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- (71) **Applicant:** SYNGENTA PARTICIPATIONS AG
[CH/CH]; Schwarzwaldallee 215, CH-4058 Basel (CH).
- (72) **Inventors:** MAIENFISCH, Peter; Syngenta Crop Protection
Münchwilen AG, Schaffhauserstrasse, CH-4332 Stein
(CH). RENDLER, Sebastian; Syngenta Crop Protection
Münchwilen AG, Schaffhauserstrasse, CH-4332 Stein
(CH). PITTERNA, Thomas; Syngenta Crop Protection
Münchwilen AG, Schaffhauserstrasse, CH-4332 Stein
(CH).
- (74) **Agent:** SAUVAGEOT, Olivier; Syngenta International
AG, Intellectual Property, WRO-1004-6-22, Schwar-
zwaldallee 215, CH-4058 Basel (CH).
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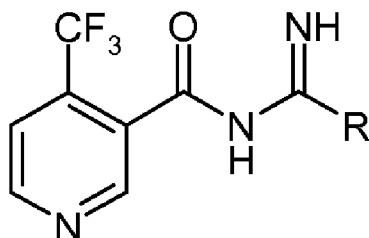
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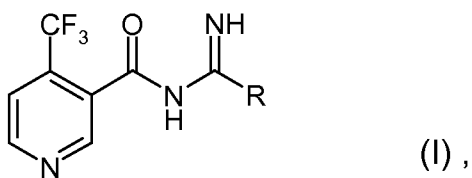
(I)

(57) **Abstract:** Compounds of the formula (I), wherein the substituent is as defined in claim 1, are useful as pesticides.

CHEMICAL COMPOUNDS

- 5 The present invention relates to substituted pyridine carboxamide derivatives, to processes for preparing them, to pesticidal, in particular insecticidal, acaricidal, molluscicidal and nematicidal compositions comprising them and to methods of using them to combat and control pests such as insect, acarine, mollusc and nematode pests.
- 10 It has now surprisingly been found that certain new substituted pyridine carboxamide derivatives have good insecticidal properties.

The present invention therefore provides compounds of the formula I



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wherein R is:

- C₁₋₈alkyl,
 - C₂₋₆alkenyl,
 - 20 -C₂₋₆alkynyl,
 - a three- to ten-membered mono- or bi-cyclic, saturated, partially unsaturated or aromatic ring system,
- said C₁₋₈alkyl, C₂₋₆alkenyl, C₂₋₆alkynyl and ring system being optionally interrupted by one or more heteroatoms selected from nitrogen, oxygen or sulphur, and being optionally
- 25 substituted by one or more substituents independently selected from the group consisting of halogen, cyano, nitro, C₁-C₆alkyl, C₁-C₆alkoxy, C₁-C₆alkylthio, C₁-C₆haloalkyl, C₁-C₆alkylsulfenyl, C₁-C₆alkylsulfonyl, aminosulfonyl, C₁-C₆alkylaminosulfonyl, C₁-C₆di-alkylaminosulfonyl, C₁-C₆alkoxycarbonyl, aminocarbonyl, C₁-C₆alkylaminocarbonyl, C₁-C₆di-alkylaminocarbonyl, C₁-C₆alkylamino, C₁-C₆di-alkylamino, C₁-C₆alkoxycarbonylamino, C₁-
- 30 C₃haloalkylthio, C₁-C₃haloalkylsulfenyl, C₁-C₃haloalkylsulfonyl, formyl, C₁-C₃haloalkoxy, C₁-C₆alkoxyC₁-C₃alkyl, C₁-C₆alkoxyC₁-C₃alkoxyC₁-C₃alkyl, C₂-C₆alkynyl, C₂-C₆alkenyl, C₁-C₄cyanoalkyl, C₁-C₆alkylcarbonyl, C₁-C₆haloalkylcarbonyl, C₁-C₆alkylsulfonyl, C₃-C₆cycloalkylcarbonyl, C₃-C₆cycloalkyl, wherein a ring methylene group may optionally be replaced by O or S, C₁-C₆alkylcarbonylamino,

and wherein the ring system containing a nitrogen atom is not attached by this nitrogen atom to the imino group, and wherein R is not phenyl, 4-chlorophenyl, 3-methylphenyl and 2-pyridinyl.

- 5 Where substituents are indicated as being optionally substituted, this means that they may or may not carry one or more identical or different substituents, e.g. one to five substituents, e.g. one to three substituents. Normally not more than three such optional substituents are present at the same time. Where a group is indicated as being substituted, e.g. alkyl, unless stated otherwise this includes those groups that are part of other groups, e.g. the alkyl in
10 alkylthio.

The term "halogen" refers to fluorine, chlorine, bromine or iodine, preferably fluorine, chlorine or bromine.

- 15 Alkyl substituents may be straight-chained or branched. Alkyl on its own or as part of another substituent is, depending upon the number of carbon atoms mentioned, for example, methyl, ethyl, n-propyl, n-butyl, n-pentyl, n-hexyl and the isomers thereof, for example, iso-propyl, iso-butyl, sec-butyl, tert-butyl, iso-amyl or pivaloyl.
- 20 Alkenyl substituents can be in the form of straight or branched chains, and the alkenyl moieties, where appropriate, can be of either the (E)- or (Z)-configuration. Examples are vinyl and allyl. The alkenyl groups are preferably C₂-C₆, more preferably C₂-C₄ and most preferably C₂-C₃ alkenyl groups.
- 25 Alkynyl substituents can be in the form of straight or branched chains. Examples are ethynyl and propargyl. The alkynyl groups are preferably C₂-C₆, more preferably C₂-C₄ and most preferably C₂-C₃ alkynyl groups.

- Haloalkyl groups may contain one or more identical or different halogen atoms and, for
30 example, may stand for CH₂Cl, CHCl₂, CCl₃, CH₂F, CHF₂, CF₃, CF₃CH₂, CH₃CF₂, CF₃CF₂ or CCl₃CCl₂.

- Alkoxy means a radical -OR, where R is alkyl, e.g. as defined above. Alkoxy groups include, but are not limited to, methoxy, ethoxy, 1-methylethoxy, propoxy, butoxy, 1-
35 methylpropoxy and 2-methylpropoxy.

Amino means an NH₂ group.

The term "halogen" refers to fluorine, chlorine, bromine or iodine, preferably fluorine, chlorine or bromine.

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A ring system is defined to include aryl, heteroaryl and in addition their saturated or partially unsaturated analogues. The different rings of a bicyclic ring system may be linked via one atom belonging to two different rings (spiro), via two adjacent ring atoms belonging to two different rings (annelated) or via two different, not adjacent ring atoms belonging to two different rings (bridged). "Ring systems" do not contain adjacent oxygen ring atoms. A link to a heteroaryl group can be via a carbon atom but not via a nitrogen atom.

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Aryl means a ring system which may be mono-, or bicyclic. Examples of such rings include phenyl, naphthalenyl, indenyl. A preferred aryl group is phenyl.

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Heteroaryl stands for aromatic ring systems comprising mono-, or bicyclic systems wherein at least one oxygen, nitrogen or sulfur atom is present as a ring member. Monocyclic and bicyclic aromatic ring systems are preferred, monocyclic ring systems are more preferred. For example, monocyclic heteroaryl may be a 5- to 7-membered aromatic ring containing one to three heteroatoms selected from oxygen, nitrogen and sulfur, more preferably selected from nitrogen and sulfur. Bicyclic heteroaryl may be a 8- to 11-membered bicyclic ring containing one to five heteroatoms, preferably one to three heteroatoms, selected from oxygen, nitrogen and sulfur. Examples are furyl, thienyl, pyrrolyl, imidazolyl, pyrazolyl, thiazolyl, isothiazolyl, oxazolyl, isoxazolyl, oxadiazolyl, thiadiazolyl, triazolyl, tetrazolyl, pyridyl, pyridazinyl, pyrimidinyl, pyrazinyl, triazinyl, tetrazinyl, indolyl, benzothiophenyl, benzofuranyl, benzimidazolyl, indazolyl, benzotriazolyl, benzothiazolyl, benzoxazolyl, imiazothiazoyl, quinolinyl, quinoxalinyl, isoquinolinyl, phthalazinyl, quinoxalinyl, quinazolinyl, cinnolinyl and naphthyridinyl, preferably pyridyl, pyrazinyl, pyridazinyl, pyrimidinyl, pyrrolyl, pyrazolyl, imidazolyl, triazolyl, furanyl, thienyl thiazolyl or thiadiazolyl. Heteroaryl rings do not contain adjacent oxygen ring atoms, adjacent sulfur ring atoms or adjacent oxygen and sulfur ring atoms. A link to a heteroaryl group can be via a carbon atom but not via a nitrogen atom.

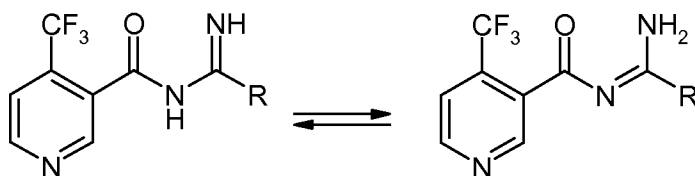
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Depending on the nature of the substituents, compounds of formula I may exist in different isomeric forms:



This invention covers all such isomers and tautomers and mixtures thereof in all
5 proportions. Also, when substituents contain double bonds, *cis*- and *trans*-isomers can exist. These isomers, too, are within the scope of the claimed compounds of the formula I.

The invention relates also to the agriculturally acceptable salts which the compounds of
formula I are able to form with transition metal, alkali metal and alkaline earth metal bases,
10 amines, quaternary ammonium bases or tertiary sulfonium bases.

Among the transition metal, alkali metal and alkaline earth metal salt formers, special
mention should be made of the hydroxides of copper, iron, lithium, sodium, potassium,
magnesium and calcium, and preferably the hydroxides, bicarbonates and carbonates of
15 sodium and potassium.

Examples of amines suitable for ammonium salt formation include ammonia as well as
primary, secondary and tertiary C₁-C₁₈alkylamines, C₁-C₄hydroxyalkylamines and
C₂-C₄alkoxyalkyl-amines, for example methylamine, ethylamine, *n*-propylamine, *i*-
20 propylamine, the four butylamine isomers, *n*-amylamine, *i*-amylamine, hexylamine,
heptylamine, octylamine, nonylamine, decylamine, pentadecylamine, hexadecylamine,
heptadecylamine, octadecylamine, methylethylamine, methylisopropylamine,
methylhexylamine, methylnonylamine, methylpentadecylamine, methyloctadecylamine,
ethylbutylamine, ethylheptylamine, ethyloctylamine, hexylheptylamine, hexyloctylamine,
25 dimethylamine, diethylamine, di-*n*-propylamine, di-*i*-propylamine, di-*n*-butylamine, di-*n*-
amylamine, di-*i*-amylamine, dihexylamine, diheptylamine, dioctylamine, ethanolamine, *n*-
propanolamine, *i*-propanolamine, *N,N*-diethanolamine, *N*-ethylpropanolamine, *N*-
butylethanolamine, allylamine, *n*-but-2-enylamine, *n*-pent-2-enylamine, 2,3-dimethylbut-2-
enylamine, dibut-2-enylamine, *n*-hex-2-enylamine, propylenediamine, trimethylamine,
30 triethylamine, tri-*n*-propylamine, tri-*i*-propylamine, tri-*n*-butylamine, tri-*i*-butylamine, tri-*sec*-
butylamine, tri-*n*-amylamine, methoxyethylamine and ethoxyethylamine; heterocyclic
amines, for example pyridine, quinoline, isoquinoline, morpholine, piperidine, pyrrolidine,
indoline, quinuclidine and azepine; primary arylamines, for example anilines,

methoxyanilines, ethoxyanilines, *o*-, *m*- and *p*-toluidines, phenylenediamines, benzidines, naphthylamines and *o*-, *m*- and *p*-chloroanilines; but especially triethylamine, *i*-propylamine and di-*i*-propylamine.

- 5 Preferred quaternary ammonium bases suitable for salt formation correspond, for example, to the formula $[N(R_{a1} R_{b1} R_{c1} R_{d1})]OH$, wherein R_{a1} , R_{b1} , R_{c1} and R_{d1} are each independently of the others hydrogen or C_1 - C_4 alkyl. Further suitable tetraalkylammonium bases with other anions can be obtained, for example, by anion exchange reactions.
- 10 Preferred tertiary sulfonium bases suitable for salt formation correspond, for example, to the formula $[SR_{e1}R_{f1}R_{g1}]OH$, wherein R_{e1} , R_{f1} and R_{g1} are each independently of the others C_1 - C_4 alkyl. Trimethylsulfonium hydroxide is especially preferred. Suitable sulfonium bases may be obtained from the reaction of thioethers, in particular dialkylsulfides, with alkylhalides, followed by conversion to a suitable base, for example a hydroxide, by anion exchange
- 15 reactions.

- Compounds of formula I which have at least one basic centre can form, for example, acid addition salts, for example with strong inorganic acids such as mineral acids, for example perchloric acid, sulphuric acid, nitric acid, nitroic acid, a phosphorus acid or a hydrohalic
- 20 acid, with strong organic carboxylic acids, such as C_1 - C_4 alkanecarboxylic acids which are unsubstituted or substituted, for example by halogen, for example acetic acid, such as saturated or unsaturated dicarboxylic acids, for example oxalic acid, malonic acid, succinic acid, maleic acid, fumaric acid or phthalic acid, such as hydroxycarboxylic acids, for example ascorbic acid, lactic acid, malic acid, tartaric acid or citric acid, or such as benzoic
- 25 acid, or with organic sulfonic acids, such as C_1 - C_4 alkane- or arylsulfonic acids which are unsubstituted or substituted, for example by halogen, for example methane- or *p*-toluenesulfonic acid. Compounds of formula I which have at least one acidic group can form, for example, salts with bases, for example mineral salts such as alkali metal or alkaline earth metal salts, for example sodium, potassium or magnesium salts, or salts with
- 30 ammonia or an organic amine, such as morpholine, piperidine, pyrrolidine, a mono-, di- or tri-lower-alkylamine, for example ethyl-, diethyl-, triethyl- or dimethylpropylamine, or a mono-, di- or trihydroxy-lower-alkylamine, for example mono-, di- or triethanolamine.

- The compounds of formula I according to the invention also include hydrates which may be
- 35 formed during the salt formation.

Preferably, R is:

- a five- to ten-membered aromatic or partially saturated heterocycle, containing one or more heteroatoms selected from nitrogen, oxygen, or sulphur, or
- a three- to ten-membered fully saturated heterocycle containing one or more heteroatoms selected from nitrogen, oxygen, or sulphur.

In a preferred embodiment, R is an heterocycle containing one to two heteroatoms selected from oxygen, nitrogen, or sulphur, wherein nitrogen and sulphur can be substituted as follows: $N-R^1$, $S(O)_n$, or $S(O)_mN-R^2$, wherein,

- 10 R^1 is hydrogen, formyl, C_1 - C_6 alkyl, C_1 - C_3 haloalkyl, C_1 - C_3 alkoxy, C_6 alkoxy C_1 - C_3 alkyl, C_1 - C_6 alkoxy C_1 - C_3 alkoxy C_1 - C_3 alkyl, C_2 - C_6 alkynyl, C_1 - C_4 cyanoalkyl, C_2 - C_6 alkenyl, phenyl C_1 - C_4 alkyl, C_1 - C_6 alkylcarbonyl, C_1 - C_6 haloalkylcarbonyl, C_1 - C_6 alkoxycarbonyl, phenyl C_1 - C_5 alkylcarbonyl, phenyl C_1 - C_5 alkoxycarbonyl, phenylcarbonyl, C_1 - C_6 alkylsulfonyl, phenylsulfonyl, or C_3 - C_6 cycloalkylcarbonyl,

- 15 n is 0, 1 or 2,

m is 0 or 1,

R^2 is hydrogen, formyl, C_1 - C_6 alkyl, C_1 - C_3 haloalkyl, cyano, nitro, C_2 - C_6 alkynyl, C_1 - C_4 cyanoalkyl, or C_2 - C_6 alkenyl.

- 20 Alternatively, R is methyl, ethyl, propyl, isopropyl, n-butyl, iso-butyl, sec-butyl, or tert-butyl optionally interrupted by one or more N, O or S, and optionally substituted by halogen, cyano, nitro, C_1 - C_6 alkyl, C_1 - C_6 alkoxy, C_1 - C_6 haloalkyl, C_1 - C_6 alkoxycarbonyl, or C_1 - C_4 cyanoalkyl.

- 25 Alternatively, R is C_{2-10} heteroaryl which contains one or more heteroatom selected from nitrogen, oxygen or sulphur, said heteroaryl being optionally substituted by halogen, cyano, nitro, C_1 - C_6 alkyl, C_1 - C_6 alkoxy, C_1 - C_6 haloalkyl, C_1 - C_6 alkoxycarbonyl, or C_1 - C_4 cyanoalkyl.

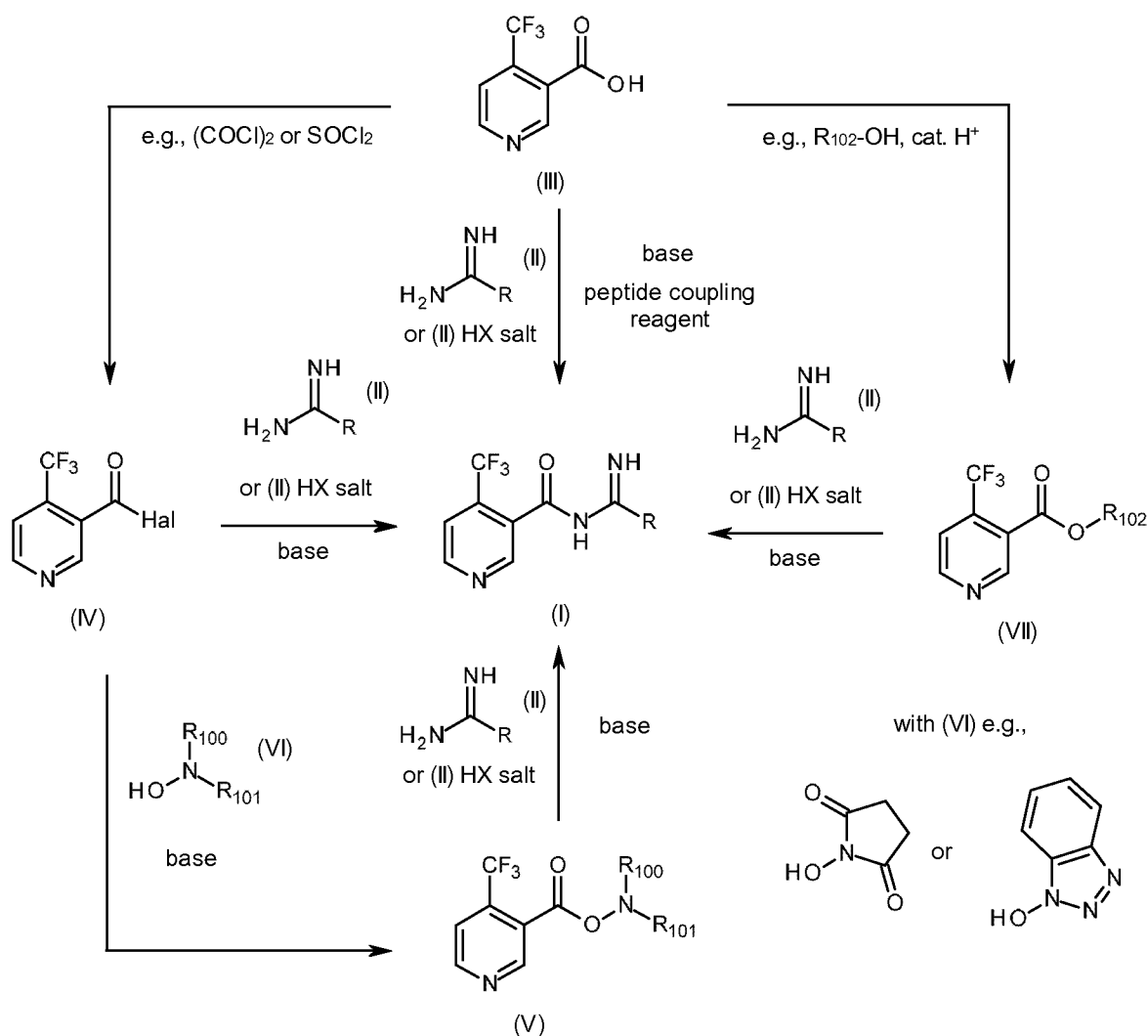
Alternatively, R is C_{6-10} aryl and most preferably, a phenyl, optionally substituted by halogen, cyano, nitro, C_1 - C_6 alkyl, C_1 - C_6 alkoxy, C_1 - C_6 haloalkyl, C_1 - C_6 alkoxycarbonyl, and C_1 - C_4 cyanoalkyl.

- 35 Alternatively, R is a five- to ten-membered aromatic heterocycle, containing one or more heteroatoms selected from nitrogen, oxygen, or sulphur, said heterocycle being optionally substituted by halogen, cyano, nitro, C_1 - C_6 alkyl, C_1 - C_6 alkoxy, C_1 - C_6 haloalkyl, C_1 - C_6 alkoxycarbonyl, and C_1 - C_4 cyanoalkyl

Alternatively, R is cycloalkyl and preferably cyclopropyl, cyclopentyl or cyclohexyl, which may contain one or more heteroatom selected from nitrogen, oxygen or sulphur, said cycloalkyl being optionally substituted by halogen, cyano, nitro, C₁-C₆alkyl, C₁-C₆alkoxy, C₁-C₆haloalkyl, C₁-C₆alkoxycarbonyl, or C₁-C₄cyanoalkyl.

The compounds of the invention may be made by a variety of methods (Reaction Scheme 1). For example, the compounds of formula I, wherein the R has the meanings assigned to them above, can be prepared by means of processes known *per se*, e.g. by treating the compound of formula III with a compound of general formula II or the acid addition salt II*HX (wherein HX is an inorganic or organic acid, e.g. HCl, HBr, HI, HOAc, trifluoroacetic acid), wherein R is defined as above, in the presence of a coupling reagent, such as DCC (N,N'-dicyclohexylcarbodiimide), EDC (1-ethyl-3-[3-dimethylamino-propyl]carbodiimide hydrochloride), BOP-Cl (bis(2-oxo-3-oxazolidinyl)phosphonic chloride), or O-Benzotriazolyl tetramethylisouronium tetrafluoroborate (TBTU) in the presence of a base, such as pyridine, triethylamine, 4-(dimethylamino)pyridine or diisopropylethylamine, and optionally in the presence of a nucleophilic catalyst, such as hydroxybenzotriazole. The reaction is advantageously carried out in an organic solvent such as tetrahydrofuran or N,N-dimethylformamide in a temperature range from approximately -80°C to approximately +80°C, preferably from approximately -20°C to approximately +40°C, in many cases in the range between 0 °C and ambient temperature. Compounds of general formula II or their acid salts II*HX, wherein R is defined as above, are either commercially available or may be prepared using methods known to persons skilled in the art.

