fungi *Ascomycetes*, *Basidiomycetes*, *Deuteromycetes* and *Peronosporomycetes* (syn. *Oomycetes*). Some of them are systemically effective and can be employed in crop protection as foliar fungicides, as fungicides for seed dressing and as soil fungicides. They can also be used for treating seed.
They are particularly important in the control of a multitude of fungi on various cultivated plants, such as wheat, rye, barley, oats, rice, corn, lawns, bananas, cotton, soybean, coffee, sugar cane, grapevines, fruits and ornamental plants, and vegetables such as cucumbers, beans, tomatoes, potatoes and cucurbits, and on the seeds of these plants.

They are especially suitable for controlling the following plant diseases:

- *Alternaria* species on vegetables, oilseed rape, sugar beet and fruit and rice, for example, *A. solani* or *A. alternata* on potatoes and tomatoes;
- *Aphanomyces* species on sugar beet and vegetables;
- *Ascochyta* species on cereals and vegetables;
- *Bipolaris* and *Drechslera* species on corn, cereals, rice and lawns, for example, *D. maydis* on corn;
- *Blumeria graminis* (powdery mildew) on cereals;
- *Botrytis cinerea* (gray mold) on strawberries, vegetables, flowers and grapevines;
- *Bremia lactucae* on lettuce;
- *Cercospora* species on corn, soybeans, rice and sugar beet;
- *Cochliobolus* species on corn, cereals, rice, for example *Cochliobolus sativus* on cereals, *Cochliobolus miyabeanus* on rice;
- *Colletotricum* species on soybeans and cotton;

- *Drechslera* species, *Pyrenophora* species on corn, cereals, rice and lawns, for example, *D. teres* on barley or *D. tritici-repentis* on wheat;
- *Esca* on grapevines, caused by *Phaeoacremonium chlamydosporium, Ph. Aleophilum* and *Formitipora punctata (syn. Phellinus punctatus)*;
- *Exserohilum* species on corn;
- *Erysiphe cichoracearum* and *Sphaerotheca fuliginea* on cucumbers;
- *Fusarium* and *Verticillium* species on various plants, for example, *F. graminearum* or *F. culmorum* on cereals or *F. oxysporum* on a multitude of plants, such as, for example, tomatoes;
- *Gaeumanomyces graminis* on cereals;
- *Gibberella* species on cereals and rice (for example *Gibberella fujikuroi* on rice);
- *Grainstaining complex* on rice;
- *Helminthosporium* species on corn and rice;
- *Michrodochium nivale* on cereals;
- *Mycosphaerella* species on cereals, bananas and peanuts, for example, *M. graminicola* on wheat or *M.fijiensis* on bananas;
- *Peronospora* species on cabbage and bulbous plants, for example, *P. brassicae* on cabbage or *P. destructor* on onions;
- *Phakopsara pachyrhizi* and *Phakopsara meibomiae* on soybeans;
- *Phomopsis* species on soybeans and sunflowers;
- *Phytophthora infestans* on potatoes and tomatoes;
- *Phytophthora* species on various plants, for example, *P. capsici* on bell pepper;
- *Plasmopara viticola* on grapevines;
- *Podosphaera leucotricha* on apples;
- *Pseudocercosporella herpotrichoides* on cereals;
- *Pseudoperonospora* on various plants, for example, *P. cubensis* on cucumber or *P. humili* on hops;
- *Puccinia* species on various plants, for example, *P. triticina, P. striformins, P. hordei* or *P.graminis* on cereals or *P. asparagi* on asparagus;
- *Pyricularia oryzae, Corticium sasakii, Sarocladium oryzae, S.attenuatum, Entyloma oryzae* on rice;
- *Pyricularia grisea* on lawns and cereals;
- *Pythium spp.* on lawns, rice, corn, cotton, oilseed rape, sunflowers, sugar beet, vegetables and other plants, for example, *P. ultiumum* on various plants, *P. aphanidermatum* on lawns;
- *Rhizoctonia* species on cotton, rice, potatoes, lawns, corn, oilseed rape, sugar beet, vegetables and on various plants, for example, *R. solani* on beet and various plants;
- *Rhynchosporium secalis* on barley, rye and triticale;
- *Sclerotinia* species on oilseed rape and sunflowers;
- *Septoria tritici* and *Stagonospora nodorum* on wheat;
- *Erysiphe (*syn. *Uncinula) necator* on grapevines;
- *Setospaeria* species on corn and lawns;

- *Sphacelotheca reilinia* on corn;
- *Thievaliopsis* species on soybeans and cotton;
- *Tilletia* species on cereals;
- *Ustilago* species on cereals, corn and sugar cane, for example, *U. maydis* on corn;
- *Venturia* species (scab) on apples and pears, for example, *V. inaequalis* on apples.

The mixtures according to the invention are also suitable for controlling harmful fungi in the protection of materials (for example wood, paper, paint dispersions, fibers or fabrics) and in the protection of stored products. In the protection of wood, 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., *Trichoderma* spp., *Alternaria* spp., *Paecilomyces* spp. and Zygomycetes, such as *Mucor* spp., additionally in the protection of materials the following yeasts: *Candida* spp. and *Saccharomyces cerevisae.*

Moreover, the inventive mixtures are especially useful for the control of Lepidoptera, Coleoptera, Diptera, Thysanoptera and Hemiptera.