Reaction Scheme 1.



Alternatively, compounds of general formula I, wherein R is defined as above, may be prepared by treating the compound of general formula IV, wherein Hal is defined as halogen, e.g. F, Cl, Br, preferably Cl, or CCl₃, with the compound of general formula II or its acid salt II*HX, wherein R and HX are defined as above, in the presence of a base, such as triethylamine, diisopropylethylamine, or pyridine. The reaction is advantageously carried out in an organic solvent such as tetrahydrofuran or dichloromethane in a temperature range from approximately -80°C to approximately +40°C, preferably from approximately -80°C to approximately +20°C, in many cases in the range between 0 °C and ambient temperature.

Alternatively, compounds of general formula I, wherein R is defined as above, may be prepared by treating the compound of general formula V, wherein R₁₀₀ and R₁₀₁ form together an activating group, such as succinimide or benzotriazole, with the compound of general formula II or its acid salt II*HX, wherein R and HX are defined as above, in the presence of a base, such as triethylamine, diisopropylethylamine, pyridine, or

diazabicyclooctane (DBU). The reaction is advantageously carried out in an organic solvent such as tetrahydrofuran, 1,4-dioxane or dichloromethane in a temperature range from approximately -80°C to approximately +40°C, preferably from approximately -80°C to approximately +20°C, in many cases in the range between 0 °C and ambient temperature.

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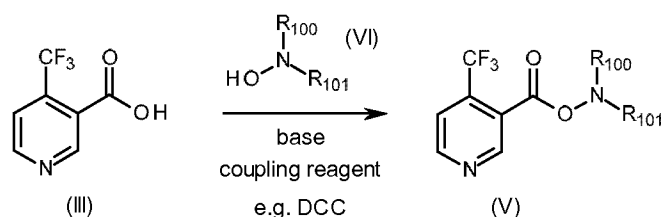
Compounds of general formula V, wherein R₁₀₀ and R₁₀₁ form together an activating group, such as phthalimide or benzotriazole, may be prepared from compounds of general formula IV, wherein Hal is defined as above, by reaction with compounds of general formula VI, wherein R₁₀₀ and R₁₀₁ form together an activating group, such as succinimide or benzotriazole in the presence of, i.e. VI being reagents such as N-hydroxysuccinimide or N-hydroxybenzotriazole, in the presence or absence of a base, such as triethylamine or pyridine in the presence of a solvent, e.g. dichloromethane or tetrahydrofuran. The reaction is advantageously carried out in a temperature range from approximately -80°C to approximately +150°C, preferably from approximately 0°C to approximately ambient temperature.

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Alternatively, compounds of general formula V, wherein R₁₀₀ and R₁₀₁ form together an activating group, such as phthalimide or benzotriazole, may be prepared from compound of formula III, by reaction with compounds of general formula VI, wherein R₁₀₀ and R₁₀₁ form together an activating group, such as succinimide or benzotriazole in the presence of, i.e. VI being reagents such as N-hydroxysuccinimide or N-hydroxybenzotriazole, in the presence of a coupling reagent, such as DCC (N,N'-dicyclohexylcarbodiimide), EDC (1-ethyl-3-[3-dimethylamino-propyl]carbodiimide hydrochloride), in the presence or absence of a base, such as triethylamine or pyridine in the presence of a solvent, e.g. dichloromethane or tetrahydrofuran. The reaction is advantageously carried out in a temperature range from approximately -80°C to approximately +150°C, preferably from approximately 0°C to approximately ambient temperature (Reaction Scheme 2).

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Reaction Scheme 2:



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In yet another alternative, compounds of general formula I, wherein R is defined as above, may be prepared from compounds of general formula VII, wherein R₁₀₂ is defined as C₁.

alkyl or C₁₋₈haloalkyl, with the compound of general formula II or its acid salt II*HX, wherein R and HX are defined as above, in the presence or absence of a base, such as triethylamine, diisopropylethylamine, pyridine, or diazabicyclooctane (DBU). The reaction is advantageously carried out in an organic solvent such as tetrahydrofuran, 1,4-dioxane or dichloromethane in a temperature range from approximately -80°C to approximately +180°C, preferably from approximately 0°C to approximately 140°C, in many cases in the range between 20 °C and 100 °C. Compounds of general formula VII, are either commercially available or may be prepared by methods known to persons skilled in the art.

The reactants can be reacted with each other as such, i.e. without adding a solvent or diluent. In most cases, however, it is advantageous to add an inert solvent or diluent or a mixture of these. If the reaction is carried out in the presence of a base, bases which are employed in excess, such as triethylamine, pyridine, N-methylmorpholine or N,N-diethylaniline, may also act as solvents or diluents.

The reactions are advantageously carried out in a temperature range from approximately -80°C to approximately +140°C, preferably from approximately -30°C to approximately +100°C, in many cases in the range between ambient temperature and approximately +80°C.

A compound I can be converted in a manner known per se into another compound I by replacing one or more substituents of the starting compound I in the customary manner by (an) other substituent(s) according to the invention.

Depending on the choice of the reaction conditions and starting materials which are suitable in each case, it is possible, for example, in one reaction step only to replace one substituent by another substituent according to the invention, or a plurality of substituents can be replaced by other substituents according to the invention in the same reaction step.

Salts of compounds I can be prepared in a manner known per se. Thus, for example, acid addition salts of compounds I are obtained by treatment with a suitable acid or a suitable ion exchanger reagent and salts with bases are obtained by treatment with a suitable base or with a suitable ion exchanger reagent.

Salts of compounds I can be converted in the customary manner into the free compounds I, acid addition salts, for example, by treatment with a suitable basic compound or with a

suitable ion exchanger reagent and salts with bases, for example, by treatment with a suitable acid or with a suitable ion exchanger reagent.

Salts of compounds I can be converted in a manner known per se into other salts of compounds I, acid addition salts, for example, into other acid addition salts, for example by treatment of a salt of inorganic acid such as hydrochloride with a suitable metal salt such as a sodium, barium or silver salt, of an acid, for example with silver acetate, in a suitable solvent in which an inorganic salt which forms, for example silver chloride, is insoluble and thus precipitates from the reaction mixture.

Depending on the procedure or the reaction conditions, the compounds I, which have salt-forming properties can be obtained in free form or in the form of salts.

The compounds I and, where appropriate, the tautomers thereof, in each case in free form or in salt form, can be present in the form of one of the isomers which are possible or as a mixture of these, for example in the form of pure isomers, such as antipodes and/or diastereomers, or as isomer mixtures, such as enantiomer mixtures, for example racemates, diastereomer mixtures or racemate mixtures, depending on the number, absolute and relative configuration of asymmetric carbon atoms which occur in the molecule and/or depending on the configuration of non-aromatic double bonds which occur in the molecule; the invention relates to the pure isomers and also to all isomer mixtures which are possible and is to be understood in each case in this sense hereinabove and hereinbelow, even when stereochemical details are not mentioned specifically in each case.

Diastereomer mixtures or racemate mixtures of compounds I, in free form or in salt form, which can be obtained depending on which starting materials and procedures have been chosen can be separated in a known manner into the pure diastereomers or racemates on the basis of the physicochemical differences of the components, for example by fractional crystallization, distillation and/or chromatography.

Enantiomer mixtures, such as racemates, which can be obtained in a similar manner can be resolved into the optical antipodes by known methods, for example by recrystallization from an optically active solvent, by chromatography on chiral adsorbents, for example high-performance liquid chromatography (HPLC) on acetyl cellulose, with the aid of suitable microorganisms, by cleavage with specific, immobilized enzymes, via the formation of inclusion compounds, for example using chiral crown ethers, where only one enantiomer is

complexed, or by conversion into diastereomeric salts, for example by reacting a basic end-product racemate with an optically active acid, such as a carboxylic acid, for example camphor, tartaric or malic acid, or sulfonic acid, for example camphorsulfonic acid, and separating the diastereomer mixture which can be obtained in this manner, for example by
5 fractional crystallization based on their differing solubilities, to give the diastereomers, from which the desired enantiomer can be set free by the action of suitable agents, for example basic agents.

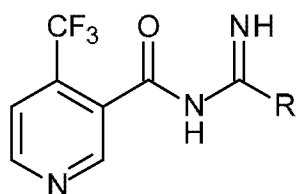
Pure diastereomers or enantiomers can be obtained according to the invention not only by
10 separating suitable isomer mixtures, but also by generally known methods of diastereoselective or enantioselective synthesis, for example by carrying out the process according to the invention with starting materials of a suitable stereochemistry.

It is advantageous to isolate or synthesize in each case the biologically more effective isomer, for example enantiomer or diastereomer, or isomer mixture, for example enantiomer
15 mixture or diastereomer mixture, if the individual components have a different biological activity.

The compounds I and, where appropriate, the tautomers thereof, in each case in free form
20 or in salt form, can, if appropriate, also be obtained in the form of hydrates and/or include other solvents, for example those which may have been used for the crystallization of compounds which are present in solid form.

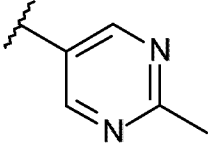
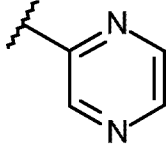
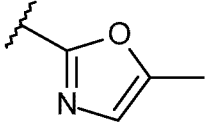
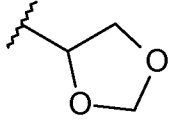
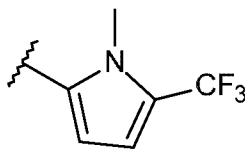
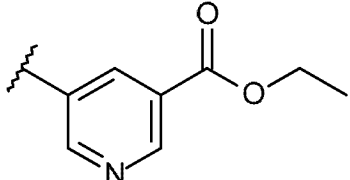
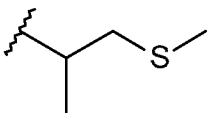
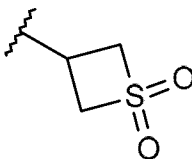
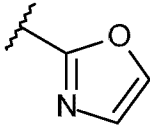
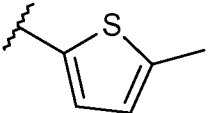
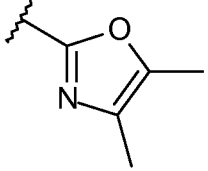
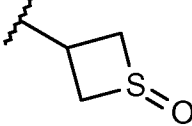
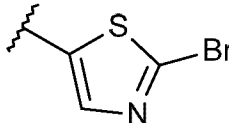
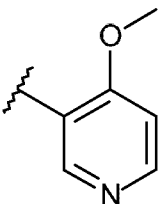
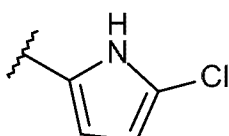
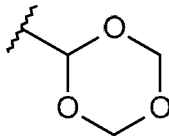
The compounds according to the following Tables 1 below can be prepared according to the
25 methods described above. The examples which follow are intended to illustrate the invention and show preferred compounds of formula I.

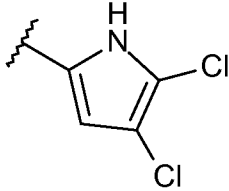
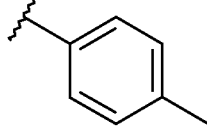
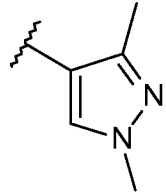
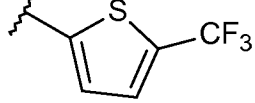
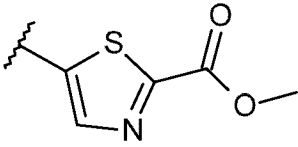
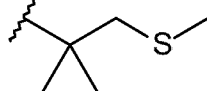
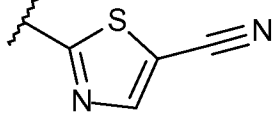
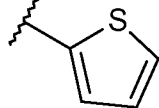
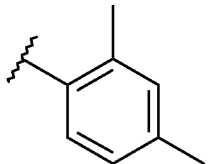
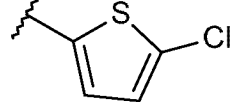
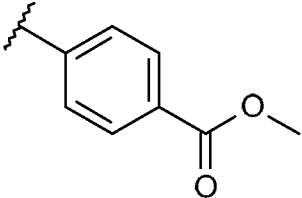
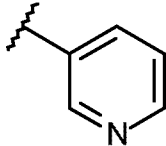
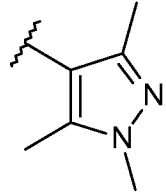
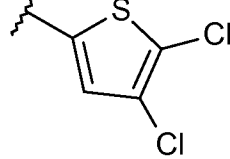
Table 1: This table discloses compounds T1.001 to T1.110 of the formula I:

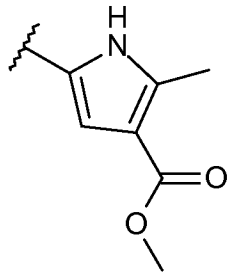
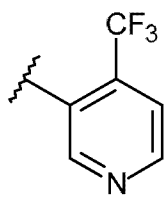
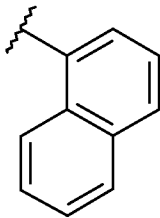
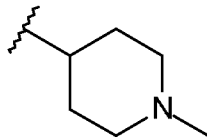
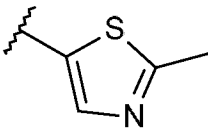
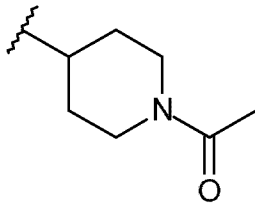
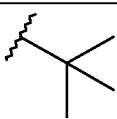
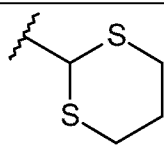
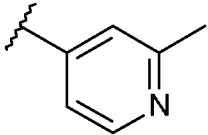
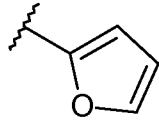
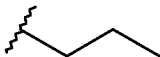
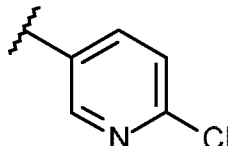
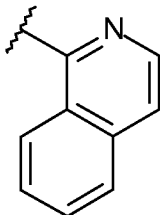
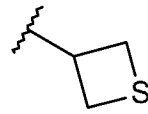


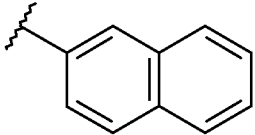
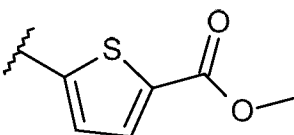
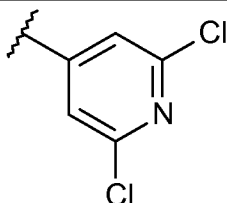
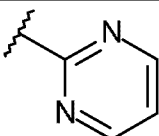
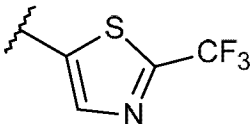
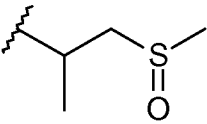
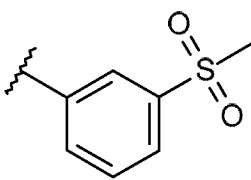
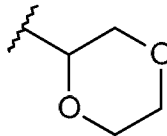
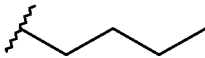
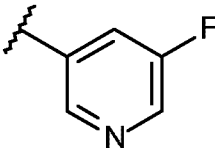
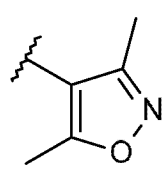
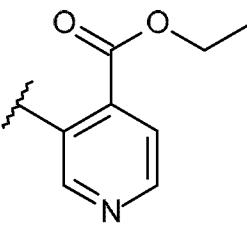
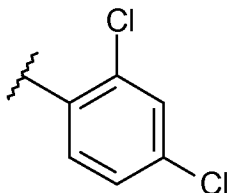
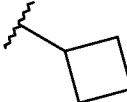
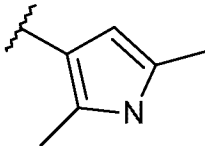
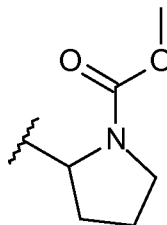
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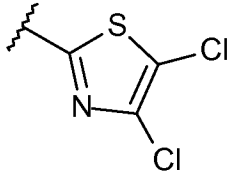
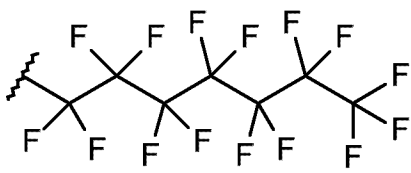
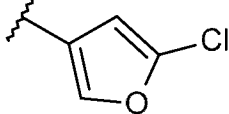
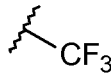
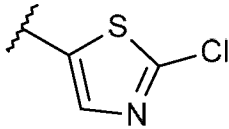
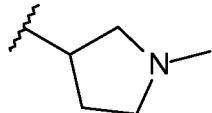
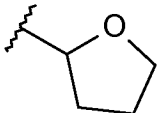
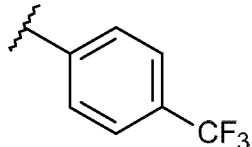
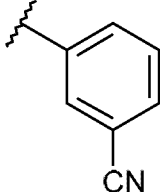
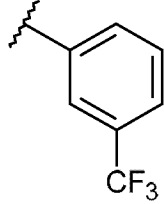
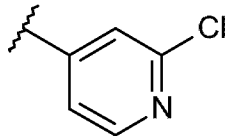
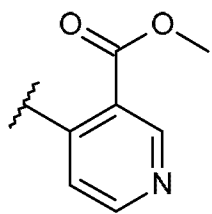
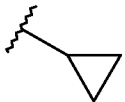
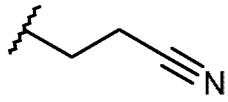
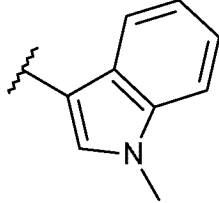
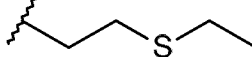
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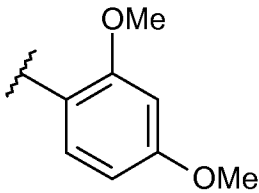
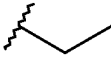
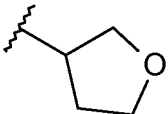
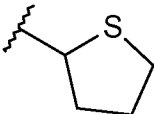
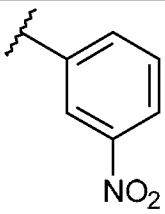
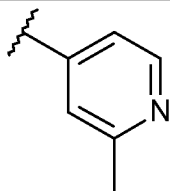
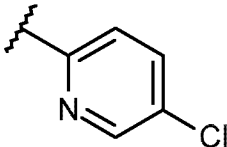
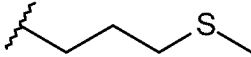
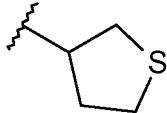
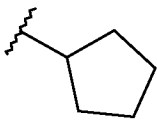
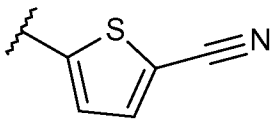
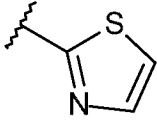
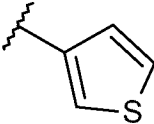
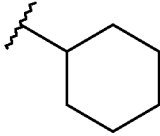
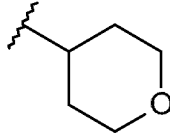
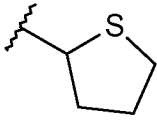
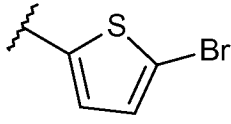
Compound No.	R	Compound No.	R
T1.001		T1.057	
T1.002		T1.058	
T1.003		T1.059	
T1.004		T1.060	
T1.005		T1.061	
T1.006		T1.062	
T1.007		T1.063	
T1.008		T1.064	

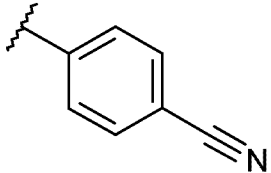
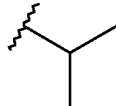
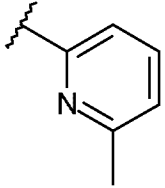
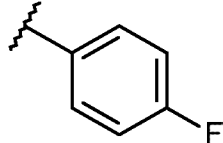
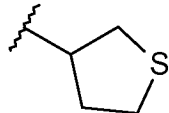
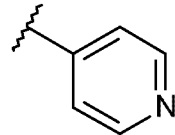
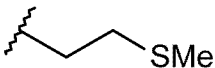
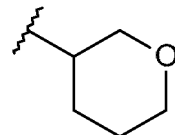
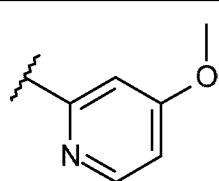
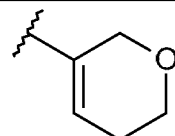
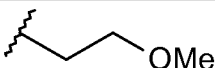
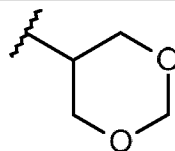
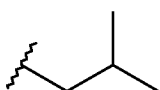
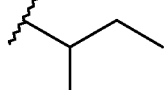
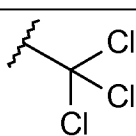
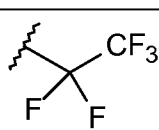
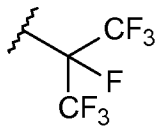
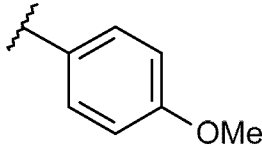
T1.009		T1.065	
T1.010		T1.066	
T1.011		T1.067	
T1.012		T1.068	
T1.013		T1.069	
T1.014		T1.070	
T1.015		T1.071	

T1.016	 <chem>CC1=C(C(=O)OC)C(N)=C1C</chem>	T1.072	 <chem>FC(F)(F)c1cc(C)ncn1</chem>
T1.017	 <chem>c1ccc2ccccc2c1C</chem>	T1.073	 <chem>CN1CCN(C1)C</chem>
T1.018	 <chem>CC1=CN=C(S1)C</chem>	T1.074	 <chem>CC(=O)N1CCN(C1)C</chem>
T1.019	 <chem>CC(C)(C)C(C)(C)C</chem>	T1.075	 <chem>C1S(C1)CCSC1</chem>
T1.020	 <chem>CC1=CC=CC=N1C</chem>	T1.076	 <chem>C1C=CC(=C1)O</chem>
T1.021	 <chem>CCCC</chem>	T1.077	 <chem>Clc1cc(C)ncn1</chem>
T1.022	 <chem>c1ccc2c(c1)c(c[nH]2)C</chem>	T1.078	 <chem>C1S(C1)CCSC1</chem>

T1.023		T1.079	
T1.024		T1.080	
T1.025		T1.081	
T1.026		T1.082	
T1.027		T1.083	
T1.028		T1.084	
T1.029		T1.085	
T1.030		T1.086	

T1.031		T1.087	
T1.032		T1.088	
T1.033		T1.089	
T1.034		T1.090	
T1.035		T1.091	
T1.036		T1.092	
T1.037		T1.093	
T1.038		T1.094	

T1.039		T1.095	
T1.040		T1.096	
T1.041		T1.097	
T1.042		T1.098	
T1.043		T1.099	
T1.044		T1.100	
T1.045		T1.101	
T1.046		T1.102	
T1.047		T1.103	

T1.048		T1.104	
T1.049		T1.105	
T1.050		T1.106	
T1.051		T1.107	
T1.052		T1.108	
T1.053		T1.109	
T1.054		T1.110	
T1.055		T1.111	
T1.056		T1.112	

The compounds according to the invention are preventively and/or curatively valuable active ingredients in the field of pest control, even at low rates of application, which have a very favorable biocidal spectrum and are well tolerated by warm-blooded species, fish and lants.

- 5 The invention also related to a pesticidal composition comprising a pesticidal effective amount of at least one compound of formula I. The active ingredients according to the invention act against all or individual developmental stages of normally sensitive, but also resistant, animal pests, such as insects or representatives of the order Acarina. The insecticidal or acaricidal activity of the active ingredients according to the invention can
- 10 manifest itself directly, i. e. in destruction of the pests, which takes place either immediately or only after some time has elapsed, for example during ecdysis, or indirectly, for example in a reduced oviposition and/or hatching rate, a good activity corresponding to a destruction rate (mortality) of at least 50 to 60%.
- 15 The compounds of formula I can be used to combat and control infestations of insect pests such as Lepidoptera, Diptera, Hemiptera, Thysanoptera, Orthoptera, Dictyoptera, Coleoptera, Siphonaptera, Hymenoptera and Isoptera and also other invertebrate pests, for example, acarine, nematode and mollusc pests. Insects, acarines, nematodes and molluscs are hereinafter collectively referred to as pests. The pests which may be
- 20 combated and controlled by the use of the invention compounds include those pests associated with agriculture (which term includes the growing of crops for food and fibre products), horticulture and animal husbandry, companion animals, forestry and the storage of products of vegetable origin (such as fruit, grain and timber); those pests associated with the damage of man-made structures and the transmission of diseases of man and animals;
- 25 and also nuisance pests (such as flies).

Examples of pest species which may be controlled by the compounds of formula I include:

- Myzus persicae* (aphid), *Aphis gossypii* (aphid), *Aphis fabae* (aphid), *Lygus* spp. (capsids), *Dysdercus* spp. (capsids), *Nilaparvata lugens* (planthopper), *Nephotettix inciticeps*
- 30 (leafhopper), *Nezara* spp. (stinkbugs), *Euschistus* spp. (stinkbugs), *Leptocorisa* spp. (stinkbugs), *Frankliniella occidentalis* (thrip), Thrips spp. (thrips), *Leptinotarsa decemlineata* (Colorado potato beetle), *Anthonomus grandis* (boll weevil), *Aonidiella* spp. (scale insects), *Trialeurodes* spp. (white flies), *Bemisia tabaci* (white fly), *Ostrinia nubilalis* (European corn borer), *Spodoptera littoralis* (cotton leafworm), *Heliothis virescens* (tobacco budworm),
- 35 *Helicoverpa armigera* (cotton bollworm), *Helicoverpa zea* (cotton bollworm), *Sylepta derogata* (cotton leaf roller), *Pieris brassicae* (white butterfly), *Plutella xylostella* (diamond

back moth), *Agrotis* spp. (cutworms), *Chilo suppressalis* (rice stem borer), *Locusta migratoria* (locust), *Chortiocetes terminifera* (locust), *Diabrotica* spp. (rootworms), *Panonychus ulmi* (European red mite), *Panonychus citri* (citrus red mite), *Tetranychus urticae* (two-spotted spider mite), *Tetranychus cinnabarinus* (carmine spider mite),
 5 *Phyllocoptruta oleivora* (citrus rust mite), *Polyphagotarsonemus latus* (broad mite), *Brevipalpus* spp. (flat mites), *Boophilus microplus* (cattle tick), *Dermacentor variabilis* (American dog tick), *Ctenocephalides felis* (cat flea), *Liriomyza* spp. (leafminer), *Musca domestica* (housefly), *Aedes aegypti* (mosquito), *Anopheles* spp. (mosquitoes), *Culex* spp. (mosquitoes), *Lucilia* spp. (blowflies), *Blattella germanica* (cockroach), *Periplaneta*
 10 *americana* (cockroach), *Blatta orientalis* (cockroach), termites of the Mastotermitidae (for example *Mastotermes* spp.), the Kalotermitidae (for example *Neotermes* spp.), the Rhinotermitidae (for example *Coptotermes formosanus*, *Reticulitermes flavipes*, *R. speratu*, *R. virginicus*, *R. hesperus*, and *R. santonensis*) and the Termitidae (for example *Globitermes sulphureus*), *Solenopsis geminata* (fire ant), *Monomorium pharaonis* (pharaoh's
 15 ant), *Damalinia* spp. and *Linognathus* spp. (biting and sucking lice), *Meloidogyne* spp. (root knot nematodes), *Globodera* spp. and *Heterodera* spp. (cyst nematodes), *Pratylenchus* spp. (lesion nematodes), *Rhodopholus* spp. (banana burrowing nematodes), *Tylenchulus* spp. (citrus nematodes), *Haemonchus contortus* (barber pole worm), *Caenorhabditis elegans* (vinegar eelworm), *Trichostrongylus* spp. (gastro intestinal nematodes) and
 20 *Deroceras reticulatum* (slug).

Further examples of the above mentioned pests are:

from the order *Acarina*, for example,

Acarus siro, *Aceria sheldoni*, *Aculus schlechtendali*, *Amblyomma* spp., *Argas* spp., *Boophilus* spp., *Brevipalpus* spp., *Bryobia praetiosa*, *Calipitrimerus* spp., *Chorioptes* spp., *Dermanyssus gallinae*, *Eotetranychus carpini*, *Eriophyes* spp., *Hyalomma* spp., *Ixodes* spp., *Oligonychus pratensis*, *Ornithodoros* spp., *Panonychus* spp., *Phyllocoptruta oleivora*, *Polyphagotarsonemus latus*, *Psoroptes* spp., *Rhipicephalus* spp., *Rhizoglyphus* spp., *Sarcoptes* spp., *Tarsonemus* spp. and *Tetranychus* spp.;

from the order *Anoplura*, for example,

30 *Haematopinus* spp., *Linognathus* spp., *Pediculus* spp., *Pemphigus* spp. and *Phylloxera* spp.;

from the order *Coleoptera*, for example,

Agriotes spp., *Anthonomus* spp., *Atomaria linearis*, *Chaetocnema tibialis*, *Cosmopolites* spp., *Curculio* spp., *Dermestes* spp., *Diabrotica* spp., *Epilachna* spp., *Eremnus* spp., *Leptinotarsa decemlineata*, *Lissorhoptrus* spp., *Melolontha* spp., *Oryzaephilus* spp., *Otiorhyn-*
 35

chus spp., Phlyctinus spp., Popillia spp., Psylliodes spp., Rhizopertha spp., Scarabeidae, Sitophilus spp., Sitotroga spp., Tenebrio spp., Tribolium spp. and Trogoderma spp.;

from the order *Diptera*, for example,

- 5 Aedes spp., Antherigona soccata, Bibio hortulanus, Calliphora erythrocephala, Ceratitis spp., Chrysomyia spp., Culex spp., Cuterebra spp., Dacus spp., Drosophila melanogaster, Fannia spp., Gastrophilus spp., Glossina spp., Hypoderma spp., Hyppobosca spp., Liriomyza spp., Lucilia spp., Melanagromyza spp., Musca spp., Oestrus spp., Orseolia spp., Oscinella frit, Pegomyia hyoscyami, Phorbia spp., Rhagoletis pomonella, Sciara spp., Stomoxys spp., Tabanus spp., Tannia spp. and Tipula spp.;

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from the order *Heteroptera*, for example,

Cimex spp., Distantiella theobroma, Dysdercus spp., Euchistus spp., Eurygaster spp., Leptocoris spp., Nezara spp., Piesma spp., Rhodnius spp., Sahlbergella singularis, Scotinophara spp. and Triatoma spp.;

- 15 from the order *Homoptera*, for example,

Aleurothrixus floccosus, Aleyrodes brassicae, Aonidiella spp., Aphididae, Aphis spp., Aspidiotus spp., Bemisia tabaci, Ceroplaster spp., Chrysomphalus aonidium, Chrysomphalus dictyospermi, Coccus hesperidum, Empoasca spp., Eriosoma larigerum, Erythroneura spp., Gascardia spp., Laodelphax spp., Lecanium corni, Lepidosaphes spp., Macrosiphus spp., Myzus spp., Nephotettix spp., Nilaparvata spp., Parlatoria spp., Pemphigus spp., Planococcus spp., Pseudaulacaspis spp., Pseudococcus spp., Psylla spp., Pulvinaria aethiopica, Quadraspidiotus spp., Rhopalosiphum spp., Saissetia spp., Scaphoideus spp., Schizaphis spp., Sitobion spp., Trialeurodes vaporariorum, Trioza erytrae and Unaspis citri;

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from the order *Hymenoptera*, for example,

- 25 Acromyrmex, Atta spp., Cephus spp., Diprion spp., Diprionidae, Gilpinia polytoma, Hoplocampa spp., Lasius spp., Monomorium pharaonis, Neodiprion spp., Solenopsis spp. and Vespa spp.;

from the order *Isoptera*, for example,

Reticulitermes spp.;

- 30 from the order *Lepidoptera*, for example,

Accleris spp., Adoxophyes spp., Aegeria spp., Agrotis spp., Alabama argillaceae, Amylois spp., Anticarsia gemmatilis, Archips spp., Argyrotaenia spp., Autographa spp., Busseola fusca, Cadra cautella, Carposina nipponensis, Chilo spp., Choristoneura spp., Clysia ambiguella, Cnaphalocrocis spp., Cnephasia spp., Cochylis spp., Coleophora spp., Crocidolomia binotalis, Cryptophlebia leucotreta, Cydia spp., Diatraea spp., Diparopsis castanea, Earias spp., Ephestia spp., Eucosma spp., Eupoecilia ambiguella, Euproctis spp., Euxoa spp., Gra-

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- pholita spp., Hedyia nubiferana, Heliothis spp., Hellula undalis, Hyphantria cunea, Keiferia lycopersicella, Leucoptera scitella, Lithocollethis spp., Lobesia botrana, Lymantria spp., Lyonetia spp., Malacosoma spp., Mamestra brassicae, Manduca sexta, Operophtera spp., Ostrinia nubilalis, Pammene spp., Pandemis spp., Panolis flammea, Pectinophora gossypiella, Phthorimaea operculella, Pieris rapae, Pieris spp., Plutella xylostella, Prays spp., Scirpophaga spp., Sesamia spp., Sparganothis spp., Spodoptera spp., Synanthedon spp., Thaumetopoea spp., Tortrix spp., Trichoplusia ni and Yponomeuta spp.;
- from the order *Mallophaga*, for example,
Damalineia spp. and Trichodectes spp.;
- 10 from the order *Orthoptera*, for example,
Blatta spp., Blattella spp., Gryllotalpa spp., Leucophaea maderae, Locusta spp., Periplaneta spp. and Schistocerca spp.;
- from the order *Psocoptera*, for example,
Liposcelis spp.;
- 15 from the order *Siphonaptera*, for example,
Ceratophyllus spp., Ctenocephalides spp. and Xenopsylla cheopis;
- from the order *Thysanoptera*, for example,
Frankliniella spp., Hercinothrips spp., Scirtothrips aurantii, Taeniothrips spp., Thrips palmi and Thrips tabaci; and
- 20 from the order *Thysanura*, for example,
Lepisma saccharina.

The active ingredients according to the invention can be used for controlling, i. e. containing or destroying, pests of the abovementioned type which occur in particular on plants, especially on useful plants and ornamentals in agriculture, in horticulture and in forests, or

25 on organs, such as fruits, flowers, foliage, stalks, tubers or roots, of such plants, and in some cases even plant organs which are formed at a later point in time remain protected against these pests.

Suitable target crops are, in particular, cereals, such as wheat, barley, rye, oats, rice, maize or sorghum; beet, such as sugar or fodder beet; fruit, for example pomaceous fruit, stone

30 fruit or soft fruit, such as apples, pears, plums, peaches, almonds, cherries or berries, for example strawberries, raspberries or blackberries; leguminous crops, such as beans, lentils, peas or soya; oil crops, such as oilseed rape, mustard, poppies, olives, sunflowers, coconut, castor, cocoa or ground nuts; cucurbits, such as pumpkins, cucumbers or melons; fibre plants, such as cotton, flax, hemp or jute; citrus fruit, such as oranges, lemons, grapefruit or

35 tangerines; vegetables, such as spinach, lettuce, asparagus, cabbages, carrots, onions,

tomatoes, potatoes or bell peppers; Lauraceae, such as avocado, Cinnamomum or camphor; and also tobacco, nuts, coffee, eggplants, sugarcane, tea, pepper, grapevines, hops, the plantain family, latex plants and ornamentals.

- The term "crops" is to be understood as including also crops that have been rendered
- 5 tolerant to herbicides like bromoxynil or classes of herbicides (such as, for example, HPPD inhibitors, ALS inhibitors, for example primisulfuron, prosulfuron and trifloxysulfuron, EPSPS (5-enol-pyrovyl-shikimate-3-phosphate-synthase) inhibitors, GS (glutamine synthetase) inhibitors) as a result of conventional methods of breeding or genetic engineering. An example of a crop that has been rendered tolerant to imidazolinones, e.g. imazamox, by
- 10 conventional methods of breeding (mutagenesis) is Clearfield® summer rape (Canola). Examples of crops that have been rendered tolerant to herbicides or classes of herbicides by genetic engineering methods include glyphosate- and glufosinate-resistant maize varieties commercially available under the trade names RoundupReady® and LibertyLink®.
- 15 The term "crops" is also to be understood as including also crop plants which have been so transformed by the use of recombinant DNA techniques that they are capable of synthesising one or more selectively acting toxins, such as are known, for example, from toxin-producing bacteria, especially those of the genus *Bacillus*.
- 20 Toxins that can be expressed by such transgenic plants include, for example, insecticidal proteins, for example insecticidal proteins from *Bacillus cereus* or *Bacillus popilliae*; or insecticidal proteins from *Bacillus thuringiensis*, such as δ -endotoxins, e.g. CryIA(b), CryIA(c), CryIF, CryIF(a2), CryIIA(b), CryIIIA, CryIIIB(b1) or Cry9c, or vegetative insecticidal proteins (VIP), e.g. VIP1, VIP2, VIP3 or VIP3A; or insecticidal proteins of bacteria colonising
- 25 nematodes, for example *Photorhabdus* spp. or *Xenorhabdus* spp., such as *Photorhabdus luminescens*, *Xenorhabdus nematophilus*; toxins produced by animals, such as scorpion toxins, arachnid toxins, wasp toxins and other insect-specific neurotoxins; toxins produced by fungi, such as *Streptomyces* toxins, plant lectins, such as pea lectins, barley lectins or snowdrop lectins; agglutinins; proteinase inhibitors, such as trypsin inhibitors, serine
- 30 protease inhibitors, patatin, cystatin, papain inhibitors; ribosome-inactivating proteins (RIP), such as ricin, maize-RIP, abrin, luffin, saporin or bryodin; steroid metabolism enzymes, such as 3-hydroxysteroid oxidase, ecdysteroid-UDP-glycosyl-transferase, cholesterol oxidases, ecdysone inhibitors, HMG-CoA-reductase, ion channel blockers, such as blockers of sodium or calcium channels, juvenile hormone esterase, diuretic hormone receptors,
- 35 stilbene synthase, bibenzyl synthase, chitinases and glucanases.

In the context of the present invention there are to be understood by δ -endotoxins, for example CryIA(b), CryIA(c), CryIF, CryIF(a2), CryIIA(b), CryIIIA, CryIIIB(b1) or Cry9c, or vegetative insecticidal proteins (VIP), for example VIP1, VIP2, VIP3 or VIP3A, expressly also hybrid toxins, truncated toxins and modified toxins. Hybrid toxins are produced
5 recombinantly by a new combination of different domains of those proteins (see, for example, WO 02/15701). Truncated toxins, for example a truncated CryIA(b), are known. In the case of modified toxins, one or more amino acids of the naturally occurring toxin are replaced. In such amino acid replacements, preferably non-naturally present protease recognition sequences are inserted into the toxin, such as, for example, in the case of
10 CryIIIA055, a cathepsin-D-recognition sequence is inserted into a CryIIIA toxin (see WO 03/018810).

Examples of such toxins or transgenic plants capable of synthesising such toxins are disclosed, for example, in EP-A-0 374 753, WO 93/07278, WO 95/34656, EP-A-0 427 529,
15 EP-A-451 878 and WO 03/052073.

The processes for the preparation of such transgenic plants are generally known to the person skilled in the art and are described, for example, in the publications mentioned above. CryI-type deoxyribonucleic acids and their preparation are known, for example, from
20 WO 95/34656, EP-A-0 367 474, EP-A-0 401 979 and WO 90/13651.

The toxin contained in the transgenic plants imparts to the plants tolerance to harmful insects. Such insects can occur in any taxonomic group of insects, but are especially commonly found in the beetles (Coleoptera), two-winged insects (Diptera) and butterflies
25 (Lepidoptera).

Transgenic plants containing one or more genes that code for an insecticidal resistance and express one or more toxins are known and some of them are commercially available. Examples of such plants are: YieldGard® (maize variety that expresses a CryIA(b) toxin);
30 YieldGard Rootworm® (maize variety that expresses a CryIIIB(b1) toxin); YieldGard Plus® (maize variety that expresses a CryIA(b) and a CryIIIB(b1) toxin); Starlink® (maize variety that expresses a Cry9(c) toxin); Herculex I® (maize variety that expresses a CryIF(a2) toxin and the enzyme phosphinothricine N-acetyltransferase (PAT) to achieve tolerance to the herbicide glufosinate ammonium); NuCOTN 33B® (cotton variety that expresses a CryIA(c)
35 toxin); Bollgard I® (cotton variety that expresses a CryIA(c) toxin); Bollgard II® (cotton variety that expresses a CryIA(c) and a CryIIA(b) toxin); VIPCOT® (cotton variety that

expresses a VIP toxin); NewLeaf® (potato variety that expresses a CryIIIA toxin); Nature-Gard® Agrisure® GT Advantage (GA21 glyphosate-tolerant trait), Agrisure® CB Advantage (Bt11 corn borer (CB) trait) and Protecta®.

5 Further examples of such transgenic crops are:

1. Bt11 Maize from Syngenta Seeds SAS, Chemin de l'Hobit 27, F-31 790 St. Sauveur, France, registration number C/FR/96/05/10. Genetically modified *Zea mays* which has been rendered resistant to attack by the European corn borer (*Ostrinia nubilalis* and *Sesamia nonagrioides*) by transgenic expression of a truncated CryIA(b) toxin. Bt11 maize also
10 transgenically expresses the enzyme PAT to achieve tolerance to the herbicide glufosinate ammonium.
2. Bt176 Maize from Syngenta Seeds SAS, Chemin de l'Hobit 27, F-31 790 St. Sauveur,
15 France, registration number C/FR/96/05/10. Genetically modified *Zea mays* which has been rendered resistant to attack by the European corn borer (*Ostrinia nubilalis* and *Sesamia nonagrioides*) by transgenic expression of a CryIA(b) toxin. Bt176 maize also transgenically expresses the enzyme PAT to achieve tolerance to the herbicide glufosinate ammonium.
- 20 3. MIR604 Maize from Syngenta Seeds SAS, Chemin de l'Hobit 27, F-31 790 St. Sauveur, France, registration number C/FR/96/05/10. Maize which has been rendered insect-resistant by transgenic expression of a modified CryIIIA toxin. This toxin is Cry3A055 modified by insertion of a cathepsin-D-protease recognition sequence. The preparation of such transgenic maize plants is described in WO 03/018810.
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4. MON 863 Maize from Monsanto Europe S.A. 270-272 Avenue de Tervuren, B-1150 Brussels, Belgium, registration number C/DE/02/9. MON 863 expresses a CryIIIB(b1) toxin and has resistance to certain Coleoptera insects.
- 30 5. IPC 531 Cotton from Monsanto Europe S.A. 270-272 Avenue de Tervuren, B-1150 Brussels, Belgium, registration number C/ES/96/02.
6. 1507 Maize from Pioneer Overseas Corporation, Avenue Tedesco, 7 B-1160 Brussels, Belgium, registration number C/NL/00/10. Genetically modified maize for the expression of
35 the protein Cry1F for achieving resistance to certain Lepidoptera insects and of the PAT protein for achieving tolerance to the herbicide glufosinate ammonium.

7. NK603 × MON 810 Maize from Monsanto Europe S.A. 270-272 Avenue de Tervuren, B-1150 Brussels, Belgium, registration number C/GB/02/M3/03. Consists of conventionally bred hybrid maize varieties by crossing the genetically modified varieties NK603 and MON 810. NK603 × MON 810 Maize transgenically expresses the protein CP4 EPSPS, obtained from *Agrobacterium sp.* strain CP4, which imparts tolerance to the herbicide Roundup® (contains glyphosate), and also a CryIA(b) toxin obtained from *Bacillus thuringiensis subsp. kurstaki* which brings about tolerance to certain Lepidoptera, include the European corn borer.

Transgenic crops of insect-resistant plants are also described in BATS (Zentrum für Biosicherheit und Nachhaltigkeit, Zentrum BATS, Clarastrasse 13, 4058 Basel, Switzerland) Report 2003.

The term "crops" is to be understood as including also crop plants which have been so transformed by the use of recombinant DNA techniques that they are capable of synthesising antipathogenic substances having a selective action, such as, for example, the so-called "pathogenesis-related proteins" (PRPs, see e.g. EP-A-0 392 225). Examples of such antipathogenic substances and transgenic plants capable of synthesising such antipathogenic substances are known, for example, from EP-A-0 392 225, WO 95/33818, and EP-A-0 353 191. The methods of producing such transgenic plants are generally known to the person skilled in the art and are described, for example, in the publications mentioned above.