In particular the inventive mixtures are useful for the control of Thysanoptera and Hemiptera, especially Hemiptera.

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 according to the invention.

For seed treatment purposes, respective formulations can be diluted 2-10 fold leading to concentrations in the ready to use preparations of 0.01 to 60% by weight active compounds by weight, preferably 0.1 to 40% by weight.

Examples

A. Preparation examples

With appropriate modification of the starting materials, the procedures given in the synthesis examples below were used to obtain further compounds I. The compounds obtained in this manner are listed in the table that follows, together with physical data.

The products shown below were characterized by melting point determination, by NMR spectroscopy or by the masses ([m/z]) or retention time (RT; [min.]) determined by HPLC-MS or HPLC spectrometry.

HPLC-MS = high performance liquid chromatography-coupled mass spectrometry; HPLC methods:

Method 1: RP-18 column (Chromolith® Speed ROD from Merck KgaA, Germany), 50*4.6 mm; mobile phase: acetonitrile + 0.1% trifluoroacetic acid (TFA)/water + 0.1% TFA, using a gradient of 5:95 to 100:0 over 5 minutes at 40°C, flow rate 1.8 ml/min.

Method 2: 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: quadrupole electrospray ionization, 80 V (positive mode).

Method 3: Column: CHIRALPAK® IA 5 µm – 250 x 4.6 mm; mobile phase: heptane/dichloromethane/ethanol/diethylamine 50/50/1/0.1; flow: 1 ml/min; detection: UV 280 nm; 25°C.

Method 4: Column: CHIRALPAK® IC 5 µm – 250 x 4.6 mm; mobile phase: ethanol/methanol 50/50; flow: 0.7 ml/min; detection: UV 280 nm; 25°C.

Example 1:

Preparation of 1-[1-(2,2-dimethyl-1,3-dioxolan-4-yl)ethyl]-N,5-dimethyl-N-pyridazin-4-yl-pyrazole-4-carboxamide [I-18]

To a solution of 240mg 1-[1-(2,2-dimethyl-1,3-dioxolan-4-yl)ethyl]-5-methyl-pyrazole-4-carboxylic acid in 8ml THF were added 103mg N-methylpyridazin-4-amine, 152mg diisopropylethylamine and 359mg 1-[Bis(dimethylamino)methylene]-1*H*-1,2,3-triazolo[4,5-*b*]pyridinium 3-oxid hexafluorophosphate. The mixture was stirred at 20-25°C for about 2 d, then another 180mg 1-[Bis(dimethylamino)methylene]-1*H*-1,2,3-triazolo[4,5-*b*]pyridinium 3-oxid hexafluorophosphate and 119mg triethylamine were added. The mixture was stirred at 20-25°C for another 3 days and concentrated under reduced pressure. Purification by flash chromatography (CH_2Cl_2/MeOH) gave 140mg of the title compound (95% purity).

HPLC-MS (Method 2): RT 0.725 min, m/z $[MH]^+$ 346.4.

Table I - Compounds of formula I (Isomer T-A)

No.	R^1	R^2	D-E-$(R^a)_m$	R^3	R^4	physical data (HPLC / MS)		
						RT [min]	Method	m/z $[MH]^+$
I-1	H	CH_3	<TP>-4	CH_3	H	0.695	2	316.4
I-2	CH_3	CH_3	<TP>-4	CH_3	H	0.690	2	330.5
I-3	CH_2CH_3	CH_3	<TP>-4	CH_3	H	0.740	2	344.6
I-4	H	CH_3	2-CH_3-1,3-<OTL>-2	CH_3	H	0.780	2	334.3
I-5	CH_3	CH_3	2-CH_3-1,3-<OTL>-2	CH_3	H	0.784	2	348.4
I-6	CH_2CH_3	CH_3	2-CH_3-1,3-<OTL>-2	CH_3	H	0.827	2	362.5
I-7	H	CH_3	2-CH_2-<TP>	CH_3	H	0.815	2	330.4
I-8	CH_3	CH_3	2-CH_2-<TP>	CH_3	H	0.823	2	344.4
I-9	CH_2CH_3	CH_3	2-CH_2-<TP>	CH_3	H	0.870	2	358.5
I-10	H	CH_3	1,1-<DOT>-3	CH_3	H	0.603	2	336.0
I-11	CH_3	CH_3	1,1-<DOT>-3	CH_3	H	0.574	2	350.0
I-12	CH_2CH_3	CH_3	1,1-<DOT>-3	CH_3	H	0.666	2	364.0
I-13	H	CH_3	1,3-<DT>-2-CH_2	CH_3	H	0.840	2	364.3
I-14	CH_3	CH_3	1,3-<DT>-2-CH_2	CH_3	H	0.837	2	378.4
I-15	CH_2CH_3	CH_3	1,3-<DT>-2-CH_2	CH_3	H	0.889	2	392.3
I-16	CH_3	CH_3	<TT>-3	CH_3	H	0.751	2	318.0
I-17	CH_2CH_3	CH_3	1-<OTT>-3	CH_3	H	0.635	2	348.0
I-18	CH_3	CH_3	2,2-$(CH_3)_2$-1,3-<DOL>-4	CH_3	H	0.725	2	346.4
I-19	CH_2CH_3	CH_3	2,2-$(CH_3)_2$-1,3-<DOL>-4	CH_3	H	0.777	2	360.4
I-20	CH_2CH_3	CH_3	CH_2-cC_6H_{11}	CH_3	H	1.047	2	356.6
I-21	CH_3	CH_3	CH_2-cC_6H_{11}	CH_3	H	1.003	2	342.4
I-22	H	CH_3	CH_2-cC_6H_{11}	CH_3	H	0.982	2	328.5