Antipathogenic substances which can be expressed by such transgenic plants include, for example, ion channel blockers, such as blockers for sodium and calcium channels, for example the viral KP1, KP4 or KP6 toxins; stilbene synthases; bibenzyl synthases; chitinases; glucanases; the so-called "pathogenesis-related proteins" (PRPs; see e.g. EP-A-0 392 225); antipathogenic substances produced by microorganisms, for example peptide antibiotics or heterocyclic antibiotics (see e.g. WO 95/33818) or protein or polypeptide factors involved in plant pathogen defence (so-called "plant disease resistance genes", as described in WO 03/000906).

Crops may also be modified for enhanced resistance to fungal (for example *Fusarium*, *Anthraxnose*, or *Phytophthora*), bacterial (for example *Pseudomonas*) or viral (for example potato leafroll virus, tomato spotted wilt virus, cucumber mosaic virus) pathogens.

Crops also include those that have enhanced resistance to nematodes, such as the soybean cyst nematode.

- 5 Crops that are tolerance to abiotic stress include those that have enhanced tolerance to drought, high salt, high temperature, chill, frost, or light radiation, for example through expression of NF-YB or other proteins known in the art.

- 10 Crops that exhibit enhanced yield or quality include those with improved flowering or fruit ripening properties (such as delayed ripening); modified oil, starch, amino acid, fatty acid, vitamin, phenolic or other content (such as VistiveTM soybean variety); enhanced nutrient utilisation (such as improved nitrogen assimilation); and enhanced quality plant product (such as higher quality cotton fibre).

- 15 Further areas of use of the compounds and compositions according to the invention are the protection of stored goods and storerooms and the protection of raw materials, such as wood, textiles, floor coverings or buildings, and also in the hygiene sector, especially the protection of humans, domestic animals and productive livestock against pests of the mentioned type.
- 20 In the hygiene sector, the compounds and compositions according to the invention are active against ectoparasites such as hard ticks, soft ticks, mange mites, harvest mites, flies (biting and licking), parasitic fly larvae, lice, hair lice, bird lice and fleas.

Examples of such parasites are:

- 25 Of the order Anoplurida: Haematopinus spp., Linognathus spp., Pediculus spp. and Phtirus spp., Solenopotes spp..

Of the order Mallophagida: Trimenopon spp., Menopon spp., Trinoton spp., Bovicola spp., Werneckiella spp., Lepikentron spp., Damalina spp., Trichodectes spp. and Felicola spp..

- 30 Of the order Diptera and the suborders Nematocerina and Brachycerina, for example Aedes spp., Anopheles spp., Culex spp., Simulium spp., Eusimulium spp., Phlebotomus spp., Lutzomyia spp., Culicoides spp., Chrysops spp., Hybomitra spp., Atylotus spp., Tabanus spp., Haematopota spp., Philipomyia spp., Braula spp., Musca spp., Hydrotaea spp., Stomoxys spp., Haematobia spp., Morellia spp., Fannia spp., Glossina spp., Calliphora spp., Lucilia spp., Chrysomyia spp., Wohlfahrtia spp., Sarcophaga spp., Oestrus spp.,

Hypoderma spp., Gasterophilus spp., Hippobosca spp., Lipoptena spp. and Melophagus spp..

Of the order Siphonapterida, for example Pulex spp., Ctenocephalides spp., Xenopsylla spp., Ceratophyllus spp..

- 5 Of the order Heteropterida, for example Cimex spp., Triatoma spp., Rhodnius spp., Panstrongylus spp..

Of the order Blattarida, for example Blatta orientalis, Periplaneta americana, Blattelagermanica and Supella spp..

- 10 Of the subclass Acaria (Acarida) and the orders Meta- and Meso-stigmata, for example Argas spp., Ornithodoros spp., Otobius spp., Ixodes spp., Amblyomma spp., Boophilus spp., Dermacentor spp., Haemophysalis spp., Hyalomma spp., Rhipicephalus spp., Dermanyssus spp., Raillietia spp., Pneumonyssus spp., Sternostoma spp. and Varroa spp..

- 15 Of the orders Actinedida (Prostigmata) and Acaridida (Astigmata), for example Acarapis spp., Cheyletiella spp., Ornithocheyletia spp., Myobia spp., Psorergatesspp., Demodex spp., Trombicula spp., Listrophorus spp., Acarus spp., Tyrophagus spp., Caloglyphus spp., Hypodectes spp., Pterolichus spp., Psoroptes spp., Chorioptes spp., Otodectes spp., Sarcoptes spp., Notoedres spp., Knemidocoptes spp., Cytodites spp. and Laminosioptes spp..

- 20 The compounds and compositions according to the invention are also suitable for protecting against insect infestation in the case of materials such as wood, textiles, plastics, adhesives, glues, paints, paper and card, leather, floor coverings and buildings.

- The compositions according to the invention can be used, for example, against the following pests: beetles such as Hylotrupes bajulus, Chlorophorus pilosis, Anobium punctatum, Xestobium rufovillosum, Ptilinuspecticornis, Dendrobium pertinex, Ernobius mollis, Priobium
25 carpini, Lyctus brunneus, Lyctus africanus, Lyctus planicollis, Lyctus linearis, Lyctus pubescens, Trogoxylon aequale, Minthesrugicollis, Xyleborus spec., Tryptodendron spec., Apate monachus, Bostrychus capucins, Heterobostrychus brunneus, Sinoxylon spec. and Dinoderus minutus, and also hymenopterans such as Sirex juvencus, Urocerus gigas, Urocerus gigas taignus and Urocerus augur, and termites such as Kaloterms flavicollis,
30 Cryptoterms brevis, Heteroterms indicola, Reticuliterms flavipes, Reticuliterms santonensis, Reticuliterms lucifugus, Mastoterms darwiniensis, Zootermopsis nevadensis and Coptoterms formosanus, and bristletails such as Lepisma saccharina.

The invention therefore provides a method of combating and controlling insects, acarines, nematodes or molluscs which comprises applying an insecticidally, acaricidally, nematocidally or molluscicidally effective amount of a compound of formula I, or a composition containing a compound of formula I, to a pest, a locus of pest, or to a plant susceptible to attack by a pest, The compounds of formula I are preferably used against insects or acarines.

The term "plant" as used herein includes seedlings, bushes and trees.

The invention also relates to a pesticidal composition, which, in addition to comprising the compound of formula I, comprises formulation adjuvants.

The invention therefore also relates to pesticidal compositions such as emulsifiable concentrates, suspension concentrates, directly sprayable or dilutable solutions, spreadable pastes, dilute emulsions, soluble powders, dispersible powders, wettable powders, dusts, granules or encapsulations in polymeric substances, which comprise - at least - one of the active ingredients according to the invention and which are to be selected to suit the intended aims and the prevailing circumstances.

In these compositions, the active ingredient is employed in pure form, a solid active ingredient for example in a specific particle size, or, preferably, together with - at least - one of the auxiliaries conventionally used in the art of formulation, such as extenders, for example solvents or solid carriers, or such as surface-active compounds (surfactants).

Examples of suitable solvents are: unhydrogenated or partially hydrogenated aromatic hydrocarbons, preferably the fractions C8 to C12 of alkylbenzenes, such as xylene mixtures, alkylated naphthalenes or tetrahydronaphthalene, aliphatic or cycloaliphatic hydrocarbons, such as paraffins or cyclohexane, alcohols such as ethanol, propanol or butanol, glycols and their ethers and esters such as propylene glycol, dipropylene glycol ether, ethylene glycol or ethylene glycol monomethyl ether or ethylene glycol monoethyl ether, ketones, such as cyclohexanone, isophorone or diacetone alcohol, strongly polar solvents, such as N-methylpyrrolid-2-one, dimethyl sulfoxide or N,N-dimethylformamide, water, unepoxidized or epoxidized vegetable oils, such as unexpodized or epoxidized rapeseed, castor, coconut or soya oil, and silicone oils.

- Solid carriers which are used for example for dusts and dispersible powders are, as a rule, ground natural minerals such as calcite, talc, kaolin, montmorillonite or attapulgite. To improve the physical properties, it is also possible to add highly disperse silicas or highly disperse absorptive polymers. Suitable particulate adsorptive carriers for granules are
- 5 porous types, such as pumice, brick grit, sepiolite or bentonite, and suitable non-sorptive carrier materials are calcite or sand. In addition, a large number of granulated materials of inorganic or organic nature can be used, in particular dolomite or comminuted plant residues.
- 10 Suitable surface-active compounds are, depending on the type of the active ingredient to be formulated, non-ionic, cationic and/or anionic surfactants or surfactant mixtures which have good emulsifying, dispersing and wetting properties. The surfactants mentioned below are only to be considered as examples; a large number of further surfactants which are conventionally used in the art of formulation and suitable according to the invention are
- 15 described in the relevant literature.

- Suitable non-ionic surfactants are, especially, polyglycol ether derivatives of aliphatic or cycloaliphatic alcohols, of saturated or unsaturated fatty acids or of alkyl phenols which may contain approximately 3 to approximately 30 glycol ether groups and approximately 8 to
- 20 approximately 20 carbon atoms in the (cyclo)aliphatic hydrocarbon radical or approximately 6 to approximately 18 carbon atoms in the alkyl moiety of the alkyl phenols. Also suitable are water-soluble polyethylene oxide adducts with polypropylene glycol, ethylenediaminopolypropylene glycol or alkyl polypropylene glycol having 1 to approximately 10 carbon atoms in the alkyl chain and approximately 20 to approximately
- 25 250 ethylene glycol ether groups and approximately 10 to approximately 100 propylene glycol ether groups. Normally, the abovementioned compounds contain 1 to approximately 5 ethylene glycol units per propylene glycol unit. Examples which may be mentioned are nonylphenoxypolyethoxyethanol, castor oil polyglycol ether, polypropylene glycol/polyethylene oxide adducts, tributylphenoxypolyethoxyethanol, polyethylene glycol
- 30 or octylphenoxypolyethoxyethanol. Also suitable are fatty acid esters of polyoxyethylene sorbitan, such as polyoxyethylene sorbitan trioleate.

- The cationic surfactants are, especially, quarternary ammonium salts which generally have at least one alkyl radical of approximately 8 to approximately 22 C atoms as substituents
- 35 and as further substituents (unhalogenated or halogenated) lower alkyl or hydroxyalkyl or benzyl radicals. The salts are preferably in the form of halides, methylsulfates or

ethylsulfates. Examples are stearyltrimethylammonium chloride and benzylbis(2-chloroethyl)ethylammonium bromide.

Examples of suitable anionic surfactants are water-soluble soaps or water-soluble synthetic surface-active compounds. Examples of suitable soaps are the alkali, alkaline earth or (unsubstituted or substituted) ammonium salts of fatty acids having approximately 10 to approximately 22 C atoms, such as the sodium or potassium salts of oleic or stearic acid, or of natural fatty acid mixtures which are obtainable for example from coconut or tall oil; mention must also be made of the fatty acid methyl taurates. However, synthetic surfactants are used more frequently, in particular fatty sulfonates, fatty sulfates, sulfonated benzimidazole derivatives or alkylaryl sulfonates. As a rule, the fatty sulfonates and fatty sulfates are present as alkali, alkaline earth or (substituted or unsubstituted) ammonium salts and they generally have an alkyl radical of approximately 8 to approximately 22 C atoms, alkyl also to be understood as including the alkyl moiety of acyl radicals; examples which may be mentioned are the sodium or calcium salts of lignosulfonic acid, of the dodecylsulfuric ester or of a fatty alcohol sulfate mixture prepared from natural fatty acids. This group also includes the salts of the sulfuric esters and sulfonic acids of fatty alcohol/ethylene oxide adducts. The sulfonated benzimidazole derivatives preferably contain 2 sulfonyl groups and a fatty acid radical of approximately 8 to approximately 22 C atoms. Examples of alkylarylsulfonates are the sodium, calcium or triethanolammonium salts of decylbenzenesulfonic acid, of dibutyl-naphthalenesulfonic acid or of a naphthalenesulfonic acid/formaldehyde condensate. Also possible are, furthermore, suitable phosphates, such as salts of the phosphoric ester of a p-nonylphenol/(4-14)ethylene oxide adduct, or phospholipids. Further suitable phosphates are tris-esters of phosphoric acid with aliphatic or aromatic alcohols and/or bis-esters of alkyl phosphonic acids with aliphatic or aromatic alcohols, which are a high performance oil-type adjuvant. These tris-esters have been described, for example, in WO0147356, WO0056146, EP-A-0579052 or EP-A-1018299 or are commercially available under their chemical name. Preferred tris-esters of phosphoric acid for use in the new compositions are tris-(2-ethylhexyl) phosphate, tris-n-octyl phosphate and tris-butoxyethyl phosphate, where tris-(2-ethylhexyl) phosphate is most preferred. Suitable bis-ester of alkyl phosphonic acids are bis-(2-ethylhexyl)-(2-ethylhexyl)-phosphonate, bis-(2-ethylhexyl)-(n-octyl)-phosphonate, dibutyl-butyl phosphonate and bis(2-ethylhexyl)-tripropylene-phosphonate, where bis-(2-ethylhexyl)-(n-octyl)-phosphonate is particularly preferred.

The compositions according to the invention can preferably additionally include an additive comprising an oil of vegetable or animal origin, a mineral oil, alkyl esters of such oils or mixtures of such oils and oil derivatives. The amount of oil additive used in the composition according to the invention is generally from 0.01 to 10 %, based on the spray mixture. For example, the oil additive can be added to the spray tank in the desired concentration after the spray mixture has been prepared. Preferred oil additives comprise mineral oils or an oil of vegetable origin, for example rapeseed oil such as ADIGOR® and MERO®, olive oil or sunflower oil, emulsified vegetable oil, such as AMIGO® (Rhône-Poulenc Canada Inc.), alkyl esters of oils of vegetable origin, for example the methyl derivatives, or an oil of animal origin, such as fish oil or beef tallow. A preferred additive contains, for example, as active components essentially 80 % by weight alkyl esters of fish oils and 15 % by weight methylated rapeseed oil, and also 5 % by weight of customary emulsifiers and pH modifiers. Especially preferred oil additives comprise alkyl esters of C₈-C₂₂ fatty acids, especially the methyl derivatives of C₁₂-C₁₈ fatty acids, for example the methyl esters of lauric acid, palmitic acid and oleic acid, being important. Those esters are known as methyl laurate (CAS-111-82-0), methyl palmitate (CAS-112-39-0) and methyl oleate (CAS-112-62-9). A preferred fatty acid methyl ester derivative is Emery® 2230 and 2231 (Cognis GmbH). Those and other oil derivatives are also known from the Compendium of Herbicide Adjuvants, 5th Edition, Southern Illinois University, 2000. Also, alkoxylated fatty acids can be used as additives in the inventive compositions as well as polymethylsiloxane based additives, which have been described in WO08/037373.

The application and action of the oil additives can be further improved by combining them with surface-active substances, such as non-ionic, anionic or cationic surfactants. Examples of suitable anionic, non-ionic and cationic surfactants are listed on pages 7 and 8 of WO 97/34485. Preferred surface-active substances are anionic surfactants of the dodecylbenzylsulfonate type, especially the calcium salts thereof, and also non-ionic surfactants of the fatty alcohol ethoxylate type. Special preference is given to ethoxylated C₁₂-C₂₂ fatty alcohols having a degree of ethoxylation of from 5 to 40. Examples of commercially available surfactants are the Genapol types (Clariant AG). Also preferred are silicone surfactants, especially polyalkyl-oxide-modified heptamethyltrisiloxanes, which are commercially available e.g. as Silwet L-77®, and also perfluorinated surfactants. The concentration of surface-active substances in relation to the total additive is generally from 1 to 30 % by weight. Examples of oil additives that consist of mixtures of oils or mineral oils or derivatives thereof with surfactants are Edenor ME SU®, Turbocharge® (Syngenta AG, CH) and Actipron® (BP Oil UK Limited, GB).

The said surface-active substances may also be used in the formulations alone, that is to say without oil additives.

- 5 Furthermore, the addition of an organic solvent to the oil additive/surfactant mixture can contribute to a further enhancement of action. Suitable solvents are, for example, Solvesso® (ESSO) and Aromatic Solvent® (Exxon Corporation). The concentration of such solvents can be from 10 to 80 % by weight of the total weight. Such oil additives, which may be in admixture with solvents, are described, for example, in US-A-4 834 908. A
- 10 commercially available oil additive disclosed therein is known by the name MERGE® (BASF Corporation). A further oil additive that is preferred according to the invention is SCORE® (Syngenta Crop Protection Canada.)

- In addition to the oil additives listed above, in order to enhance the activity of the compositions according to the invention it is also possible for formulations of alkylpyrrolidones, (e.g. Agrimax®) to be added to the spray mixture. Formulations of synthetic latices, such as, for example, polyacrylamide, polyvinyl compounds or poly-1-p-menthene (e.g. Bond®, Courier® or Emerald®) can also be used. Solutions that contain propionic acid, for example Eurogkem Pen-e-trate®, can also be mixed into the spray mixture as activity-enhancing
- 20 agents.

- As a rule, the compositions comprise 0.1 to 99%, especially 0.1 to 95%, of active ingredient of the formula I and 1 to 99.9%, especially 5 to 99.9%, of at least one solid or liquid adjuvant, it being possible as a rule for 0 to 25%, especially 0.1 to 20%, of the composition
- 25 to be surfactants(% in each case meaning percent by weight). Whereas concentrated compositions tend to be preferred for commercial goods, the end consumer as a rule uses dilute compositions which have substantially lower concentrations of active ingredient. Preferred compositions are composed in particular as follows (% = percent by weight):

30 Emulsifiable concentrates:

active ingredient:	1 to 95%, preferably 5 to 50%, more preferably 5 to 20%
surfactant:	1 to 30%, preferably 10 to 20 %
solvent:	5 to 98%, preferably 70 to 85%

35 Dusts:

active ingredient:	0.1 to 10%, preferably 2 to 5%,
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solid carrier: 99.9 to 90%, preferably 99.9 to 99%

Suspension concentrates:

5 active ingredient: 5 to 75%, preferably 10 to 50%, more preferably 10 to 40%

water: 94 to 24%, preferably 88 to 30%

surfactant: 1 to 40%, preferably 2 to 30%

Oil-based suspension concentrates:

10 active ingredient: 2 to 75%, preferably 5 to 50%, more preferably 10 to 25%

oil: 94 to 24%, preferably 88 to 30%

surfactant: 1 to 40%, preferably 2 to 30%

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Wettable powders:

active ingredient: 0.5 to 90%, preferably 1 to 80%, more preferably 25 to 75%

surfactant: 0.5 to 20%, preferably 1 to 15%

20 solid carrier: 5 to 99%, preferably 15 to 98%

Granulates:

active ingredient: 0.5 to 30%, preferably 3 to 25%, more preferably 3 to 15%

25 solid carrier: 99.5 to 70%, preferably 97 to 85%

Preferably, the term "active ingredient" refers to one of the compounds selected from Table 1 shown above. It also refers to mixtures of the compound of formula I, in particular a compound selected from said Table 1, with other insecticides, fungicides, herbicides, safeners, adjuvants and the like, which mixtures are specifically disclosed below.

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The compositions can also comprise further solid or liquid auxiliaries, such as stabilizers, for example unepoxidized or epoxidized vegetable oils (for example epoxidized coconut oil, rapeseed oil or soya oil), antifoams, for example silicone oil, preservatives, viscosity regulators, binders and/or tackifiers; fertilizers, in particular nitrogen containing fertilizers such as ammonium nitrates and urea as described in WO08/017388, which can enhance

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the efficacy of the inventive compounds; or other active ingredients for achieving specific effects, for example ammonium or phosphonium salts, in particular halides, (hydrogen)sulphates, nitrates, (hydrogen)carbonates, citrates, tartrates, formiates and acetates, as described in WO07/068427 and WO07/068428, which also can enhance the efficacy of the inventive compounds and which can be used in combination with penetration enhancers such as alkoxalated fatty acids; bactericides, fungicides, nematocides, plant activators, molluscicides or herbicides.

The compositions according to the invention are prepared in a manner known per se, in the absence of auxiliaries for example by grinding, screening and/or compressing a solid active ingredient and in the presence of at least one auxiliary for example by intimately mixing and/or grinding the active ingredient with the auxiliary (auxiliaries). These processes for the preparation of the compositions and the use of the compounds I for the preparation of these compositions are also a subject of the invention.

The application methods for the compositions, that is the methods of controlling pests of the abovementioned type, such as spraying, atomizing, dusting, brushing on, dressing, scattering or pouring - which are to be selected to suit the intended aims of the prevailing circumstances - and the use of the compositions for controlling pests of the abovementioned type are other subjects of the invention. Typical rates of concentration are between 0.1 and 1000 ppm, preferably between 0.1 and 500 ppm, of active ingredient. The rate of application per hectare is generally 1 to 2000 g of active ingredient per hectare, in particular 10 to 1000 g/ha, preferably 10 to 600 g/ha.

A preferred method of application in the field of crop protection is application to the foliage of the plants (foliar application), it being possible to select frequency and rate of application to match the danger of infestation with the pest in question. Alternatively, the active ingredient can reach the plants via the root system (systemic action), by drenching the locus of the plants with a liquid composition or by incorporating the active ingredient in solid form into the locus of the plants, for example into the soil, for example in the form of granules (soil application). In the case of paddy rice crops, such granules can be metered into the flooded paddy-field.

The compositions according to the invention are also suitable for the protection of plant propagation material, for example seeds, such as fruit, tubers or kernels, or nursery plants, against pests of the abovementioned type. The propagation material can be treated with the

compositions prior to planting, for example seed can be treated prior to sowing.

Alternatively, the compositions can be applied to seed kernels (coating), either by soaking the kernels in a liquid composition or by applying a layer of a solid composition. It is also possible to apply the compositions when the propagation material is planted to the site of application, for example into the seed furrow during drilling. These treatment methods for plant propagation material and the plant propagation material thus treated are further subjects of the invention.

Further methods of application of the compositions according to the invention comprise drip application onto the soil, dipping of parts of plants such as roots bulbs or tubers, drenching the soil, as well as soil injection. These methods are known in the art.

In order to apply a compound of formula I as an insecticide, acaricide, nematocide or molluscicide to a pest, a locus of pest, or to a plant susceptible to attack by a pest, a compound of formula I is usually formulated into a composition which includes, in addition to the compound of formula I, a suitable inert diluent or carrier and, optionally, a formulation adjuvant in form of a surface active agent (SFA) as described herein or, for example, in EP-B-1062217. SFAs are chemicals which are able to modify the properties of an interface (for example, liquid/solid, liquid/air or liquid/liquid interfaces) by lowering the interfacial tension and thereby leading to changes in other properties (for example dispersion, emulsification and wetting). It is preferred that all compositions (both solid and liquid formulations) comprise, by weight, 0.0001 to 95%, more preferably 1 to 85%, for example 5 to 60%, of a compound of formula I. The composition is generally used for the control of pests such that a compound of formula I is applied at a rate of from 0.1g to 10kg per hectare, preferably from 1g to 6kg per hectare, more preferably from 1g to 1kg per hectare.