No.	R^1	R^2	D-E-$(R^a)_m$	R^3	R^4	physical data (HPLC / MS)		
						RT [min]	Method	m/z $[MH]^+$
I-23	CH_2CH_3	CH_3	CH_2(*trans*-4-H_3CO-cC_6H_{10})	CH_3	H	0.916	2	386.2
I-24	CH_3	CH_3	CH_2(*trans*-4-H_3CO-cC_6H_{10})	CH_3	H	0.878	2	372.3
I-25	CH_2CH_3	CH_3	CH_2(*cis*-4-H_3CO-cC_6H_{10})	CH_3	H	0.951	2	386.3
I-26	CH_3	CH_3	CH_2(*cis*-4-H_3CO-cC_6H_{10})	CH_3	H	0.886	2	372.4

Abbreviations:

<DOL>: dioxolanyl
<DOT>: dioxothietanyl
<DT>: dithianyl
<OTL>: oxathiolanyl
<OTT>: oxothietanyl
<TP>: tetrahydropyranyl
<TT>: thietanyl

B. Biological examples

The activity of the compounds of formula I of the present invention could be demonstrated and evaluated in biological tests described in the following.

If not otherwise specified the test solutions were prepared as follows:

The active compound was dissolved at the desired concentration in a mixture of 1:1 (vol:vol) distilled water : aceton. The test solution was prepared at the day of use and in general at concentrations of ppm (wt/vol).

B.1 Cowpea aphid (Aphis craccivora)

Potted cowpea plants colonized with 100 - 150 aphids of various stages were sprayed after the pest population had been recorded. Population reduction was assessed after 24, 72, and 120 hours.

In this test, the compounds I-1, I-2, I-3, I-4, I-5, I-6, I-7, I-8, I-9, I-10, I-11, I-12, I-13, I-14, I-15, I-16, I-17, I-18, I-19, I-20, I-21, I-22, I-23, I-24, and I-26 at 500 ppm showed at least 75% mortality in comparison with untreated controls.

B.2 Cotton aphid (Aphis gossypii, mixed life stages)

The active compounds were formulated in cyclohexanone as a 10,000 ppm solution supplied in 1.3 ml ABgene® tubes. These tubes were inserted into an automated electrostatic sprayer equipped with an atomizing nozzle and they served as stock solutions for which lower dilutions were made in 1:1 (vol:vol) water : aceton. A nonionic surfactant (Kinetic®) was included in the solution at a volume of 0.01% (v/v).

Cotton plants at the cotyledon stage were infested with aphids prior to treatment by placing a heavily infested leaf from the main aphid colony on top of each cotyledon. Aphids were allowed to transfer overnight to accomplish an infestation of 80-100 aphids per plant and the host leaf was removed. The infested plants were then sprayed by an automated electrostatic plant sprayer equipped with an atomizing spray nozzle. The plants were dried in the sprayer fume hood, removed from the sprayer, and then maintained in a growth room under fluorescent lighting in a 24-hr photoperiod at 25ºC and 20-40% relative humidity. Aphid mortality on the treated plants, relative to mortality on untreated control plants, was determined after 5 days.

In this test, the compounds I-1, I-3, I-4, I-5, I-6, I-7, I-13, I-15, I-16, I-18, and I-19 at 10 ppm showed at least 75% mortality in comparison with untreated controls.

B.3 Silverleaf whitefly (Bemisia argentifolii, adult)

The active compounds were formulated in cyclohexanone as a 10,000 ppm solution supplied in 1.3 ml ABgene® tubes. These tubes were inserted into an automated electrostatic sprayer equipped with an atomizing nozzle and they served as stock solutions for which lower dilutions were made in 1:1 (vol:vol) water : aceton. A nonionic surfactant (Kinetic®) was included in the solution at a volume of 0.01% (v/v).

Cotton plants at the cotyledon stage (one plant per pot) were sprayed by an automated electrostatic plant sprayer equipped with an atomizing spray nozzle. The plants were dried in the

sprayer fume hood and then removed from the sprayer. Each pot was placed into a plastic cup and 10 to 12 whitefly adults (approximately 3-5 days old) were introduced. The insects were collected using an aspirator and 0.6 cm, nontoxic Tygon® tubing (R-3603) connected to a barrier pipette tip. The tip, containing the collected insects, was 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 were covered with a reusable screened lid (150-micron mesh polyester screen Pe-Cap from Tetko, Inc.). Test plants were maintained in a growth room at 25ºC and 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 was assessed 3 days after treatment, compared to untreated control plants.

In this test, the compounds I-1, I-3, I-4, I-5, I-6, I-18, and I-19 at 10 ppm showed at least 75% mortality in comparison with untreated controls.

B.4 Vetch aphid (Megoura viciae)

The active compounds were formulated in 3:1 (vol:vol) water : DMSO with different concentrations of formulated compounds.

Bean leaf disks were placed into microtiterplates filled with 0.8% agar-agar and 2.5 ppm OPUS™. The leaf disks were sprayed with 2.5 µl of the test solution and 5 to 8 adult aphids were placed into the microtiter plates which were then closed and kept at 23 ± 1 °C and 50 ± 5% relative humidity under fluorescent light for 6 days. Mortality was assessed on the basis of vital, reproduced aphids. Aphid mortality and fecundity was then visually assessed.

In this test, the compounds I-1, I-2, I-3, I-4, I-5, I-6, I-7, I-8, I-9, I-10, I-11, I-12, I-13, I-14, I-16, I-17, I-18, I-19, I-22, and I-26 at 2500 ppm showed at least 75% mortality in comparison with untreated controls.

B.5 Green peach aphid (Myzus persicae)

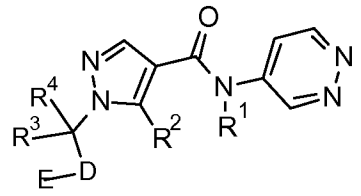
The active compounds were formulated in cyclohexanone as a 10,000 ppm solution supplied in 1.3 ml ABgene® tubes. These tubes were inserted into an automated electrostatic sprayer equipped with an atomizing nozzle and they served as stock solutions for which lower dilutions were made in 1:1 (vol:vol) water : aceton. A nonionic surfactant (Kinetic®) was included in the solution at a volume of 0.01% (v/v).

Bell pepper plants at the first true-leaf stage were infested prior to treatment by placing heavily infested leaves from the main colony on top of the treatment plants. Aphids were allowed to transfer overnight to accomplish an infestation of 30-50 aphids per plant and the host leaves were removed. The infested plants were then sprayed by an automated electrostatic plant sprayer equipped with an atomizing spray nozzle. The plants were dried in the sprayer fume hood, removed, and then maintained in a growth room under fluorescent lighting in a 24 hour photoperiod at 25ºC and 20-40% relative humidity. Aphid mortality on the treated plants, relative to mortality on untreated control plants, was determined after 5 days.

In this test, compounds I-1, I-2, I-3, I-4, I-5, I-6, I-7, I-9, I-10, I-11, I-12, I-13, I-14, I-15, I-16, I-18, I-19, and I-23 at 10 ppm showed at least 75% mortality in comparison with untreated controls.

Claims:

1. Substituted pyrazole compounds of formula I



I

wherein

R^1 is H, C_1-C_2-alkyl, or C_1-C_2-alkoxy-C_1-C_2-alkyl;

R^2 is CH_3, or halomethyl;

R^3 CN, C_1-C_2-alkyl, C_1-C_2-haloalkyl, or cyclopropyl;

R^4 H, CN, C_1-C_2-alkyl, or C_1-C_2-haloalkyl;

D is a direct bond, C_1-C_6-alkylene, C_2-C_6-alkenylene, or C_2-C_6-alkynylene, which carbon chains can be partially or fully substituted R^a;

E is a non-aromatic 3- to 12-membered carbo- or heterocycle, which may contain 1, 2, 3, or 4 heteroatoms selected from N-R^c, O, and S, wherein S may be oxidised, which carbo- or heterocycle may be partially or fully substituted by R^a;

R^a is halogen, CN, NO_2, C_1-C_2-alkyl, C_1-C_2-haloalkyl, C_2-C_6-alkenyl, C_2-C_6-alkynyl, C_3-C_6-cycloalkyl, C_3-C_6-cycloalkenyl, C_1-C_4-alkoxy, C_1-C_2-haloalkoxy, C_1-C_2-alkyliden, =O, =S, =NR^b, =NOR^b, =NSR^b, or S(O)$_n$$R^b$, wherein n is 0, 1, or 2, two adjacent groups R^a may form together with the atoms to which they are bonded a 3- to 8-membered carbo- or heterocycle, which may contain 1, 2, 3, or 4 heteroatoms selected from N-R^c, O, and S, wherein S may be oxidised, which cyclic R^a moieties may be substituted by halogen, R^b, or R^c;

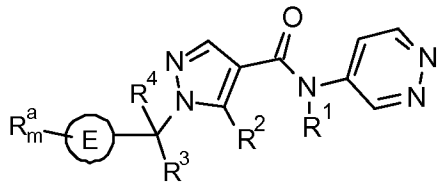
R^b is H, C_1-C_2-alkyl, C_1-C_2-haloalkyl, C_3-C_6-cycloalkyl, or C_1-C_4-alkoxy,

R^c is H, C_1-C_2-alkyl, C_1-C_2-haloalkyl, C_1-C_2-alkylcarbonyl, or C_1-C_2-alkoxycarbonyl;

and the stereoisomers, salts, tautomers and N-oxides thereof.

2. The compounds of formula I according to claim 1, wherein E is a saturated heterocycle.

3. The compounds of formula I according to claim 1 or 2, which correspond to formula I.A



I.A

wherein m is 0, 1, or 2.

4. The compounds of formula I as claimed in any of the preceding claims, wherein R^1 is H, C_1-C_2-alkyl, or C_1-C_2-alkoxymethyl.

5. The compounds of formula I as claimed in any of the preceding claims, wherein R^2 is CH_3, CHF_2, or CF_3.

6. The compounds as claimed in any of the preceding claims, wherein R^3 is C_1-C_4-alkyl, C_1-C_4-haloalkyl, or C_3-C_6-cycloalkyl, wherein the C-atoms may be substituted.