When used in a seed dressing, a compound of formula I is used at a rate of 0.0001g to 10g (for example 0.001g or 0.05g), preferably 0.005g to 10g, more preferably 0.005g to 4g, per kilogram of seed.

In another aspect the present invention provides an insecticidal, acaricidal, nematocidal or molluscicidal composition comprising an insecticidally, acaricidally, nematocidally or molluscicidally effective amount of a compound of formula I and a suitable carrier or diluent therefor.

In a still further aspect the invention provides a method of combating and controlling pests at a locus which comprises treating the pests or the locus of the pests with an insecticidally,

acaricidally, nematocidally or molluscicidally effective amount of a composition comprising a compound of formula I.

The compositions can be chosen from a number of formulation types, including dustable
5 powders (DP), soluble powders (SP), water soluble granules (SG), water dispersible granules (WG), wettable powders (WP), granules (GR) (slow or fast release), soluble concentrates (SL), oil miscible liquids (OL), ultra low volume liquids (UL), emulsifiable concentrates (EC), dispersible concentrates (DC), emulsions (both oil in water (EW) and water in oil (EO)), micro-emulsions (ME), suspension concentrates (SC), oil-based
10 suspension concentrate (OD), aerosols, fogging/smoke formulations, capsule suspensions (CS) and seed treatment formulations. The formulation type chosen in any instance will depend upon the particular purpose envisaged and the physical, chemical and biological properties of the compound of formula I.

15 Dustable powders (DP) may be prepared by mixing a compound of formula I with one or more solid diluents (for example natural clays, kaolin, pyrophyllite, bentonite, alumina, montmorillonite, kieselguhr, chalk, diatomaceous earths, calcium phosphates, calcium and magnesium carbonates, sulphur, lime, flours, talc and other organic and inorganic solid carriers) and mechanically grinding the mixture to a fine powder.

20 Soluble powders (SP) may be prepared by mixing a compound of formula I with one or more water-soluble inorganic salts (such as sodium bicarbonate, sodium carbonate or magnesium sulphate) or one or more water-soluble organic solids (such as a polysaccharide) and, optionally, one or more wetting agents, one or more dispersing agents
25 or a mixture of said agents to improve water dispersibility/solubility. The mixture is then ground to a fine powder. Similar compositions may also be granulated to form water soluble granules (SG).

Wettable powders (WP) may be prepared by mixing a compound of formula I with one or
30 more solid diluents or carriers, one or more wetting agents and, preferably, one or more dispersing agents and, optionally, one or more suspending agents to facilitate the dispersion in liquids. The mixture is then ground to a fine powder. Similar compositions may also be granulated to form water dispersible granules (WG).

35 Granules (GR) may be formed either by granulating a mixture of a compound of formula I and one or more powdered solid diluents or carriers, or from pre-formed blank granules by

absorbing a compound of formula I (or a solution thereof, in a suitable agent) in a porous granular material (such as pumice, attapulgite clays, fuller's earth, kieselguhr, diatomaceous earths or ground corn cobs) or by adsorbing a compound of formula I (or a solution thereof, in a suitable agent) on to a hard core material (such as sands, silicates, mineral carbonates, sulphates or phosphates) and drying if necessary. Agents which are commonly used to aid absorption or adsorption include solvents (such as aliphatic and aromatic petroleum solvents, alcohols, ethers, ketones and esters) and sticking agents (such as polyvinyl acetates, polyvinyl alcohols, dextrans, sugars and vegetable oils). One or more other additives may also be included in granules (for example an emulsifying agent, wetting agent or dispersing agent).

Dispersible Concentrates (DC) may be prepared by dissolving a compound of formula I in water or an organic solvent, such as a ketone, alcohol or glycol ether. These solutions may contain a surface active agent (for example to improve water dilution or prevent crystallisation in a spray tank).

Emulsifiable concentrates (EC) or oil-in-water emulsions (EW) may be prepared by dissolving a compound of formula I in an organic solvent (optionally containing one or more wetting agents, one or more emulsifying agents or a mixture of said agents). Suitable organic solvents for use in ECs include aromatic hydrocarbons (such as alkylbenzenes or alkylnaphthalenes, exemplified by SOLVESSO 100, SOLVESSO 150 and SOLVESSO 200; SOLVESSO is a Registered Trade Mark), ketones (such as cyclohexanone or methylcyclohexanone) and alcohols (such as benzyl alcohol, furfuryl alcohol or butanol), N-alkylpyrrolidones (such as N-methylpyrrolidone or N-octylpyrrolidone), dimethyl amides of fatty acids (such as C₈-C₁₀ fatty acid dimethylamide) and chlorinated hydrocarbons. An EC product may spontaneously emulsify on addition to water, to produce an emulsion with sufficient stability to allow spray application through appropriate equipment. Preparation of an EW involves obtaining a compound of formula I either as a liquid (if it is not a liquid at room temperature, it may be melted at a reasonable temperature, typically below 70°C) or in solution (by dissolving it in an appropriate solvent) and then emulsifying the resultant liquid or solution into water containing one or more SFAs, under high shear, to produce an emulsion. Suitable solvents for use in EWs include vegetable oils, chlorinated hydrocarbons (such as chlorobenzenes), aromatic solvents (such as alkylbenzenes or alkylnaphthalenes) and other appropriate organic solvents which have a low solubility in water.

- Microemulsions (ME) may be prepared by mixing water with a blend of one or more solvents with one or more SFAs, to produce spontaneously a thermodynamically stable isotropic liquid formulation. A compound of formula I is present initially in either the water or the solvent/SFA blend. Suitable solvents for use in MEs include those hereinbefore described for use in ECs or in EWs. An ME may be either an oil-in-water or a water-in-oil system (which system is present may be determined by conductivity measurements) and may be suitable for mixing water-soluble and oil-soluble pesticides in the same formulation. An ME is suitable for dilution into water, either remaining as a microemulsion or forming a conventional oil-in-water emulsion.
- Suspension concentrates (SC) may comprise aqueous or non-aqueous suspensions of finely divided insoluble solid particles of a compound of formula I. SCs may be prepared by ball or bead milling the solid compound of formula I in a suitable medium, optionally with one or more dispersing agents, to produce a fine particle suspension of the compound.
- One or more wetting agents may be included in the composition and a suspending agent may be included to reduce the rate at which the particles settle. Alternatively, a compound of formula I may be dry milled and added to water, containing agents hereinbefore described, to produce the desired end product.
- Oil-based suspension concentrate (OD) may be prepared similarly by suspending finely divided insoluble solid particles of a compound of formula I in an organic fluid (for example at least one mineral oil or vegetable oil). ODs may further comprise at least one penetration promoter (for example an alcohol ethoxylate or a related compound), at least one non-ionic surfactants and/or at least one anionic surfactant, and optionally at least one additive from the group of emulsifiers, foam-inhibiting agents, preservatives, anti-oxidants, dyestuffs, and/or inert filler materials. An OD is intended and suitable for dilution with water before use to produce a spray solution with sufficient stability to allow spray application through appropriate equipment.
- Aerosol formulations comprise a compound of formula I and a suitable propellant (for example *n*-butane). A compound of formula I may also be dissolved or dispersed in a suitable medium (for example water or a water miscible liquid, such as *n*-propanol) to provide compositions for use in non-pressurised, hand-actuated spray pumps.

A compound of formula I may be mixed in the dry state with a pyrotechnic mixture to form a composition suitable for generating, in an enclosed space, a smoke containing the compound.

- 5 Capsule suspensions (CS) may be prepared in a manner similar to the preparation of EW formulations but with an additional polymerisation stage such that an aqueous dispersion of oil droplets is obtained, in which each oil droplet is encapsulated by a polymeric shell and contains a compound of formula I and, optionally, a carrier or diluent therefor. The polymeric shell may be produced by either an interfacial polycondensation reaction or by a
- 10 coacervation procedure. The compositions may provide for controlled release of the compound of formula I and they may be used for seed treatment. A compound of formula I may also be formulated in a biodegradable polymeric matrix to provide a slow, controlled release of the compound.
- 15 A compound of formula I may also be formulated for use as a seed treatment, for example as a powder composition, including a powder for dry seed treatment (DS), a water soluble powder (SS) or a water dispersible powder for slurry treatment (WS), or as a liquid composition, including a flowable concentrate (FS), a solution (LS) or a capsule suspension (CS). The preparations of DS, SS, WS, FS and LS compositions are very similar to those
- 20 of, respectively, DP, SP, WP, SC, OD and DC compositions described above. Compositions for treating seed may include an agent for assisting the adhesion of the composition to the seed (for example a mineral oil or a film-forming barrier).

- A composition of the present invention may include one or more additives to improve the
- 25 biological performance of the composition (for example by improving wetting, retention or distribution on surfaces; resistance to rain on treated surfaces; or uptake or mobility of a compound of formula I). Such additives include surface active agents (SFAs), spray additives based on oils, for example certain mineral oils, vegetable oils or natural plant oils (such as soy bean and rape seed oil), and blends of these with other bio-enhancing
- 30 adjuvants (ingredients which may aid or modify the action of a compound of formula I). Increasing the effect of a compound of formula I may for example be achieved by adding ammonium and/or phosphonium salts, and/or optionally at least one penetration promotor such as fatty alcohol alkoxylates (for example rape oil methyl ester) or vegetable oil esters.
- 35 Wetting agents, dispersing agents and emulsifying agents may be surface active agents (SFAs) of the cationic, anionic, amphoteric or non-ionic type.

Suitable SFAs of the cationic type include quaternary ammonium compounds (for example cetyltrimethyl ammonium bromide), imidazolines and amine salts.

- 5 Suitable anionic SFAs include alkali metals salts of fatty acids, salts of aliphatic monoesters of sulphuric acid (for example sodium lauryl sulphate), salts of sulphonated aromatic compounds (for example sodium dodecylbenzenesulphonate, calcium dodecylbenzenesulphonate, butylnaphthalene sulphonate and mixtures of sodium di-*isopropyl*- and tri-*isopropyl*-naphthalene sulphonates), ether sulphates, alcohol ether
- 10 sulphates (for example sodium laureth-3-sulphate), ether carboxylates (for example sodium laureth-3-carboxylate), phosphate esters (products from the reaction between one or more fatty alcohols and phosphoric acid (predominately mono-esters) or phosphorus pentoxide (predominately di-esters), for example the reaction between lauryl alcohol and tetraphosphoric acid; additionally these products may be ethoxylated), sulphosuccinamates,
- 15 paraffin or olefine sulphonates, taurates and lignosulphonates.

Suitable SFAs of the amphoteric type include betaines, propionates and glycines.

- Suitable SFAs of the non-ionic type include condensation products of alkylene oxides, such
- 20 as ethylene oxide, propylene oxide, butylene oxide or mixtures thereof, with fatty alcohols (such as oleyl alcohol or cetyl alcohol) or with alkylphenols (such as octylphenol, nonylphenol or octylcresol); partial esters derived from long chain fatty acids or hexitol anhydrides; condensation products of said partial esters with ethylene oxide; block polymers (comprising ethylene oxide and propylene oxide); alkanolamides; simple esters (for example
- 25 fatty acid polyethylene glycol esters); amine oxides (for example lauryl dimethyl amine oxide); and lecithins.

- Suitable suspending agents include hydrophilic colloids (such as polysaccharides, polyvinylpyrrolidone or sodium carboxymethylcellulose) and swelling clays (such as
- 30 bentonite or attapulgate).

- A compound of formula I may be applied by any of the known means of applying pesticidal compounds. For example, it may be applied, formulated or unformulated, to the pests or to a locus of the pests (such as a habitat of the pests, or a growing plant liable to infestation by
- 35 the pests) or to any part of the plant, including the foliage, stems, branches or roots, to the seed before it is planted or to other media in which plants are growing or are to be planted

(such as soil surrounding the roots, the soil generally, paddy water or hydroponic culture systems), directly or it may be sprayed on, dusted on, applied by dipping, applied as a cream or paste formulation, applied as a vapour or applied through distribution or incorporation of a composition (such as a granular composition or a composition packed in a water-soluble bag) in soil or an aqueous environment.

A compound of formula I may also be injected into plants or sprayed onto vegetation using electrodynamic spraying techniques or other low volume methods, or applied by land or aerial irrigation systems.

Compositions for use as aqueous preparations (aqueous solutions or dispersions) are generally supplied in the form of a concentrate containing a high proportion of the active ingredient, the concentrate being added to water before use. These concentrates, which may include DCs, SCs, ODs, ECs, EWs, MEs SGs, SPs, WPs, WGs and CSs, are often required to withstand storage for prolonged periods and, after such storage, to be capable of addition to water to form aqueous preparations which remain homogeneous for a sufficient time to enable them to be applied by conventional spray equipment. Such aqueous preparations may contain varying amounts of a compound of formula I (for example 0.0001 to 10%, by weight) depending upon the purpose for which they are to be used.

A compound of formula I may be used in mixtures with fertilisers (for example nitrogen-, potassium- or phosphorus-containing fertilisers, and more particularly ammonium nitrate and/or urea fertilizers). Suitable formulation types include granules of fertiliser. The mixtures suitably contain up to 25% by weight of the compound of formula I.

The invention therefore also provides a fertiliser composition comprising a fertiliser and a compound of formula I.

The compositions of this invention may contain other compounds having biological activity, for example micronutrients or compounds having fungicidal activity or which possess plant growth regulating, herbicidal, safening, insecticidal, nematocidal or acaricidal activity.

The compound of formula I may be the sole active ingredient of the composition or it may be admixed with one or more additional active ingredients such as a pesticide (insect, acarine, mollusc and nematode pesticide), fungicide, synergist, herbicide, safener or plant growth

regulator where appropriate. The activity of the compositions according to the invention may thereby be broadened considerably and may have surprising advantages which can also be described, in a wider sense, as synergistic activity. An additional active ingredient may: provide a composition having a broader spectrum of activity or increased persistence at a locus; provide a composition demonstrating better plant/crop tolerance by reducing phytotoxicity; provide a composition controlling insects in their different development stages; synergise the activity or complement the activity (for example by increasing the speed of effect or overcoming repellency) of the compound of formula I; or help to overcome or prevent the development of resistance to individual components. The particular additional active ingredient will depend upon the intended utility of the composition. Examples of suitable pesticides include the following:

- a) Pyrethroids, such as permethrin, cypermethrin, fenvalerate, esfenvalerate, deltamethrin, cyhalothrin (in particular lambda-cyhalothrin), bifenthrin, fenpropathrin, cyfluthrin, tefluthrin, fish safe pyrethroids (for example ethofenprox), natural pyrethrin, tetramethrin, s-bioallethrin, fenfluthrin, prallethrin or 5-benzyl-3-furylmethyl-(E)-(1R,3S)-2,2-dimethyl-3-(2-oxothiolan-3-ylidenemethyl)cyclopropane carboxylate;
- b) Organophosphates, such as, profenofos, sulprofos, acephate, methyl parathion, azinphos-methyl, demeton-s-methyl, heptenophos, thiometon, fenamiphos, monocrotophos, profenofos, triazophos, methamidophos, dimethoate, phosphamidon, malathion, chlorpyrifos, phosalone, terbufos, fensulfotion, fonofos, phorate, phoxim, pirimiphos-methyl, pirimiphos-ethyl, fenitrothion, fosthiazate or diazinon;
- c) Carbamates (including aryl carbamates), such as pirimicarb, triazamate, cloethocarb, carbofuran, furathiocarb, ethiofencarb, aldicarb, thiofurox, carbosulfan, bendiocarb, fenobucarb, propoxur, methomyl or oxamyl;
- d) Benzoyl ureas, such as diflubenzuron, triflumuron, hexaflumuron, flufenoxuron or chlorfluazuron;
- e) Organic tin compounds, such as cyhexatin, fenbutatin oxide or azocyclotin;
- f) Pyrazoles, such as tebufenpyrad and fenpyroximate;
- g) Macrolides, such as avermectins or milbemycins, for example abamectin, emamectin benzoate, ivermectin, milbemycin, or spinosad, spinetoram or azadirachtin;
- h) Hormones or pheromones;
- i) Organochlorine compounds such as endosulfan, benzene hexachloride, DDT, chlordane or dieldrin;
- j) Amidines, such as chlordimeform or amitraz;
- k) Fumigant agents, such as chloropicrin, dichloropropane, methyl bromide or metam;

- l) Neonicotinoid compounds such as imidacloprid, thiacloprid, acetamiprid, clothianidin, nitenpyram, dinotefuran or thiamethoxam;
- m) Diacylhydrazines, such as tebufenozide, chromafenozide or methoxyfenozide;
- n) Diphenyl ethers, such as diofenolan or pyriproxifen;
- 5 o) Indoxacarb;
- p) Chlorfenapyr;
- q) Pymetrozine or pyrifluquinazon;
- r) Spirotetramat, spiroticlofen or spiromesifen;
- s) Flubendiamide, chloranthraliniprole, or cyanthraniliprole;
- 10 t) Cyenopyrafen or cyflumetofen; or
- u) Sulfoxaflor.

In addition to the major chemical classes of pesticide listed above, other pesticides having particular targets may be employed in the composition, if appropriate for the intended utility

15 of the composition. For instance, selective insecticides for particular crops, for example stemborer specific insecticides (such as cartap) or hopper specific insecticides (such as buprofezin) for use in rice may be employed. Alternatively insecticides or acaricides specific for particular insect species/stages may also be included in the compositions (for example acaricidal ovo-larvicides, such as clofentezine, flubenzimine, hexythiazox or tetradifon;

20 acaricidal motilicidic, such as dicofol or propargite; acaricides, such as bromopropylate or chlorobenzilate; or growth regulators, such as hydramethylnon, cyromazine, methoprene, chlorfluazuron or diflubenzuron).

The following mixtures of the compounds of formula I with active ingredients are preferred,

25 wherein, preferably, the term "COMPOUND OF FORMULA I" refers to a compound selected from the Table 1:

- an adjuvant selected from the group of substances consisting of an oil of vegetable or animal origin, a mineral oil, alkyl esters of such oils or mixtures of such oils, and petroleum oils (alternative name) (628) + COMPOUND OF FORMULA I,
- 30 an acaricide selected from the group of substances consisting of 1,1-bis(4-chlorophenyl)-2-ethoxyethanol (IUPAC name) (910) + COMPOUND OF FORMULA I, 2,4-dichlorophenyl benzenesulfonate (IUPAC/Chemical Abstracts name) (1059) + COMPOUND OF FORMULA I, 2-fluoro-*N*-methyl-*N*-1-naphthylacetamide (IUPAC name) (1295) + COMPOUND OF FORMULA I, 4-chlorophenyl phenyl sulfone (IUPAC name) (981) +
- 35 COMPOUND OF FORMULA I, abamectin (1) + COMPOUND OF FORMULA I, acequinocyl (3) + COMPOUND OF FORMULA I, acetoprole [CCN] + COMPOUND OF

FORMULA I, acrinathrin (9) + COMPOUND OF FORMULA I, aldicarb (16) +
COMPOUND OF FORMULA I, aldoxycarb (863) + COMPOUND OF FORMULA I, alpha-
cypermethrin (202) + COMPOUND OF FORMULA I, amidithion (870) + COMPOUND OF
FORMULA I, amidoflumet [CCN] + COMPOUND OF FORMULA I, amidothioate (872) +
5 COMPOUND OF FORMULA I, amiton (875) + COMPOUND OF FORMULA I, amiton
hydrogen oxalate (875) + COMPOUND OF FORMULA I, amitraz (24) + COMPOUND OF
FORMULA I, aramite (881) + COMPOUND OF FORMULA I, arsenous oxide (882) +
COMPOUND OF FORMULA I, AVI 382 (compound code) + COMPOUND OF FORMULA I,
AZ 60541 (compound code) + COMPOUND OF FORMULA I, azinphos-ethyl (44) +
10 COMPOUND OF FORMULA I, azinphos-methyl (45) + COMPOUND OF FORMULA I,
azobenzene (IUPAC name) (888) + COMPOUND OF FORMULA I, azocyclotin (46) +
COMPOUND OF FORMULA I, azothoate (889) + COMPOUND OF FORMULA I, benomyl
(62) + COMPOUND OF FORMULA I, benoxafos (alternative name) [CCN] + COMPOUND
OF FORMULA I, benzoximate (71) + COMPOUND OF FORMULA I, benzyl benzoate
15 (IUPAC name) [CCN] + COMPOUND OF FORMULA I, bifenazate (74) + COMPOUND OF
FORMULA I, bifenthrin (76) + COMPOUND OF FORMULA I, binapacryl (907) +
COMPOUND OF FORMULA I, brofenvalerate (alternative name) + COMPOUND OF
FORMULA I, bromocyclen (918) + COMPOUND OF FORMULA I, bromophos (920) +
COMPOUND OF FORMULA I, bromophos-ethyl (921) + COMPOUND OF FORMULA I,
20 bromopropylate (94) + COMPOUND OF FORMULA I, buprofezin (99) + COMPOUND OF
FORMULA I, butocarboxim (103) + COMPOUND OF FORMULA I, butoxycarboxim (104)
+ COMPOUND OF FORMULA I, butylpyridaben (alternative name) + COMPOUND OF
FORMULA I, calcium polysulfide (IUPAC name) (111) + COMPOUND OF FORMULA I,
camphechlor (941) + COMPOUND OF FORMULA I, carbanolate (943) + COMPOUND OF
25 FORMULA I, carbaryl (115) + COMPOUND OF FORMULA I, carbofuran (118) +
COMPOUND OF FORMULA I, carbophenothion (947) + COMPOUND OF FORMULA I,
CGA 50'439 (development code) (125) + COMPOUND OF FORMULA I, chinomethionat
(126) + COMPOUND OF FORMULA I, chlorbenside (959) + COMPOUND OF FORMULA
I, chlordimeform (964) + COMPOUND OF FORMULA I, chlordimeform hydrochloride
30 (964) + COMPOUND OF FORMULA I, chlorfenapyr (130) + COMPOUND OF FORMULA I,
chlorfenethol (968) + COMPOUND OF FORMULA I, chlorfenson (970) + COMPOUND OF
FORMULA I, chlorfensulphide (971) + COMPOUND OF FORMULA I, chlorfenvinphos
(131) + COMPOUND OF FORMULA I, chlorobenzilate (975) + COMPOUND OF
FORMULA I, chloromebuform (977) + COMPOUND OF FORMULA I, chloromethiuron
35 (978) + COMPOUND OF FORMULA I, chloropropylate (983) + COMPOUND OF
FORMULA I, chlorpyrifos (145) + COMPOUND OF FORMULA I, chlorpyrifos-methyl