7. The compounds as claimed in any of the preceding claims, wherein R^4 is H or CH_3.

8. A composition comprising at least one compound according to any one of claims 1 to 7 and at least one inert liquid and/or solid carrier.

9. An agricultural composition for combating animal pests comprising at least one compound as defined in any of claims 1 to 7 and at least one inert liquid and/or solid acceptable carrier and, if desired, at least one surfactant.

10. An agricultural composition according to claims 8, or 9, comprising at least one compound as defined in any of claims 1 to 9 and at least one further active compound selected from the compounds of the following groups A.1, A.2, A.3, A.4, A.5, A.6, A.7, A.8, A.9, A.10, A.11, A.12, A.13, A.14, A.15, A.16, A.17, F.1, F.2, F.3, F.4, F.5, F.6, F.7, F.8, F.9, F.10 and F.11:

A.1 Carbamate compounds, selected from the group consisting of methiocarb and thiodicarb;

A.2 Pyrethroid compounds, selected from the group consisting of 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, permethrin, phenothrin, prallethrin, profluthrin, pyrethrin (pyrethrum), resmethrin, silafluofen, tefluthrin, tetramethylfluthrin, tetramethrin, tralomethrin and transfluthrin;

A.3 Nicotinic receptor agonists/antagonists compounds, selected from the group consisting of acetamiprid, bensultap, cartap hydrochloride, clothianidin, dinotefuran, imidacloprid, thiamethoxam, nitenpyram, spinosad (allosteric agonist), spinetoram (allosteric agonist), thiacloprid, thiocyclam and thiosultap-sodium;

A.4 GABA gated chloride channel antagonist compounds, selected from the group consisting of acetoprole, ethiprole and fipronil;

A.5 Chloride channel activators, selected from the group consisting of abamectin, emamectin benzoate, milbemectin and lepimectin;

A.6 Uncouplers of oxidative phosphorylation, namely chlorfenapyr;

A.7 Synergists, namely piperonyl butoxide;

A.8 Selective feeding blockers, selected from the group consisting of pymetrozine and flonicamid;

A.9 Chitin synthesis inhibitors, selected from the group consisting of teflubenzuron and novaluron;

A.10 Lipid biosynthesis inhibitors, selected from the group consisting of spirodiclofen, spiromesifen and spirotetramat;

A.11 Diamide-type Ryanodine receptor modulators - Phthalamides, selected from the group consisting of flubendiamide and (R)-, (S)-3-chloro-N1-{2-methyl-4-[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]phenyl}-N2-(1-methyl-2-methylsulfonyl-ethyl)phthalamide (A11.1);

A.12 Isoxazoline compounds, selected from the group consisting of 4-[5-(3,5-dichlorophenyl)-5-trifluoromethyl-4,5-dihydro-isoxazol-3-yl]-2-methyl-N-pyridin-2-ylmethyl-benzamide (A12.1), 4-[5-(3,5-dichloro-phenyl)-5-trifluoromethyl-4,5-dihydro-isoxazol-3-yl]-2-methyl-N-(2,2,2-trifluoroethyl)-benzamide (A12.2), 4-[5-(3,5-dichloro-phenyl)-5-trifluoromethyl-4,5-dihydroisoxazol-3-yl]-2-methyl-N-[(2,2,2-trifluoro-ethylcarbamoyl)-methyl]-benzamide (A12.3), 4-[5-(3,5-dichloro-phenyl)-5-trifluoromethyl-4,5-dihydro-isoxazol-3-yl]-naphthalene-1-carboxylic acid [(2,2,2-trifluoro-ethylcarbamoyl)-methyl]-amide (A12.4), 4-[5-(3-chloro-5-trifluoromethyl-phenyl)-5-trifluoromethyl-4,5-dihydro-isoxazol-3-yl]-2-methyl-N-[(2,2,2-trifluoro-ethylcarbamoyl)-methyl]-benzamide (A12.5), 4-[5-(3-chloro-5-trifluoromethylphenyl)-5-trifluoromethyl-4,5-dihydro-isoxazol-3-yl]-naphthalene-1-carboxylic acid [(2,2,2-trifluoroethylcarbamoyl)-methyl]-amide (A12.6), 5-[5-(3,5-dichloro-4-fluorophenyl)-5-trifluoromethyl-4,5-dihydro-isoxazol-3-yl]-2-[1,2,4]triazol-1-yl-benzonitrile (A12.7) and 5-[5-(3,5-dichloro-phenyl)-5-trifluoromethyl-4,5-dihydro-isoxazol-3-yl]-2-[1,2,4]triazol-1-yl-benzonitrile (A12.8);

A.13 Diamide-type Ryanodine receptor modulators - Anthranilamide compounds, selected from the group consisting of chloranthraniliprole (rynaxypyr), cyantraniliprole, 5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carboxylic acid [4-cyano-2-(1-cyclopropyl-ethylcarbamoyl)-6-methyl-phenyl]-amide (A13.1), 5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carboxylic acid [2-chloro-4-cyano-6-(1-cyclopropyl-ethylcarbamoyl)-phenyl]-amide (A13.2), 5-bromo-2-(3-chloropyridin-2-yl)-2H-pyrazole-3-carboxylic acid [2-bromo-4-cyano-6-(1-cyclopropyl-ethylcarbamoyl)-phenyl]-amide(A13.3), 5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carboxylic acid [2-bromo-4-chloro-6-(1-cyclopropyl-ethylcarbamoyl)-phenyl]-amide (A13.4), 5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carboxylic acid [2,4-dichloro-6-(1-cyclopropyl-ethylcarbamoyl)-phenyl]-amide (A13.5), 5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carboxylic acid [4-chloro-2-(1-cyclopropyl-ethylcarbamoyl)-6-methyl-phenyl]-amide (A13.6), N'-(2-{[5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carbonyl]-amino}-5-chloro-3-methyl-benzoyl)-hydrazinecarboxylic acid methyl ester (A13.7), N'-(2-{[5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carbonyl]-amino}-5-chloro-3-methyl-benzoyl)-N'-methyl-hydrazinecarboxylic acid methyl ester (A13.8), N'-(2-{[5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carbonyl]-amino}-5-chloro-3-methyl-benzoyl)-N,N'-dimethyl-hydrazinecarboxylic acid methyl ester (A13.9), N'-(3,5-dibromo-2-{[5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carbonyl]-amino}-benzoyl)-hydrazinecarboxylic acid methyl ester (A13.10), N'-(3,5-dibromo-2-{[5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carbonyl]-amino}-benzoyl)-N'-methyl-hydrazine

carboxylic acid methyl ester (A13.11) and N'-(3,5-dibromo-2-{[5-bromo-2-(3-chloro-pyridin-2-yl)-2H-pyrazole-3-carbonyl]-amino}-benzoyl)-N,N'-dimethyl-hydrazinecarboxylic acid methyl ester (A13.12);

A.14 Malononitrile compounds, selected from the group consisting of 2-(2,2,3,3,4,4,5,5-octafluoropentyl)-2-(3,3,3-trifluoropropyl) malononitrile (CF_2H-CF_2-CF_2-CH_2-$C(CN)_2$-CH_2-CH_2-CF_3) (A14.1) and 2-(2,2,3,3,4,4,5,5-octafluoropentyl)-2-(3,3,4,4,4-pentafluorobutyl)-malonodinitrile (CF_2HCF_2-CF_2-CF_2-CH_2-$C(CN)_2$-CH_2-CH_2-CF_2-CF_3) (A14.2);

A.15 Microbial disruptors, selected from the group consisting of Bacillus thuringiensis subsp. Israelensi, Bacillus sphaericus, Bacillus thuringiensis subsp. Aizawai, Bacillus thuringiensis subsp. Kurstaki and Bacillus thuringiensis subsp. Tenebrionis;

A.16 Aminofuranone compounds, selected from the group consisting of 4-{[(2-chloro1,3-thiazolo-5-yl)methyl](2-fluoroethyl)amino}furan-2(5H)-on (A16.1), 4-{[(6-chloropyrid-3-yl)methyl](2-fluoroethyl)amino}furan-2(5H)-on (A16.2), 4-{[(6-chloropyrid-3-yl)methyl](2,2-difluoroethyl)amino}furan-2(5H)-on (A16.3), 4-{[(6-chloro-5-fluoropyrid-3-yl)methyl](methyl)amino}furan-2(5H)-on (A16.4), 4-{[(6-chloro-5-fluoropyrid-3-yl)methyl](cyclopropyl)amino}furan-2(5H)-on (A16.5), 4-{[(6-chloropyrid-3-yl)methyl](cyclopropyl)amino}furan-2(5H)-on (A16.6) and 4-{[(6-chloropyrid-3-yl)methyl](methyl)amino}furan-2(5H)-on (A16.7);

A.17 Various compounds, selected from the group consisting of aluminium phosphide, amidoflumet, benclothiaz, benzoximate, bifenazate, borax, bromopropylate, cryolite, cyanide, cyenopyrafen, cyflumetofen, chinomethionate, dicofol, fluensulfone, fluoroacetate, phosphine, pyridalyl, pyrifluquinazon, sulfur, organic sulfur compounds, tartar emetic, sulfoxaflor, afidopyropen (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), 4-but-2-ynyloxy-6-(3,5-dimethyl-piperidin-1-yl)-2-fluoro-pyrimidine (A17.1), and 8-(2-cyclopropylmethoxy-4-trifluoromethyl-phenoxy)-3-(6-trifluoromethyl-pyridazin-3-yl)-3-aza-bicyclo[3.2.1]octane (A17.2);

F.1 Respiration inhibitors selected from the following groups a), b), c) and d):

a) Inhibitors of complex III at Q_o site (e.g. strobilurins), selected from the group consisting of azoxystrobin, coumethoxystrobin, coumoxystrobin, dimoxystrobin, enestroburin, fenaminstrobin, fenoxystrobin / flufenoxystrobin, fluoxastrobin, kresoxim-methyl, metominostrobin, orysastrobin, picoxystrobin, pyraclostrobin, pyrametostrobin, pyraoxystrobin, 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, pyribencarb, triclopyricarb/chlorodincarb, famoxadone and fenamidone;

b) inhibitors of complex III at Q_i site, selected from the group consisting of cyazofamid and amisulbrom;

c) inhibitors of complex II (e. g. carboxamides), selected from the group consisting of benodanil, bixafen, boscalid, carboxin, fenfuram, fluopyram, flutolanil, fluxapyroxad, furametpyr, isopyrazam, mepronil, oxycarboxin, penflufen, penthiopyrad, sedaxane, tecloftalam, thifluzamide, N-(4'-trifluoromethylthio-biphenyl-2-yl)-3-difluoromethyl-1-methyl-1H-pyrazole-4-carboxamide and N-(2-(1,3,3-trimethyl-butyl)-phenyl)-1,3-dimethyl-5-fluoro-1H-pyrazole-4-carboxamide;

d) other respiration inhibitors (e.g. complex I, uncouplers), selected from the group consisting of diflumetorim; the nitrophenyl derivatives: binapacryl, dinobuton, dinocap and fluazinam; ferimzone; fentin salts, such as fentin-acetate, fentin chloride or fentin hydroxide; ametoctradin; and silthiofam;