(146) + COMPOUND OF FORMULA I, chlorthiophos (994) + COMPOUND OF FORMULA I, cinerin I (696) + COMPOUND OF FORMULA I, cinerin II (696) + COMPOUND OF FORMULA I, cinerins (696) + COMPOUND OF FORMULA I, clofentezine (158) + COMPOUND OF FORMULA I, closantel (alternative name) [CCN] + COMPOUND OF FORMULA I, coumaphos (174) + COMPOUND OF FORMULA I, crotamiton (alternative name) [CCN] + COMPOUND OF FORMULA I, crotoxyphos (1010) + COMPOUND OF FORMULA I, cufraneb (1013) + COMPOUND OF FORMULA I, cyanthoate (1020) + COMPOUND OF FORMULA I, cyenopyrafen [CCN] + COMPOUND OF FORMULA I, cyflumetofen (CAS Reg. No.: 400882-07-7) + COMPOUND OF FORMULA I, cyhalothrin (196) + COMPOUND OF FORMULA I, cyhexatin (199) + COMPOUND OF FORMULA I, cypermethrin (201) + COMPOUND OF FORMULA I, DCPM (1032) + COMPOUND OF FORMULA I, DDT (219) + COMPOUND OF FORMULA I, demephion (1037) + COMPOUND OF FORMULA I, demephion-O (1037) + COMPOUND OF FORMULA I, demephion-S (1037) + COMPOUND OF FORMULA I, demeton (1038) + COMPOUND OF FORMULA I, demeton-methyl (224) + COMPOUND OF FORMULA I, demeton-O (1038) + COMPOUND OF FORMULA I, demeton-O-methyl (224) + COMPOUND OF FORMULA I, demeton-S (1038) + COMPOUND OF FORMULA I, demeton-S-methyl (224) + COMPOUND OF FORMULA I, demeton-S-methylsulphon (1039) + COMPOUND OF FORMULA I, diafenthiuron (226) + COMPOUND OF FORMULA I, dialifos (1042) + COMPOUND OF FORMULA I, diazinon (227) + COMPOUND OF FORMULA I, dichlofluanid (230) + COMPOUND OF FORMULA I, dichlorvos (236) + COMPOUND OF FORMULA I, dicliphos (alternative name) + COMPOUND OF FORMULA I, dicofol (242) + COMPOUND OF FORMULA I, dicrotophos (243) + COMPOUND OF FORMULA I, dienochlor (1071) + COMPOUND OF FORMULA I, diflovidazin [CCN] + COMPOUND OF FORMULA I, dimefox (1081) + COMPOUND OF FORMULA I, dimethoate (262) + COMPOUND OF FORMULA I, dinactin (alternative name) (653) + COMPOUND OF FORMULA I, dinex (1089) + COMPOUND OF FORMULA I, dinex-diclexine (1089) + COMPOUND OF FORMULA I, dinobuton (269) + COMPOUND OF FORMULA I, dinocap (270) + COMPOUND OF FORMULA I, dinocap-4 [CCN] + COMPOUND OF FORMULA I, dinocap-6 [CCN] + COMPOUND OF FORMULA I, dinocton (1090) + COMPOUND OF FORMULA I, dinopenton (1092) + COMPOUND OF FORMULA I, dinosulfon (1097) + COMPOUND OF FORMULA I, dinoterbon (1098) + COMPOUND OF FORMULA I, dioxathion (1102) + COMPOUND OF FORMULA I, diphenyl sulfone (IUPAC name) (1103) + COMPOUND OF FORMULA I, disulfiram (alternative name) [CCN] + COMPOUND OF FORMULA I, disulfoton (278) + COMPOUND OF FORMULA I, DNOC (282) + COMPOUND OF FORMULA I, dofenapyn (1113) + COMPOUND OF FORMULA I,

doramectin (alternative name) [CCN] + COMPOUND OF FORMULA I, endosulfan (294) + COMPOUND OF FORMULA I, endothion (1121) + COMPOUND OF FORMULA I, EPN (297) + COMPOUND OF FORMULA I, eprinomectin (alternative name) [CCN] + COMPOUND OF FORMULA I, ethion (309) + COMPOUND OF FORMULA I, ethoate-methyl (1134) + COMPOUND OF FORMULA I, etoxazole (320) + COMPOUND OF FORMULA I, etrimfos (1142) + COMPOUND OF FORMULA I, fenazaflor (1147) + COMPOUND OF FORMULA I, fenazaquin (328) + COMPOUND OF FORMULA I, fenbutatin oxide (330) + COMPOUND OF FORMULA I, fenothiocarb (337) + COMPOUND OF FORMULA I, fenpropathrin (342) + COMPOUND OF FORMULA I, fenpyrad (alternative name) + COMPOUND OF FORMULA I, fenpyroximate (345) + COMPOUND OF FORMULA I, fenson (1157) + COMPOUND OF FORMULA I, fentrifanil (1161) + COMPOUND OF FORMULA I, fenvalerate (349) + COMPOUND OF FORMULA I, fipronil (354) + COMPOUND OF FORMULA I, fluacrypyrim (360) + COMPOUND OF FORMULA I, fluazuron (1166) + COMPOUND OF FORMULA I, flubenzimine (1167) + COMPOUND OF FORMULA I, flucycloxuron (366) + COMPOUND OF FORMULA I, flucythrinate (367) + COMPOUND OF FORMULA I, fluenetil (1169) + COMPOUND OF FORMULA I, flufenoxuron (370) + COMPOUND OF FORMULA I, flumethrin (372) + COMPOUND OF FORMULA I, fluorbenside (1174) + COMPOUND OF FORMULA I, fluvalinate (1184) + COMPOUND OF FORMULA I, FMC 1137 (development code) (1185) + COMPOUND OF FORMULA I, formetanate (405) + COMPOUND OF FORMULA I, formetanate hydrochloride (405) + COMPOUND OF FORMULA I, formothion (1192) + COMPOUND OF FORMULA I, formparanate (1193) + COMPOUND OF FORMULA I, gamma-HCH (430) + COMPOUND OF FORMULA I, glyodin (1205) + COMPOUND OF FORMULA I, halfenprox (424) + COMPOUND OF FORMULA I, heptenophos (432) + COMPOUND OF FORMULA I, hexadecyl cyclopropanecarboxylate (IUPAC/Chemical Abstracts name) (1216) + COMPOUND OF FORMULA I, hexythiazox (441) + COMPOUND OF FORMULA I, IKA 2002 (CAS Reg. No.: 211923-74-9) + COMPOUND OF FORMULA I, iodomethane (IUPAC name) (542) + COMPOUND OF FORMULA I, isocarbophos (alternative name) (473) + COMPOUND OF FORMULA I, isopropyl O-(methoxyaminothiophosphoryl)salicylate (IUPAC name) (473) + COMPOUND OF FORMULA I, ivermectin (alternative name) [CCN] + COMPOUND OF FORMULA I, jasmolin I (696) + COMPOUND OF FORMULA I, jasmolin II (696) + COMPOUND OF FORMULA I, jodfenphos (1248) + COMPOUND OF FORMULA I, lindane (430) + COMPOUND OF FORMULA I, lufenuron (490) + COMPOUND OF FORMULA I, malathion (492) + COMPOUND OF FORMULA I, malonoben (1254) + COMPOUND OF FORMULA I, mecarbam (502) + COMPOUND OF FORMULA I, mephosfolan (1261) +

COMPOUND OF FORMULA I, mesulfen (alternative name) [CCN] + COMPOUND OF
FORMULA I, methacrifos (1266) + COMPOUND OF FORMULA I, methamidophos (527)
+ COMPOUND OF FORMULA I, methidathion (529) + COMPOUND OF FORMULA I,
methiocarb (530) + COMPOUND OF FORMULA I, methomyl (531) + COMPOUND OF
5 FORMULA I, methyl bromide (537) + COMPOUND OF FORMULA I, metolcarb (550) +
COMPOUND OF FORMULA I, mevinphos (556) + COMPOUND OF FORMULA I,
mexacarbate (1290) + COMPOUND OF FORMULA I, milbemectin (557) + COMPOUND
OF FORMULA I, milbemycin oxime (alternative name) [CCN] + COMPOUND OF
FORMULA I, mipafox (1293) + COMPOUND OF FORMULA I, monocrotophos (561) +
10 COMPOUND OF FORMULA I, morphothion (1300) + COMPOUND OF FORMULA I,
moxidectin (alternative name) [CCN] + COMPOUND OF FORMULA I, naled (567) +
COMPOUND OF FORMULA I, NC-184 (compound code) + COMPOUND OF FORMULA I,
NC-512 (compound code) + COMPOUND OF FORMULA I, nifluridide (1309) +
COMPOUND OF FORMULA I, nikkomycins (alternative name) [CCN] + COMPOUND OF
15 FORMULA I, nitrilacarb (1313) + COMPOUND OF FORMULA I, nitrilacarb 1:1 zinc
chloride complex (1313) + COMPOUND OF FORMULA I, NNI-0101 (compound code) +
COMPOUND OF FORMULA I, NNI-0250 (compound code) + COMPOUND OF FORMULA
I, omethoate (594) + COMPOUND OF FORMULA I, oxamyl (602) + COMPOUND OF
FORMULA I, oxydeprofos (1324) + COMPOUND OF FORMULA I, oxydisulfoton (1325) +
20 COMPOUND OF FORMULA I, pp'-DDT (219) + COMPOUND OF FORMULA I, parathion
(615) + COMPOUND OF FORMULA I, permethrin (626) + COMPOUND OF FORMULA I,
petroleum oils (alternative name) (628) + COMPOUND OF FORMULA I, phenkapton
(1330) + COMPOUND OF FORMULA I, phenthoate (631) + COMPOUND OF FORMULA I,
phorate (636) + COMPOUND OF FORMULA I, phosalone (637) + COMPOUND OF
25 FORMULA I, phosfolan (1338) + COMPOUND OF FORMULA I, phosmet (638) +
COMPOUND OF FORMULA I, phosphamidon (639) + COMPOUND OF FORMULA I,
phoxim (642) + COMPOUND OF FORMULA I, pirimiphos-methyl (652) + COMPOUND OF
FORMULA I, polychloroterpenes (traditional name) (1347) + COMPOUND OF FORMULA
I, polynactins (alternative name) (653) + COMPOUND OF FORMULA I, proclonol (1350)
30 + COMPOUND OF FORMULA I, profenofos (662) + COMPOUND OF FORMULA I,
promacyl (1354) + COMPOUND OF FORMULA I, propargite (671) + COMPOUND OF
FORMULA I, propetamphos (673) + COMPOUND OF FORMULA I, propoxur (678) +
COMPOUND OF FORMULA I, prothidathion (1360) + COMPOUND OF FORMULA I,
prothoate (1362) + COMPOUND OF FORMULA I, pyrethrin I (696) + COMPOUND OF
35 FORMULA I, pyrethrin II (696) + COMPOUND OF FORMULA I, pyrethrins (696) +
COMPOUND OF FORMULA I, pyridaben (699) + COMPOUND OF FORMULA I,

pyridaphenthion (701) + COMPOUND OF FORMULA I, pyrimidifen (706) + COMPOUND OF FORMULA I, pyrimitate (1370) + COMPOUND OF FORMULA I, quinalphos (711) + COMPOUND OF FORMULA I, quintiofos (1381) + COMPOUND OF FORMULA I, R-1492 (development code) (1382) + COMPOUND OF FORMULA I, RA-17 (development code) (1383) + COMPOUND OF FORMULA I, rotenone (722) + COMPOUND OF FORMULA I, schradan (1389) + COMPOUND OF FORMULA I, sebufos (alternative name) + COMPOUND OF FORMULA I, selamectin (alternative name) [CCN] + COMPOUND OF FORMULA I, SI-0009 (compound code) + COMPOUND OF FORMULA I, sophamide (1402) + COMPOUND OF FORMULA I, spirodiclofen (738) + COMPOUND OF FORMULA I, spiromesifen (739) + COMPOUND OF FORMULA I, SSI-121 (development code) (1404) + COMPOUND OF FORMULA I, sulfiram (alternative name) [CCN] + COMPOUND OF FORMULA I, sulfluramid (750) + COMPOUND OF FORMULA I, sulfotep (753) + COMPOUND OF FORMULA I, sulfur (754) + COMPOUND OF FORMULA I, SZI-121 (development code) (757) + COMPOUND OF FORMULA I, tau-fluvalinate (398) + COMPOUND OF FORMULA I, tebufenpyrad (763) + COMPOUND OF FORMULA I, TEPP (1417) + COMPOUND OF FORMULA I, terbam (alternative name) + COMPOUND OF FORMULA I, tetrachlorvinphos (777) + COMPOUND OF FORMULA I, tetradifon (786) + COMPOUND OF FORMULA I, tetranactin (alternative name) (653) + COMPOUND OF FORMULA I, tetrasul (1425) + COMPOUND OF FORMULA I, thiafenox (alternative name) + COMPOUND OF FORMULA I, thiocarboxime (1431) + COMPOUND OF FORMULA I, thiofanox (800) + COMPOUND OF FORMULA I, thiometon (801) + COMPOUND OF FORMULA I, thioquinox (1436) + COMPOUND OF FORMULA I, thuringiensin (alternative name) [CCN] + COMPOUND OF FORMULA I, triamiphos (1441) + COMPOUND OF FORMULA I, triarathene (1443) + COMPOUND OF FORMULA I, triazophos (820) + COMPOUND OF FORMULA I, triazuron (alternative name) + COMPOUND OF FORMULA I, trichlorfon (824) + COMPOUND OF FORMULA I, trifenofos (1455) + COMPOUND OF FORMULA I, trinactin (alternative name) (653) + COMPOUND OF FORMULA I, vamidothion (847) + COMPOUND OF FORMULA I, vanilprole [CCN] and YI-5302 (compound code) + COMPOUND OF FORMULA I, an algicide selected from the group of substances consisting of bethoxazin [CCN] + COMPOUND OF FORMULA I, copper dioctanoate (IUPAC name) (170) + COMPOUND OF FORMULA I, copper sulfate (172) + COMPOUND OF FORMULA I, cybutryne [CCN] + COMPOUND OF FORMULA I, dichlone (1052) + COMPOUND OF FORMULA I, dichlorophen (232) + COMPOUND OF FORMULA I, endothal (295) + COMPOUND OF FORMULA I, fentin (347) + COMPOUND OF FORMULA I, hydrated lime [CCN] + COMPOUND OF FORMULA I, nabam (566) + COMPOUND OF FORMULA I,

quinoclamine (714) + COMPOUND OF FORMULA I, quinonamid (1379) + COMPOUND OF FORMULA I, simazine (730) + COMPOUND OF FORMULA I, triphenyltin acetate (IUPAC name) (347) and triphenyltin hydroxide (IUPAC name) (347) + COMPOUND OF FORMULA I,

5 an anthelmintic selected from the group of substances consisting of abamectin (1) + COMPOUND OF FORMULA I, crufomate (1011) + COMPOUND OF FORMULA I, doramectin (alternative name) [CCN] + COMPOUND OF FORMULA I, emamectin (291) + COMPOUND OF FORMULA I, emamectin benzoate (291) + COMPOUND OF FORMULA I, eprinomectin (alternative name) [CCN] + COMPOUND OF FORMULA I, ivermectin
10 (alternative name) [CCN] + COMPOUND OF FORMULA I, milbemycin oxime (alternative name) [CCN] + COMPOUND OF FORMULA I, moxidectin (alternative name) [CCN] + COMPOUND OF FORMULA I, piperazine [CCN] + COMPOUND OF FORMULA I, selamectin (alternative name) [CCN] + COMPOUND OF FORMULA I, spinosad (737) and thiophanate (1435) + COMPOUND OF FORMULA I,

15 an avicide selected from the group of substances consisting of chloralose (127) + COMPOUND OF FORMULA I, endrin (1122) + COMPOUND OF FORMULA I, fenthion (346) + COMPOUND OF FORMULA I, pyridin-4-amine (IUPAC name) (23) and strychnine (745) + COMPOUND OF FORMULA I,

a bactericide selected from the group of substances consisting of 1-hydroxy-1*H*-
20 pyridine-2-thione (IUPAC name) (1222) + COMPOUND OF FORMULA I, 4-(quinoxalin-2-ylamino)benzenesulfonamide (IUPAC name) (748) + COMPOUND OF FORMULA I, 8-hydroxyquinoline sulfate (446) + COMPOUND OF FORMULA I, bronopol (97) + COMPOUND OF FORMULA I, copper dioctanoate (IUPAC name) (170) + COMPOUND OF FORMULA I, copper hydroxide (IUPAC name) (169) + COMPOUND OF FORMULA I,
25 cresol [CCN] + COMPOUND OF FORMULA I, dichlorophen (232) + COMPOUND OF FORMULA I, dipyrithione (1105) + COMPOUND OF FORMULA I, dodicin (1112) + COMPOUND OF FORMULA I, fenaminosulf (1144) + COMPOUND OF FORMULA I, formaldehyde (404) + COMPOUND OF FORMULA I, hydrargaphen (alternative name) [CCN] + COMPOUND OF FORMULA I, kasugamycin (483) + COMPOUND OF FORMULA
30 I, kasugamycin hydrochloride hydrate (483) + COMPOUND OF FORMULA I, nickel bis(dimethyldithiocarbamate) (IUPAC name) (1308) + COMPOUND OF FORMULA I, nitrapyrin (580) + COMPOUND OF FORMULA I, octhlinone (590) + COMPOUND OF FORMULA I, oxolinic acid (606) + COMPOUND OF FORMULA I, oxytetracycline (611) + COMPOUND OF FORMULA I, potassium hydroxyquinoline sulfate (446) + COMPOUND
35 OF FORMULA I, probenazole (658) + COMPOUND OF FORMULA I, streptomycin (744) + COMPOUND OF FORMULA I, streptomycin sesquisulfate (744) + COMPOUND OF

FORMULA I, tecloftalam (766) + COMPOUND OF FORMULA I, and thiomersal (alternative name) [CCN] + COMPOUND OF FORMULA I,

a biological agent selected from the group of substances consisting of *Adoxophyes orana* GV (alternative name) (12) + COMPOUND OF FORMULA I, *Agrobacterium*

- 5 *radiobacter* (alternative name) (13) + COMPOUND OF FORMULA I, *Amblyseius* spp. (alternative name) (19) + COMPOUND OF FORMULA I, *Anagrapha falcifera* NPV (alternative name) (28) + COMPOUND OF FORMULA I, *Anagrus atomus* (alternative name) (29) + COMPOUND OF FORMULA I, *Aphelinus abdominalis* (alternative name) (33) + COMPOUND OF FORMULA I, *Aphidius colemani* (alternative name) (34) +
- 10 COMPOUND OF FORMULA I, *Aphidoletes aphidimyza* (alternative name) (35) + COMPOUND OF FORMULA I, *Autographa californica* NPV (alternative name) (38) + COMPOUND OF FORMULA I, *Bacillus firmus* (alternative name) (48) + COMPOUND OF FORMULA I, *Bacillus sphaericus* Neide (scientific name) (49) + COMPOUND OF FORMULA I, *Bacillus thuringiensis* Berliner (scientific name) (51) + COMPOUND OF
- 15 FORMULA I, *Bacillus thuringiensis* subsp. *aizawai* (scientific name) (51) + COMPOUND OF FORMULA I, *Bacillus thuringiensis* subsp. *israelensis* (scientific name) (51) + COMPOUND OF FORMULA I, *Bacillus thuringiensis* subsp. *japonensis* (scientific name) (51) + COMPOUND OF FORMULA I, *Bacillus thuringiensis* subsp. *kurstaki* (scientific name) (51) + COMPOUND OF FORMULA I, *Bacillus thuringiensis* subsp. *tenebrionis*
- 20 (scientific name) (51) + COMPOUND OF FORMULA I, *Beauveria bassiana* (alternative name) (53) + COMPOUND OF FORMULA I, *Beauveria brongniartii* (alternative name) (54) + COMPOUND OF FORMULA I, *Chrysoperla carnea* (alternative name) (151) + COMPOUND OF FORMULA I, *Cryptolaemus montrouzieri* (alternative name) (178) + COMPOUND OF FORMULA I, *Cydia pomonella* GV (alternative name) (191) +
- 25 COMPOUND OF FORMULA I, *Dacnusa sibirica* (alternative name) (212) + COMPOUND OF FORMULA I, *Diglyphus isaea* (alternative name) (254) + COMPOUND OF FORMULA I, *Encarsia formosa* (scientific name) (293) + COMPOUND OF FORMULA I, *Eretmocerus eremicus* (alternative name) (300) + COMPOUND OF FORMULA I, *Helicoverpa zea* NPV (alternative name) (431) + COMPOUND OF FORMULA I, *Heterorhabditis bacteriophora*
- 30 and *H. megidis* (alternative name) (433) + COMPOUND OF FORMULA I, *Hippodamia convergens* (alternative name) (442) + COMPOUND OF FORMULA I, *Leptomastix dactylopii* (alternative name) (488) + COMPOUND OF FORMULA I, *Macrolophus caliginosus* (alternative name) (491) + COMPOUND OF FORMULA I, *Mamestra brassicae* NPV (alternative name) (494) + COMPOUND OF FORMULA I, *Metaphycus helvolus*
- 35 (alternative name) (522) + COMPOUND OF FORMULA I, *Metarhizium anisopliae* var. *acridum* (scientific name) (523) + COMPOUND OF FORMULA I, *Metarhizium anisopliae*