F.2 Sterol biosynthesis inhibitors (SBI fungicides) selected from the following groups a), b) and c):

a) C14 demethylase inhibitors (DMI fungicides), selected from the group consisting of the following triazoles: azaconazole, bitertanol, bromuconazole, cyproconazole, difenoconazole, diniconazole, diniconazole-M, epoxiconazole, fenbuconazole, fluquinconazole, flusilazole, flutriafol, hexaconazole, imibenconazole, ipconazole, metconazole, myclobutanil, oxpoconazole, paclobutrazole, penconazole, propiconazole, prothioconazole, simeconazole, tebuconazole, tetraconazole, triadimefon, triadimenol, triticonazole and uniconazole; the following imidazoles: imazalil, pefurazoate, prochloraz and triflumizol; and the following pyrimidines, pyridines and piperazines: fenarimol, nuarimol, pyrifenox and triforine;

b) Delta14-reductase inhibitors, selected from the group consisting of aldimorph, dodemorph, dodemorph-acetate, fenpropimorph, tridemorph, fenpropidin, piperalin and spiroxamine;

c) Inhibitors of 3-keto reductase: fenhexamid;

F.3 Nucleic acid synthesis inhibitors selected from the following groups a) and b):

a) phenylamides or acyl amino acid fungicides, selected from the group consisting of benalaxyl, benalaxyl-M, kiralaxyl, metalaxyl, metalaxyl-M (mefenoxam), ofurace and oxadixyl;

b) other nucleic acid synthesis inhibitors, selected from the group consisting of hymexazole, octhilinone, oxolinic acid and bupirimate;

F.4 Inhibitors of cell division and cytoskeleton selected from the following groups a) and b):

a) tubulin inhibitors, selected from the group consisting of benzimidazoles or thiophanates such as benomyl, carbendazim, fuberidazole, thiabendazole or thiophanate-methyl; and triazolopyrimidines such as 5-chloro-7-(4-methylpiperidin-1-yl)-6-(2,4,6-trifluorophenyl)-[1,2,4]triazolo[1,5-a]pyrimidine;

b) other cell division inhibitors, selected from the group consisting of diethofencarb, ethaboxam, pencycuron, fluopicolide, zoxamide, metrafenone and pyriofenone;

F.5 Inhibitors of amino acid and protein synthesis selected from the following groups a) and b):

a) methionine synthesis inhibitors (anilino-pyrimidines), selected from the group consisting of cyprodinil, mepanipyrim and pyrimethanil;

b) protein synthesis inhibitors, selected from the group consisting of blasticidin-S, kasugamycin, kasugamycin hydrochloride-hydrate, mildiomycin, streptomycin, oxytetracyclin, polyoxine and validamycin A;

F.6 Signal transduction inhibitors selected from the following groups a) and b):

a) MAP / histidine kinase inhibitors, selected from the group consisting of fluoroimid, iprodione, procymidone, vinclozolin, fenpiclonil and fludioxonil;

b) G protein inhibitors which is quinoxyfen;

F.7 Lipid and membrane synthesis inhibitors selected from the following groups a), b), c) and d):

a) Phospholipid biosynthesis inhibitors, selected from the group consisting of edifenphos, iprobenfos, pyrazophos and isoprothiolane;

b) compounds affecting lipid peroxidation, selected from the group consisting of dicloran, quintozene, tecnazene, tolclofos-methyl, biphenyl, chloroneb and etridiazole;

c) compounds affecting phospholipid biosynthesis and cell wall deposition, selected from the group consisting of dimethomorph, flumorph, mandipropamid, pyrimorph, benthiavalicarb, iprovalicarb, valifenalate and N-(1-(1-(4-cyano-phenyl)ethanesulfonyl)-but-2-yl) carbamic acid-(4-fluorophenyl) ester;

d) compounds affecting cell membrane permeability and fatty acids selected from the group consisting of propamocarb and propamocarb-hydrochlorid;

F.8 Inhibitors with multi site action selected from the following groups a), b), c) and d):

a) inorganic active substances selected from the group consisting of Bordeaux mixture, copper acetate, copper hydroxide, copper oxychloride, basic copper sulfate and sulfur;

b) thio- and dithiocarbamates selected from the group consisting of ferbam, mancozeb, maneb, metam, metiram, propineb, thiram, zineb and ziram;

c) organochlorine compounds (e.g. phthalimides, sulfamides, chloronitriles) selected from the group consisting of anilazine, chlorothalonil, captafol, captan, folpet, dichlofluanid, dichlorophen, flusulfamide, hexachlorobenzene, pentachlorphenole and its salts, phthalide, tolylfluanid and N-(4-chloro-2-nitro-phenyl)-N-ethyl-4-methyl-benzenesulfonamide;

d) guanidines and others selected from the group consisting of guanidine, dodine, dodine free base, guazatine, guazatine-acetate, iminoctadine, iminoctadine-triacetate, iminoctadine-tris(albesilate) and dithianon;