- var. *anisopliae* (scientific name) (523) + COMPOUND OF FORMULA I, *Neodiprion sertifer* NPV and *N. lecontei* NPV (alternative name) (575) + COMPOUND OF FORMULA I, *Orius* spp. (alternative name) (596) + COMPOUND OF FORMULA I, *Pasteuria usgae* (alternative name) + COMPOUND OF FORMULA I, *Paecilomyces fumosoroseus* (alternative name) (613) + COMPOUND OF FORMULA I, *Phytoseiulus persimilis* (alternative name) (644) + COMPOUND OF FORMULA I, *Spodoptera exigua* multicapsid nuclear polyhedrosis virus (scientific name) (741) + COMPOUND OF FORMULA I, *Steinernema bibionis* (alternative name) (742) + COMPOUND OF FORMULA I, *Steinernema carpocapsae* (alternative name) (742) + COMPOUND OF FORMULA I, *Steinernema feltiae* (alternative name) (742) + COMPOUND OF FORMULA I, *Steinernema glaseri* (alternative name) (742) + COMPOUND OF FORMULA I, *Steinernema riobrave* (alternative name) (742) + COMPOUND OF FORMULA I, *Steinernema riobravus* (alternative name) (742) + COMPOUND OF FORMULA I, *Steinernema scapterisci* (alternative name) (742) + COMPOUND OF FORMULA I, *Steinernema* spp. (alternative name) (742) + COMPOUND OF FORMULA I, *Trichoderma* spp. (alternative name) + COMPOUND OF FORMULA I, *Trichogramma* spp. (alternative name) (826) + COMPOUND OF FORMULA I, *Typhlodromus occidentalis* (alternative name) (844) and *Verticillium lecanii* (alternative name) (848) + COMPOUND OF FORMULA I,
- a soil sterilant selected from the group of substances consisting of dimethyl disulfide (IUPAC name) + COMPOUND OF FORMULA I, iodomethane (IUPAC name) (542) and methyl bromide (537) + COMPOUND OF FORMULA I,
- a chemosterilant selected from the group of substances consisting of apholate [CCN] + COMPOUND OF FORMULA I, bisazir (alternative name) [CCN] + COMPOUND OF FORMULA I, busulfan (alternative name) [CCN] + COMPOUND OF FORMULA I, diflubenzuron (250) + COMPOUND OF FORMULA I, dimatif (alternative name) [CCN] + COMPOUND OF FORMULA I, hemel [CCN] + COMPOUND OF FORMULA I, hempa [CCN] + COMPOUND OF FORMULA I, metepa [CCN] + COMPOUND OF FORMULA I, methiotepa [CCN] + COMPOUND OF FORMULA I, methyl apholate [CCN] + COMPOUND OF FORMULA I, morzid [CCN] + COMPOUND OF FORMULA I, penfluron (alternative name) [CCN] + COMPOUND OF FORMULA I, tepa [CCN] + COMPOUND OF FORMULA I, thiohempa (alternative name) [CCN] + COMPOUND OF FORMULA I, thiotepa (alternative name) [CCN] + COMPOUND OF FORMULA I, tretamine (alternative name) [CCN] and uredepa (alternative name) [CCN] + COMPOUND OF FORMULA I,
- an insect pheromone selected from the group of substances consisting of (*E*)-dec-5-en-1-yl acetate with (*E*)-dec-5-en-1-ol (IUPAC name) (222) + COMPOUND OF FORMULA I, (*E*)-tridec-4-en-1-yl acetate (IUPAC name) (829) + COMPOUND OF FORMULA I, (*E*)-6-

methylhept-2-en-4-ol (IUPAC name) (541) + COMPOUND OF FORMULA I, (*E,Z*)-tetradeca-4,10-dien-1-yl acetate (IUPAC name) (779) + COMPOUND OF FORMULA I, (*Z*)-dodec-7-en-1-yl acetate (IUPAC name) (285) + COMPOUND OF FORMULA I, (*Z*)-hexadec-11-enal (IUPAC name) (436) + COMPOUND OF FORMULA I, (*Z*)-hexadec-11-en-1-yl acetate (IUPAC name) (437) + COMPOUND OF FORMULA I, (*Z*)-hexadec-13-en-11-yn-1-yl acetate (IUPAC name) (438) + COMPOUND OF FORMULA I, (*Z*)-icos-13-en-10-one (IUPAC name) (448) + COMPOUND OF FORMULA I, (*Z*)-tetradec-7-en-1-al (IUPAC name) (782) + COMPOUND OF FORMULA I, (*Z*)-tetradec-9-en-1-ol (IUPAC name) (783) + COMPOUND OF FORMULA I, (*Z*)-tetradec-9-en-1-yl acetate (IUPAC name) (784) + COMPOUND OF FORMULA I, (*7E,9Z*)-dodeca-7,9-dien-1-yl acetate (IUPAC name) (283) + COMPOUND OF FORMULA I, (*9Z,11E*)-tetradeca-9,11-dien-1-yl acetate (IUPAC name) (780) + COMPOUND OF FORMULA I, (*9Z,12E*)-tetradeca-9,12-dien-1-yl acetate (IUPAC name) (781) + COMPOUND OF FORMULA I, 14-methyloctadec-1-ene (IUPAC name) (545) + COMPOUND OF FORMULA I, 4-methylnonan-5-ol with 4-methylnonan-5-one (IUPAC name) (544) + COMPOUND OF FORMULA I, α -multistriatin (alternative name) [CCN] + COMPOUND OF FORMULA I, brevicomin (alternative name) [CCN] + COMPOUND OF FORMULA I, codlure (alternative name) [CCN] + COMPOUND OF FORMULA I, codlemone (alternative name) (167) + COMPOUND OF FORMULA I, cuelure (alternative name) (179) + COMPOUND OF FORMULA I, disparlure (277) + COMPOUND OF FORMULA I, (*E,Z*)-7,9-dodecadien-1-yl acetate (IUPAC name) + COMPOUND OF FORMULA I, dodec-8-en-1-yl acetate (IUPAC name) (286) + COMPOUND OF FORMULA I, dodec-9-en-1-yl acetate (IUPAC name) (287) + COMPOUND OF FORMULA I, dodeca-8 + COMPOUND OF FORMULA I, 10-dien-1-yl acetate (IUPAC name) (284) + COMPOUND OF FORMULA I, dominicalure (alternative name) [CCN] + COMPOUND OF FORMULA I, ethyl 4-methyloctanoate (IUPAC name) (317) + COMPOUND OF FORMULA I, eugenol (alternative name) [CCN] + COMPOUND OF FORMULA I, exosex SPTab (alternative name) + COMPOUND OF FORMULA I, frontalinal (alternative name) [CCN] + COMPOUND OF FORMULA I, gossyplure (alternative name) (420) + COMPOUND OF FORMULA I, grandlure (421) + COMPOUND OF FORMULA I, grandlure I (alternative name) (421) + COMPOUND OF FORMULA I, grandlure II (alternative name) (421) + COMPOUND OF FORMULA I, grandlure III (alternative name) (421) + COMPOUND OF FORMULA I, grandlure IV (alternative name) (421) + COMPOUND OF FORMULA I, hexalure [CCN] + COMPOUND OF FORMULA I, imicyafos (alternative name) [CCN] + COMPOUND OF FORMULA I, ipsdienol (alternative name) [CCN] + COMPOUND OF FORMULA I, ipsenol (alternative name) [CCN] + COMPOUND OF FORMULA I, japonilure (alternative name) (481) +

COMPOUND OF FORMULA I, lineatin (alternative name) [CCN] + COMPOUND OF FORMULA I, litlure (alternative name) [CCN] + COMPOUND OF FORMULA I, looplure (alternative name) [CCN] + COMPOUND OF FORMULA I, medlure [CCN] + COMPOUND OF FORMULA I, megatomoic acid (alternative name) [CCN] + COMPOUND OF FORMULA I, methyl eugenol (alternative name) (540) + COMPOUND OF FORMULA I, muscalure (563) + COMPOUND OF FORMULA I, octadeca-2,13-dien-1-yl acetate (IUPAC name) (588) + COMPOUND OF FORMULA I, octadeca-3,13-dien-1-yl acetate (IUPAC name) (589) + COMPOUND OF FORMULA I, orfralure (alternative name) [CCN] + COMPOUND OF FORMULA I, oryctalure (alternative name) (317) + COMPOUND OF FORMULA I, ostramone (alternative name) [CCN] + COMPOUND OF FORMULA I, siglure [CCN] + COMPOUND OF FORMULA I, sordidin (alternative name) (736) + COMPOUND OF FORMULA I, sulcatol (alternative name) [CCN] + COMPOUND OF FORMULA I, tetradec-11-en-1-yl acetate (IUPAC name) (785) + COMPOUND OF FORMULA I, trimedlure (839) + COMPOUND OF FORMULA I, trimedlure A (alternative name) (839) + COMPOUND OF FORMULA I, trimedlure B₁ (alternative name) (839) + COMPOUND OF FORMULA I, trimedlure B₂ (alternative name) (839) + COMPOUND OF FORMULA I, trimedlure C (alternative name) (839) and trunc-call (alternative name) [CCN] + COMPOUND OF FORMULA I,

an insect repellent selected from the group of substances consisting of 2-(octylthio)-ethanol (IUPAC name) (591) + COMPOUND OF FORMULA I, butopyronoxyl (933) + COMPOUND OF FORMULA I, butoxy(polypropylene glycol) (936) + COMPOUND OF FORMULA I, dibutyl adipate (IUPAC name) (1046) + COMPOUND OF FORMULA I, dibutyl phthalate (1047) + COMPOUND OF FORMULA I, dibutyl succinate (IUPAC name) (1048) + COMPOUND OF FORMULA I, diethyltoluamide [CCN] + COMPOUND OF FORMULA I, dimethyl carbate [CCN] + COMPOUND OF FORMULA I, dimethyl phthalate [CCN] + COMPOUND OF FORMULA I, ethyl hexanediol (1137) + COMPOUND OF FORMULA I, hexamide [CCN] + COMPOUND OF FORMULA I, methoquin-butyl (1276) + COMPOUND OF FORMULA I, methylneodecanamide [CCN] + COMPOUND OF FORMULA I, oxamate [CCN] and picaridin [CCN] + COMPOUND OF FORMULA I,

an insecticide selected from the group of substances consisting of 1-dichloro-1-nitroethane (IUPAC/Chemical Abstracts name) (1058) + COMPOUND OF FORMULA I, 1,1-dichloro-2,2-bis(4-ethylphenyl)ethane (IUPAC name) (1056), + COMPOUND OF FORMULA I, 1,2-dichloropropane (IUPAC/Chemical Abstracts name) (1062) + COMPOUND OF FORMULA I, 1,2-dichloropropane with 1,3-dichloropropene (IUPAC name) (1063) + COMPOUND OF FORMULA I, 1-bromo-2-chloroethane (IUPAC/Chemical Abstracts name) (916) + COMPOUND OF FORMULA I, 2,2,2-trichloro-1-(3,4-dichlorophenyl)ethyl

acetate (IUPAC name) (1451) + COMPOUND OF FORMULA I, 2,2-dichlorovinyl 2-ethylsulfinyethyl methyl phosphate (IUPAC name) (1066) + COMPOUND OF FORMULA I, 2-(1,3-dithiolan-2-yl)phenyl dimethylcarbamate (IUPAC/ Chemical Abstracts name) (1109) + COMPOUND OF FORMULA I, 2-(2-butoxyethoxy)ethyl thiocyanate (IUPAC/Chemical Abstracts name) (935) + COMPOUND OF FORMULA I, 2-(4,5-dimethyl-1,3-dioxolan-2-yl)phenyl methylcarbamate (IUPAC/ Chemical Abstracts name) (1084) + COMPOUND OF FORMULA I, 2-(4-chloro-3,5-xylyloxy)ethanol (IUPAC name) (986) + COMPOUND OF FORMULA I, 2-chlorovinyl diethyl phosphate (IUPAC name) (984) + COMPOUND OF FORMULA I, 2-imidazolidone (IUPAC name) (1225) + COMPOUND OF FORMULA I, 2-isovalerylindan-1,3-dione (IUPAC name) (1246) + COMPOUND OF FORMULA I, 2-methyl(prop-2-ynyl)aminophenyl methylcarbamate (IUPAC name) (1284) + COMPOUND OF FORMULA I, 2-thiocyanatoethyl laurate (IUPAC name) (1433) + COMPOUND OF FORMULA I, 3-bromo-1-chloroprop-1-ene (IUPAC name) (917) + COMPOUND OF FORMULA I, 3-methyl-1-phenylpyrazol-5-yl dimethylcarbamate (IUPAC name) (1283) + COMPOUND OF FORMULA I, 4-methyl(prop-2-ynyl)amino-3,5-xylyl methylcarbamate (IUPAC name) (1285) + COMPOUND OF FORMULA I, 5,5-dimethyl-3-oxocyclohex-1-enyl dimethylcarbamate (IUPAC name) (1085) + COMPOUND OF FORMULA I, abamectin (1) + COMPOUND OF FORMULA I, acephate (2) + COMPOUND OF FORMULA I, acetamiprid (4) + COMPOUND OF FORMULA I, acethion (alternative name) [CCN] + COMPOUND OF FORMULA I, acetoprole [CCN] + COMPOUND OF FORMULA I, acrinathrin (9) + COMPOUND OF FORMULA I, acrylonitrile (IUPAC name) (861) + COMPOUND OF FORMULA I, alanycarb (15) + COMPOUND OF FORMULA I, aldicarb (16) + COMPOUND OF FORMULA I, aldoxycarb (863) + COMPOUND OF FORMULA I, aldrin (864) + COMPOUND OF FORMULA I, allethrin (17) + COMPOUND OF FORMULA I, allosamidin (alternative name) [CCN] + COMPOUND OF FORMULA I, allyxycarb (866) + COMPOUND OF FORMULA I, alpha-cypermethrin (202) + COMPOUND OF FORMULA I, alpha-ecdysone (alternative name) [CCN] + COMPOUND OF FORMULA I, alpha-endosulfan [CCN] + COMPOUND OF FORMULA I, aluminium phosphide (640) + COMPOUND OF FORMULA I, amidithion (870) + COMPOUND OF FORMULA I, amidothioate (872) + COMPOUND OF FORMULA I, aminocarb (873) + COMPOUND OF FORMULA I, amiton (875) + COMPOUND OF FORMULA I, amiton hydrogen oxalate (875) + COMPOUND OF FORMULA I, amitraz (24) + COMPOUND OF FORMULA I, anabasine (877) + COMPOUND OF FORMULA I, athidathion (883) + COMPOUND OF FORMULA I, AVI 382 (compound code) + COMPOUND OF FORMULA I, AZ 60541 (compound code) + COMPOUND OF FORMULA I, azadirachtin (alternative name) (41) + COMPOUND OF FORMULA I, azamethiphos (42) + COMPOUND OF FORMULA I,

azinphos-ethyl (44) + COMPOUND OF FORMULA I, azinphos-methyl (45) + COMPOUND OF FORMULA I, azothoate (889) + COMPOUND OF FORMULA I, *Bacillus thuringiensis* delta endotoxins (alternative name) (52) + COMPOUND OF FORMULA I, barium hexafluorosilicate (alternative name) [CCN] + COMPOUND OF FORMULA I, barium polysulfide (IUPAC/Chemical Abstracts name) (892) + COMPOUND OF FORMULA I, barthrin [CCN] + COMPOUND OF FORMULA I, Bayer 22/190 (development code) (893) + COMPOUND OF FORMULA I, Bayer 22408 (development code) (894) + COMPOUND OF FORMULA I, bendiocarb (58) + COMPOUND OF FORMULA I, benfuracarb (60) + COMPOUND OF FORMULA I, bensultap (66) + COMPOUND OF FORMULA I, beta-cyfluthrin (194) + COMPOUND OF FORMULA I, beta-cypermethrin (203) + COMPOUND OF FORMULA I, bifenthrin (76) + COMPOUND OF FORMULA I, bioallethrin (78) + COMPOUND OF FORMULA I, bioallethrin S-cyclopentenyl isomer (alternative name) (79) + COMPOUND OF FORMULA I, bioethanomethrin [CCN] + COMPOUND OF FORMULA I, biopermethrin (908) + COMPOUND OF FORMULA I, bioresmethrin (80) + COMPOUND OF FORMULA I, bis(2-chloroethyl) ether (IUPAC name) (909) + COMPOUND OF FORMULA I, bistrifluron (83) + COMPOUND OF FORMULA I, borax (86) + COMPOUND OF FORMULA I, brofenvalerate (alternative name) + COMPOUND OF FORMULA I, bromfenvinfos (914) + COMPOUND OF FORMULA I, bromocyclen (918) + COMPOUND OF FORMULA I, bromo-DDT (alternative name) [CCN] + COMPOUND OF FORMULA I, bromophos (920) + COMPOUND OF FORMULA I, bromophos-ethyl (921) + COMPOUND OF FORMULA I, bufencarb (924) + COMPOUND OF FORMULA I, buprofezin (99) + COMPOUND OF FORMULA I, butacarb (926) + COMPOUND OF FORMULA I, butathiofos (927) + COMPOUND OF FORMULA I, butocarboxim (103) + COMPOUND OF FORMULA I, butonate (932) + COMPOUND OF FORMULA I, butoxycarboxim (104) + COMPOUND OF FORMULA I, butylpyridaben (alternative name) + COMPOUND OF FORMULA I, cadusafos (109) + COMPOUND OF FORMULA I, calcium arsenate [CCN] + COMPOUND OF FORMULA I, calcium cyanide (444) + COMPOUND OF FORMULA I, calcium polysulfide (IUPAC name) (111) + COMPOUND OF FORMULA I, camphechlor (941) + COMPOUND OF FORMULA I, carbanolate (943) + COMPOUND OF FORMULA I, carbaryl (115) + COMPOUND OF FORMULA I, carbofuran (118) + COMPOUND OF FORMULA I, carbon disulfide (IUPAC/Chemical Abstracts name) (945) + COMPOUND OF FORMULA I, carbon tetrachloride (IUPAC name) (946) + COMPOUND OF FORMULA I, carbophenothion (947) + COMPOUND OF FORMULA I, carbosulfan (119) + COMPOUND OF FORMULA I, cartap (123) + COMPOUND OF FORMULA I, cartap hydrochloride (123) + COMPOUND OF FORMULA I, celangulin (alternative name) + COMPOUND OF FORMULA I, cevadine (alternative name) (725) + COMPOUND OF FORMULA I,

chlorantraniliprole [CCN] + COMPOUND OF FORMULA I, chlorbicyclen (960) +
COMPOUND OF FORMULA I, chlordane (128) + COMPOUND OF FORMULA I,
chlordecone (963) + COMPOUND OF FORMULA I, chlordimeform (964) + COMPOUND
OF FORMULA I, chlordimeform hydrochloride (964) + COMPOUND OF FORMULA I,
5 chlorethoxyfos (129) + COMPOUND OF FORMULA I, chlorfenapyr (130) + COMPOUND
OF FORMULA I, chlorfenvinphos (131) + COMPOUND OF FORMULA I, chlorfluazuron
(132) + COMPOUND OF FORMULA I, chlormephos (136) + COMPOUND OF FORMULA
I, chloroform [CCN] + COMPOUND OF FORMULA I, chloropicrin (141) + COMPOUND
OF FORMULA I, chlorphoxim (989) + COMPOUND OF FORMULA I, chlorprazophos
10 (990) + COMPOUND OF FORMULA I, chlorpyrifos (145) + COMPOUND OF FORMULA I,
chlorpyrifos-methyl (146) + COMPOUND OF FORMULA I, chlorthiophos (994) +
COMPOUND OF FORMULA I, chromafenozide (150) + COMPOUND OF FORMULA I,
cinerin I (696) + COMPOUND OF FORMULA I, cinerin II (696) + COMPOUND OF
FORMULA I, cinerins (696) + COMPOUND OF FORMULA I, cis-resmethrin (alternative
15 name) + COMPOUND OF FORMULA I, cismethrin (80) + COMPOUND OF FORMULA I,
clocythrins (alternative name) + COMPOUND OF FORMULA I, cloethocarb (999) +
COMPOUND OF FORMULA I, closantel (alternative name) [CCN] + COMPOUND OF
FORMULA I, clothianidin (165) + COMPOUND OF FORMULA I, copper acetoarsenite
[CCN] + COMPOUND OF FORMULA I, copper arsenate [CCN] + COMPOUND OF
20 FORMULA I, copper oleate [CCN] + COMPOUND OF FORMULA I, coumaphos (174) +
COMPOUND OF FORMULA I, coumithoate (1006) + COMPOUND OF FORMULA I,
crotamiton (alternative name) [CCN] + COMPOUND OF FORMULA I, crotoxyphos (1010)
+ COMPOUND OF FORMULA I, crufomate (1011) + COMPOUND OF FORMULA I,
cryolite (alternative name) (177) + COMPOUND OF FORMULA I, CS 708 (development
25 code) (1012) + COMPOUND OF FORMULA I, cyanofenphos (1019) + COMPOUND OF
FORMULA I, cyanophos (184) + COMPOUND OF FORMULA I, cyanthoate (1020) +
COMPOUND OF FORMULA I, cyantraniliprole [CCN] + COMPOUND OF FORMULA I,
cyclothrin [CCN] + COMPOUND OF FORMULA I, cycloprothrin (188) + COMPOUND OF
FORMULA I, cyfluthrin (193) + COMPOUND OF FORMULA I, cyhalothrin (196) +
30 COMPOUND OF FORMULA I, cypermethrin (201) + COMPOUND OF FORMULA I,
cyphenothrin (206) + COMPOUND OF FORMULA I, cyromazine (209) + COMPOUND OF
FORMULA I, cythioate (alternative name) [CCN] + COMPOUND OF FORMULA I, *d*-
limonene (alternative name) [CCN] + COMPOUND OF FORMULA I, *d*-tetramethrin
(alternative name) (788) + COMPOUND OF FORMULA I, DAEP (1031) + COMPOUND
35 OF FORMULA I, dazomet (216) + COMPOUND OF FORMULA I, DDT (219) +
COMPOUND OF FORMULA I, decarbofuran (1034) + COMPOUND OF FORMULA I,

deltamethrin (223) + COMPOUND OF FORMULA I, demephion (1037) + COMPOUND OF FORMULA I, demephion-O (1037) + COMPOUND OF FORMULA I, demephion-S (1037) + COMPOUND OF FORMULA I, demeton (1038) + COMPOUND OF FORMULA I, demeton-methyl (224) + COMPOUND OF FORMULA I, demeton-O (1038) + COMPOUND OF FORMULA I, demeton-O-methyl (224) + COMPOUND OF FORMULA I, demeton-S (1038) + COMPOUND OF FORMULA I, demeton-S-methyl (224) + COMPOUND OF FORMULA I, demeton-S-methylsulphon (1039) + COMPOUND OF FORMULA I, diafenthuron (226) + COMPOUND OF FORMULA I, dialifos (1042) + COMPOUND OF FORMULA I, diamidafos (1044) + COMPOUND OF FORMULA I, diazinon (227) + COMPOUND OF FORMULA I, dicapthon (1050) + COMPOUND OF FORMULA I, dichlofenthion (1051) + COMPOUND OF FORMULA I, dichlorvos (236) + COMPOUND OF FORMULA I, dicliphos (alternative name) + COMPOUND OF FORMULA I, dicresyl (alternative name) [CCN] + COMPOUND OF FORMULA I, dicrotophos (243) + COMPOUND OF FORMULA I, dicyclanil (244) + COMPOUND OF FORMULA I, dieldrin (1070) + COMPOUND OF FORMULA I, diethyl 5-methylpyrazol-3-yl phosphate (IUPAC name) (1076) + COMPOUND OF FORMULA I, diflubenzuron (250) + COMPOUND OF FORMULA I, dilor (alternative name) [CCN] + COMPOUND OF FORMULA I, dimefluthrin [CCN] + COMPOUND OF FORMULA I, dimefox (1081) + COMPOUND OF FORMULA I, dimetan (1085) + COMPOUND OF FORMULA I, dimethoate (262) + COMPOUND OF FORMULA I, dimethrin (1083) + COMPOUND OF FORMULA I, dimethylvinphos (265) + COMPOUND OF FORMULA I, dimetilan (1086) + COMPOUND OF FORMULA I, dinex (1089) + COMPOUND OF FORMULA I, dinex-diclexine (1089) + COMPOUND OF FORMULA I, dinoprop (1093) + COMPOUND OF FORMULA I, dinosam (1094) + COMPOUND OF FORMULA I, dinoseb (1095) + COMPOUND OF FORMULA I, dinotefuran (271) + COMPOUND OF FORMULA I, diofenolan (1099) + COMPOUND OF FORMULA I, dioxabenzofos (1100) + COMPOUND OF FORMULA I, dioxacarb (1101) + COMPOUND OF FORMULA I, dioxathion (1102) + COMPOUND OF FORMULA I, disulfoton (278) + COMPOUND OF FORMULA I, dithicrofos (1108) + COMPOUND OF FORMULA I, DNOC (282) + COMPOUND OF FORMULA I, doramectin (alternative name) [CCN] + COMPOUND OF FORMULA I, DSP (1115) + COMPOUND OF FORMULA I, ecdysterone (alternative name) [CCN] + COMPOUND OF FORMULA I, EI 1642 (development code) (1118) + COMPOUND OF FORMULA I, emamectin (291) + COMPOUND OF FORMULA I, emamectin benzoate (291) + COMPOUND OF FORMULA I, EMPC (1120) + COMPOUND OF FORMULA I, empenthrin (292) + COMPOUND OF FORMULA I, endosulfan (294) + COMPOUND OF FORMULA I, endothion (1121) + COMPOUND OF FORMULA I, endrin (1122) + COMPOUND OF FORMULA I, EPBP