F.9 Cell wall synthesis inhibitors selected from the following groups a) and b):

a) inhibitors of glucan synthesis selected from the group consisting of validamycin and polyoxin B;

b) melanin synthesis inhibitors selected from the group consisting of pyroquilon, tricyclazole, carpropamid, dicyclometa and fenoxanil;

F.10 Plant defence inducers selected from the following groups a) and b):

a) the group of acibenzolar-S-methyl, probenazole, isotianil, tiadinil and prohexadione-calcium;

b) phosphonates selected from the group consisting of fosetyl, fosetyl-aluminum, phosphorous acid and its salts;

F.11 Fungicides having an unknown mode of action selected from the group consisting of bronopol, chinomethionat, cyflufenamid, cymoxanil, dazomet, debacarb, diclomezine, difenzoquat, difenzoquat-methylsulfate, diphenylamin, fenpyrazamine, flumetover, flusulfamide, flutianil, methasulfocarb, nitrapyrin, nitrothal-isopropyl, oxincopper, proquinazid, tebufloquin, tecloftalam, triazoxide, 2-butoxy-6-iodo-3-propylchromen-4-one, N-(cyclopropylmethoxyimino-(6-difluoro-methoxy-2,3-difluorophenyl)-methyl)-2-phenyl acetamide, N'-(4-(4-chloro-3-trifluoromethyl-phenoxy)-2,5-dimethyl-phenyl)-Nethyl-N-methyl formamidine, N'-(4-(4-fluoro-3-trifluoromethyl-phenoxy)-2,5-dimethylphenyl)-N-ethyl-N-methyl formamidine, N'-(2-methyl-5-trifluoromethyl-4-(3-trimethyl-silanyl-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-tetra-hydro-naphthalen-1-yl-amide, methoxy-acetic acid 6-tert-butyl-8-fluoro-2,3-dimethylquinolin-4-yl ester, 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-methyl-phenyl)-2,3-dimethyl-isoxazolidin-3-yl]-pyridine, 3-[5-(4-chloro-phenyl)-2,3-dimethyl-isoxazolidin-3-yl]-pyridine (pyrisoxazole), N-(6-methoxy-pyridin-3-yl) cyclopropanecarboxylic acid amide, 5-chloro-1-(4,6-dimethoxy-pyrimidin-2-yl)-2-methyl-1Hbenzoimidazole, 2-(4-chloro-phenyl)-N-[4-(3,4-dimethoxy-phenyl)-isoxazol-5-yl]-2-prop-2-ynyloxy-acetamide.

11. An agricultural composition according to claim 10 comprising a compound as defined in any of claims 1 to 7 and one compound B selected from the groups A.1, A.2, A.3, A.4, A.5, A.6, A.7, A.8, A.9, A.10, A.11, A.12, A.13, A.14, A.15, A.16, A.17, F.1, F.2, F.3, F.4, F.5, F.6, F.7, F.8, F.9, F.10 and F.11.

12. An agricultural composition according to claim 10 and 11 comprising a compound as defined in any of claims 1 to 7, one compound B selected from the groups A.1, A.2, A.3, A.4, A.5, A.6, A.7, A.8, A.9, A.10, A.11, A.12, A.13, A.14, A.15, A.16, and A.17, and one compound selected from the groups F.1, F.2, F.3, F.4, F.5, F.6, F.7, F.8, F.9, F.10 and F.11.

13. A method for combating or controlling invertebrate pests, which method comprises contacting said pest or its food supply, habitat or breeding grounds with a pesticidally effective amount of at least one compound as defined in any one of claims 1 to 7, or a composition as defined in any of claims 8 to 10.

14. A method for protecting growing plants from attack or infestation by invertebrate pests, which method comprises contacting a plant, or soil or water in which the plant is growing, with a pesticidally effective amount of at least one compound as defined in any of claims 1 to 7, or a composition as defined in any of claims 8 to 10.

15. Seed comprising a compound as defined in any of claims 1 to 7, or the enatiomers, diastereomers or salts thereof, in an amount of from 0.1 g to 10 kg per 100 kg of seed.

16. The use of the compounds as defined in any of claims 1 to 7, or the composition as defined in any of claims 8 to 10, for protecting growing plants from attack or infestation by invertebrate pests.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2013/057135

A. CLASSIFICATION OF SUBJECT MATTER
INV. C07D403/12 C07D405/14 C07D409/14 C07D411/14 C07D403/14
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)
C07D

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2010/034737 A1 (BASF SE [DE]; GROS STEFFEN [DE]; KOERBER KARSTEN [DE]; DEYN WOLFGANG V) 1 April 2010 (2010-04-01) cited in the application page 44; example I'.A1 page 172; table A examples 225-226 -----	1-16
X,P	WO 2012/143317 A1 (BASF SE [DE]; DEFIEBER CHRISTIAN [DE]; SOERGEL SEBASTIAN [DE]; SAELING) 26 October 2012 (2012-10-26) cited in the application page 35; table 1 Table 2, 4, 6, 8, 10, 12 &14, A7-A10; page 7 - page 9 -----	1-16

☐ Further documents are listed in the continuation of Box C.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2013/057135

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