(1123) + COMPOUND OF FORMULA I, EPN (297) + COMPOUND OF FORMULA I, epofenonane (1124) + COMPOUND OF FORMULA I, eprinomectin (alternative name) [CCN] + COMPOUND OF FORMULA I, eremophilone oil + COMPOUND OF FORMULA I, esfenvalerate (302) + COMPOUND OF FORMULA I, etaphos (alternative name) [CCN] +
5 COMPOUND OF FORMULA I, ethiofencarb (308) + COMPOUND OF FORMULA I, ethion (309) + COMPOUND OF FORMULA I, ethiprole (310) + COMPOUND OF FORMULA I, ethoate-methyl (1134) + COMPOUND OF FORMULA I, ethoprophos (312) + COMPOUND OF FORMULA I, ethyl formate (IUPAC name) [CCN] + COMPOUND OF FORMULA I, ethyl-DDD (alternative name) (1056) + COMPOUND OF FORMULA I,
10 ethylene dibromide (316) + COMPOUND OF FORMULA I, ethylene dichloride (chemical name) (1136) + COMPOUND OF FORMULA I, ethylene oxide [CCN] + COMPOUND OF FORMULA I, etofenprox (319) + COMPOUND OF FORMULA I, etrimfos (1142) + COMPOUND OF FORMULA I, EXD (1143) + COMPOUND OF FORMULA I, famphur (323) + COMPOUND OF FORMULA I, fenamiphos (326) + COMPOUND OF FORMULA I,
15 fenazaflor (1147) + COMPOUND OF FORMULA I, fenchlorphos (1148) + COMPOUND OF FORMULA I, fenethacarb (1149) + COMPOUND OF FORMULA I, fenfluthrin (1150) + COMPOUND OF FORMULA I, fenitrothion (335) + COMPOUND OF FORMULA I, fenobucarb (336) + COMPOUND OF FORMULA I, fenoxacrim (1153) + COMPOUND OF FORMULA I, fenoxycarb (340) + COMPOUND OF FORMULA I, fensulfothion (1158) +
20 COMPOUND OF FORMULA I, fenpropathrin (342) + COMPOUND OF FORMULA I, fenpyrad (alternative name) + COMPOUND OF FORMULA I, fenthion (346) + COMPOUND OF FORMULA I, fenthion-ethyl [CCN] + COMPOUND OF FORMULA I, fenvalerate (349) + COMPOUND OF FORMULA I, fipronil (354) + COMPOUND OF FORMULA I, flometoquin [CCN] +
25 COMPOUND OF FORMULA I, flonicamid (358) + COMPOUND OF FORMULA I, flubendiamide (CAS. Reg. No.: 272451-65-7) + COMPOUND OF FORMULA I, flucofuron (1168) + COMPOUND OF FORMULA I, flucycloxuron (366) + COMPOUND OF FORMULA I, flucythrinate (367) + COMPOUND OF FORMULA I, fluenetil (1169) + COMPOUND OF FORMULA I, fluensulfon [CCN] + COMPOUND OF FORMULA I, flufenerim [CCN] +
30 COMPOUND OF FORMULA I, flufenoxuron (370) + COMPOUND OF FORMULA I, flufenprox (1171) + COMPOUND OF FORMULA I, flufiprole [CCN] + COMPOUND OF FORMULA I, flumethrin (372) + COMPOUND OF FORMULA I, flupyradifurone [CCN] + COMPOUND OF FORMULA I, fluvalinate (1184) + COMPOUND OF FORMULA I, FMC 1137 (development code) (1185) + COMPOUND OF FORMULA I, fonofos (1191) +
35 COMPOUND OF FORMULA I, formetanate (405) + COMPOUND OF FORMULA I, formetanate hydrochloride (405) + COMPOUND OF FORMULA I, formothion (1192) +

COMPOUND OF FORMULA I, formparanate (1193) + COMPOUND OF FORMULA I, fosmethilan (1194) + COMPOUND OF FORMULA I, fospirate (1195) + COMPOUND OF FORMULA I, fosthiazate (408) + COMPOUND OF FORMULA I, fosthietan (1196) + COMPOUND OF FORMULA I, furathiocarb (412) + COMPOUND OF FORMULA I, furethrin (1200) + COMPOUND OF FORMULA I, gamma-cyhalothrin (197) + COMPOUND OF FORMULA I, gamma-HCH (430) + COMPOUND OF FORMULA I, guazatine (422) + COMPOUND OF FORMULA I, guazatine acetates (422) + COMPOUND OF FORMULA I, GY-81 (development code) (423) + COMPOUND OF FORMULA I, halfenprox (424) + COMPOUND OF FORMULA I, halofenozide (425) + COMPOUND OF FORMULA I, HCH (430) + COMPOUND OF FORMULA I, HEOD (1070) + COMPOUND OF FORMULA I, heptachlor (1211) + COMPOUND OF FORMULA I, heptenophos (432) + COMPOUND OF FORMULA I, heterophos [CCN] + COMPOUND OF FORMULA I, hexaflumuron (439) + COMPOUND OF FORMULA I, HHDN (864) + COMPOUND OF FORMULA I, hydramethylnon (443) + COMPOUND OF FORMULA I, hydrogen cyanide (444) + COMPOUND OF FORMULA I, hydroprene (445) + COMPOUND OF FORMULA I, hyquincarb (1223) + COMPOUND OF FORMULA I, imidacloprid (458) + COMPOUND OF FORMULA I, imiprothrin (460) + COMPOUND OF FORMULA I, indoxacarb (465) + COMPOUND OF FORMULA I, iodomethane (IUPAC name) (542) + COMPOUND OF FORMULA I, IPPA-152004 (compound code) + COMPOUND OF FORMULA I, IPSP (1229) + COMPOUND OF FORMULA I, isazofos (1231) + COMPOUND OF FORMULA I, isobenzan (1232) + COMPOUND OF FORMULA I, isocarbophos (alternative name) (473) + COMPOUND OF FORMULA I, isodrin (1235) + COMPOUND OF FORMULA I, isofenphos (1236) + COMPOUND OF FORMULA I, isolane (1237) + COMPOUND OF FORMULA I, isoprocab (472) + COMPOUND OF FORMULA I, isopropyl O-(methoxy-aminothiophosphoryl)salicylate (IUPAC name) (473) + COMPOUND OF FORMULA I, isoprothiolane (474) + COMPOUND OF FORMULA I, isothioate (1244) + COMPOUND OF FORMULA I, isoxathion (480) + COMPOUND OF FORMULA I, ivermectin (alternative name) [CCN] + COMPOUND OF FORMULA I, jasmolin I (696) + COMPOUND OF FORMULA I, jasmolin II (696) + COMPOUND OF FORMULA I, jodfenphos (1248) + COMPOUND OF FORMULA I, juvenile hormone I (alternative name) [CCN] + COMPOUND OF FORMULA I, juvenile hormone II (alternative name) [CCN] + COMPOUND OF FORMULA I, juvenile hormone III (alternative name) [CCN] + COMPOUND OF FORMULA I, kelevan (1249) + COMPOUND OF FORMULA I, kinoprene (484) + COMPOUND OF FORMULA I, lambda-cyhalothrin (198) + COMPOUND OF FORMULA I, lead arsenate [CCN] + COMPOUND OF FORMULA I, lepimectin (CCN) + COMPOUND OF FORMULA I, leptophos (1250) + COMPOUND OF FORMULA I,

lindane (430) + COMPOUND OF FORMULA I, lirimfos (1251) + COMPOUND OF
FORMULA I, lufenuron (490) + COMPOUND OF FORMULA I, lythidathion (1253) +
COMPOUND OF FORMULA I, *m*-cumenyl methylcarbamate (IUPAC name) (1014) +
COMPOUND OF FORMULA I, magnesium phosphide (IUPAC name) (640) +
5 COMPOUND OF FORMULA I, malathion (492) + COMPOUND OF FORMULA I,
malonoben (1254) + COMPOUND OF FORMULA I, mazidox (1255) + COMPOUND OF
FORMULA I, mecarbam (502) + COMPOUND OF FORMULA I, mecarphon (1258) +
COMPOUND OF FORMULA I, menazon (1260) + COMPOUND OF FORMULA I,
mephosfolan (1261) + COMPOUND OF FORMULA I, mercurous chloride (513) +
10 COMPOUND OF FORMULA I, mesulfenfos (1263) + COMPOUND OF FORMULA I,
metaflumizone (CCN) + COMPOUND OF FORMULA I, metam (519) + COMPOUND OF
FORMULA I, metam-potassium (alternative name) (519) + COMPOUND OF FORMULA I,
metam-sodium (519) + COMPOUND OF FORMULA I, methacrifos (1266) + COMPOUND
OF FORMULA I, methamidophos (527) + COMPOUND OF FORMULA I, methanesulfonyl
15 fluoride (IUPAC/Chemical Abstracts name) (1268) + COMPOUND OF FORMULA I,
methidathion (529) + COMPOUND OF FORMULA I, methiocarb (530) + COMPOUND OF
FORMULA I, methocrotophos (1273) + COMPOUND OF FORMULA I, methomyl (531) +
COMPOUND OF FORMULA I, methoprene (532) + COMPOUND OF FORMULA I,
methoquin-butyl (1276) + COMPOUND OF FORMULA I, methothrin (alternative name)
20 (533) + COMPOUND OF FORMULA I, methoxychlor (534) + COMPOUND OF FORMULA
I, methoxyfenozide (535) + COMPOUND OF FORMULA I, methyl bromide (537) +
COMPOUND OF FORMULA I, methyl isothiocyanate (543) + COMPOUND OF FORMULA
I, methylchloroform (alternative name) [CCN] + COMPOUND OF FORMULA I, methylene
chloride [CCN] + COMPOUND OF FORMULA I, metofluthrin [CCN] + COMPOUND OF
25 FORMULA I, metolcarb (550) + COMPOUND OF FORMULA I, metoxadiazone (1288) +
COMPOUND OF FORMULA I, mevinphos (556) + COMPOUND OF FORMULA I,
mexacarbate (1290) + COMPOUND OF FORMULA I, milbemectin (557) + COMPOUND
OF FORMULA I, milbemycin oxime (alternative name) [CCN] + COMPOUND OF
FORMULA I, mipafox (1293) + COMPOUND OF FORMULA I, mirex (1294) +
30 COMPOUND OF FORMULA I, monocrotophos (561) + COMPOUND OF FORMULA I,
morphothion (1300) + COMPOUND OF FORMULA I, moxidectin (alternative name) [CCN]
+ COMPOUND OF FORMULA I, naftalofos (alternative name) [CCN] + COMPOUND OF
FORMULA I, naled (567) + COMPOUND OF FORMULA I, naphthalene (IUPAC/Chemical
Abstracts name) (1303) + COMPOUND OF FORMULA I, NC-170 (development code)
35 (1306) + COMPOUND OF FORMULA I, NC-184 (compound code) + COMPOUND OF
FORMULA I, nicotine (578) + COMPOUND OF FORMULA I, nicotine sulfate (578) +

COMPOUND OF FORMULA I, nifluridide (1309) + COMPOUND OF FORMULA I,
nitenpyram (579) + COMPOUND OF FORMULA I, nithiazine (1311) + COMPOUND OF
FORMULA I, nitrilacarb (1313) + COMPOUND OF FORMULA I, nitrilacarb 1:1 zinc
chloride complex (1313) + COMPOUND OF FORMULA I, NNI-0101 (compound code) +
5 COMPOUND OF FORMULA I, NNI-0250 (compound code) + COMPOUND OF FORMULA
I, nornicotine (traditional name) (1319) + COMPOUND OF FORMULA I, novaluron (585)
+ COMPOUND OF FORMULA I, noviflumuron (586) + COMPOUND OF FORMULA I, O-
5-dichloro-4-iodophenyl O-ethyl ethylphosphonothioate (IUPAC name) (1057) +
COMPOUND OF FORMULA I, O,O-diethyl O-4-methyl-2-oxo-2*H*-chromen-7-yl
10 phosphorothioate (IUPAC name) (1074) + COMPOUND OF FORMULA I, O,O-diethyl O-6-
methyl-2-propylpyrimidin-4-yl phosphorothioate (IUPAC name) (1075) + COMPOUND OF
FORMULA I, O,O,O',O'-tetrapropyl dithiopyrophosphate (IUPAC name) (1424) +
COMPOUND OF FORMULA I, oleic acid (IUPAC name) (593) + COMPOUND OF
FORMULA I, omethoate (594) + COMPOUND OF FORMULA I, oxamyl (602) +
15 COMPOUND OF FORMULA I, oxydemeton-methyl (609) + COMPOUND OF FORMULA I,
oxydeprofos (1324) + COMPOUND OF FORMULA I, oxydisulfoton (1325) + COMPOUND
OF FORMULA I, pp'-DDT (219) + COMPOUND OF FORMULA I, para-dichlorobenzene
[CCN] + COMPOUND OF FORMULA I, parathion (615) + COMPOUND OF FORMULA I,
parathion-methyl (616) + COMPOUND OF FORMULA I, penfluron (alternative name)
20 [CCN] + COMPOUND OF FORMULA I, pentachlorophenol (623) + COMPOUND OF
FORMULA I, pentachlorophenyl laurate (IUPAC name) (623) + COMPOUND OF
FORMULA I, permethrin (626) + COMPOUND OF FORMULA I, petroleum oils
(alternative name) (628) + COMPOUND OF FORMULA I, PH 60-38 (development code)
(1328) + COMPOUND OF FORMULA I, phenkapton (1330) + COMPOUND OF FORMULA
25 I, phenothrin (630) + COMPOUND OF FORMULA I, phenthoate (631) + COMPOUND OF
FORMULA I, phorate (636) + COMPOUND OF FORMULA I, phosalone (637) +
COMPOUND OF FORMULA I, phosfolan (1338) + COMPOUND OF FORMULA I,
phosmet (638) + COMPOUND OF FORMULA I, phosnichlor (1339) + COMPOUND OF
FORMULA I, phosphamidon (639) + COMPOUND OF FORMULA I, phosphine (IUPAC
30 name) (640) + COMPOUND OF FORMULA I, phoxim (642) + COMPOUND OF FORMULA
I, phoxim-methyl (1340) + COMPOUND OF FORMULA I, pirimetaphos (1344) +
COMPOUND OF FORMULA I, pirimicarb (651) + COMPOUND OF FORMULA I,
pirimiphos-ethyl (1345) + COMPOUND OF FORMULA I, pirimiphos-methyl (652) +
COMPOUND OF FORMULA I, polychlorodicyclopentadiene isomers (IUPAC name) (1346)
35 + COMPOUND OF FORMULA I, polychloroterpenes (traditional name) (1347) +
COMPOUND OF FORMULA I, potassium arsenite [CCN] + COMPOUND OF FORMULA I,

potassium thiocyanate [CCN] + COMPOUND OF FORMULA I, prallethrin (655) +
COMPOUND OF FORMULA I, precocene I (alternative name) [CCN] + COMPOUND OF
FORMULA I, precocene II (alternative name) [CCN] + COMPOUND OF FORMULA I,
precocene III (alternative name) [CCN] + COMPOUND OF FORMULA I, primidophos
5 (1349) + COMPOUND OF FORMULA I, profenofos (662) + COMPOUND OF FORMULA I,
profluthrin [CCN] + COMPOUND OF FORMULA I, promacyl (1354) + COMPOUND OF
FORMULA I, promecarb (1355) + COMPOUND OF FORMULA I, propaphos (1356) +
COMPOUND OF FORMULA I, propetamphos (673) + COMPOUND OF FORMULA I,
propoxur (678) + COMPOUND OF FORMULA I, prothidathion (1360) + COMPOUND OF
10 FORMULA I, prothiofos (686) + COMPOUND OF FORMULA I, prothoate (1362) +
COMPOUND OF FORMULA I, protrifenbute [CCN] + COMPOUND OF FORMULA I,
pymetrozine (688) + COMPOUND OF FORMULA I, pyraclofos (689) + COMPOUND OF
FORMULA I, pyrafluprole [CCN] + COMPOUND OF FORMULA I, pyrazophos (693) +
COMPOUND OF FORMULA I, pyresmethrin (1367) + COMPOUND OF FORMULA I,
15 pyrethrin I (696) + COMPOUND OF FORMULA I, pyrethrin II (696) + COMPOUND OF
FORMULA I, pyrethrins (696) + COMPOUND OF FORMULA I, pyridaben (699) +
COMPOUND OF FORMULA I, pyridalyl (700) + COMPOUND OF FORMULA I,
pyridaphenthion (701) + COMPOUND OF FORMULA I, pyrfluquinazon [CCN] +
COMPOUND OF FORMULA I, pyrimidifen (706) + COMPOUND OF FORMULA I,
20 pyrimitate (1370) + COMPOUND OF FORMULA I, pyriprole [CCN] + COMPOUND OF
FORMULA I, pyriproxyfen (708) + COMPOUND OF FORMULA I, quassia (alternative
name) [CCN] + COMPOUND OF FORMULA I, quinalphos (711) + COMPOUND OF
FORMULA I, quinalphos-methyl (1376) + COMPOUND OF FORMULA I, quinothion
(1380) + COMPOUND OF FORMULA I, quintiofos (1381) + COMPOUND OF FORMULA I,
25 R-1492 (development code) (1382) + COMPOUND OF FORMULA I, rafoxanide
(alternative name) [CCN] + COMPOUND OF FORMULA I, resmethrin (719) +
COMPOUND OF FORMULA I, rotenone (722) + COMPOUND OF FORMULA I, RU
15525 (development code) (723) + COMPOUND OF FORMULA I, RU 25475
(development code) (1386) + COMPOUND OF FORMULA I, ryania (alternative name)
30 (1387) + COMPOUND OF FORMULA I, ryanodine (traditional name) (1387) +
COMPOUND OF FORMULA I, sabadilla (alternative name) (725) + COMPOUND OF
FORMULA I, schradan (1389) + COMPOUND OF FORMULA I, sebufos (alternative
name) + COMPOUND OF FORMULA I, selamectin (alternative name) [CCN] +
COMPOUND OF FORMULA I, SI-0009 (compound code) + COMPOUND OF FORMULA I,
35 SI-0205 (compound code) + COMPOUND OF FORMULA I, SI-0404 (compound code) +
COMPOUND OF FORMULA I, SI-0405 (compound code) + COMPOUND OF FORMULA I,

5 silafluofen (728) + COMPOUND OF FORMULA I, SN 72129 (development code) (1397) +
COMPOUND OF FORMULA I, sodium arsenite [CCN] + COMPOUND OF FORMULA I,
sodium cyanide (444) + COMPOUND OF FORMULA I, sodium fluoride (IUPAC/Chemical
Abstracts name) (1399) + COMPOUND OF FORMULA I, sodium hexafluorosilicate (1400)
10 + COMPOUND OF FORMULA I, sodium pentachlorophenoxide (623) + COMPOUND OF
FORMULA I, sodium selenate (IUPAC name) (1401) + COMPOUND OF FORMULA I,
sodium thiocyanate [CCN] + COMPOUND OF FORMULA I, sophamide (1402) +
COMPOUND OF FORMULA I, spinetoram [CCN] + COMPOUND OF FORMULA I,
spinosad (737) + COMPOUND OF FORMULA I, spiromesifen (739) + COMPOUND OF
15 FORMULA I, spirotetramat [CCN] + COMPOUND OF FORMULA I, sulcofuron (746) +
COMPOUND OF FORMULA I, sulcofuron-sodium (746) + COMPOUND OF FORMULA I,
sulfluramid (750) + COMPOUND OF FORMULA I, sulfotep (753) + COMPOUND OF
FORMULA I, sulfoxaflor [CCN] + COMPOUND OF FORMULA I, sulfuryl fluoride (756) +
COMPOUND OF FORMULA I, sulprofos (1408) + COMPOUND OF FORMULA I, tar oils
20 (alternative name) (758) + COMPOUND OF FORMULA I, tau-fluvalinate (398) +
COMPOUND OF FORMULA I, tazimcarb (1412) + COMPOUND OF FORMULA I, TDE
(1414) + COMPOUND OF FORMULA I, tebufenozide (762) + COMPOUND OF FORMULA
I, tebufenpyrad (763) + COMPOUND OF FORMULA I, tebupirimfos (764) + COMPOUND
OF FORMULA I, teflubenzuron (768) + COMPOUND OF FORMULA I, tefluthrin (769) +
25 COMPOUND OF FORMULA I, temephos (770) + COMPOUND OF FORMULA I, TEPP
(1417) + COMPOUND OF FORMULA I, terallethrin (1418) + COMPOUND OF FORMULA
I, terbam (alternative name) + COMPOUND OF FORMULA I, terbufos (773) +
COMPOUND OF FORMULA I, tetrachloroethane [CCN] + COMPOUND OF FORMULA I,
tetrachlorvinphos (777) + COMPOUND OF FORMULA I, tetramethrin (787) + COMPOUND
30 OF FORMULA I, tetramethylfluthrin (CAS. Reg. No.: 84937-88-2) + COMPOUND OF
FORMULA I, theta-cypermethrin (204) + COMPOUND OF FORMULA I, thiacloprid (791)
+ COMPOUND OF FORMULA I, thiafenox (alternative name) + COMPOUND OF
FORMULA I, thiamethoxam (792) + COMPOUND OF FORMULA I, thicrofos (1428) +
COMPOUND OF FORMULA I, thiocarboxime (1431) + COMPOUND OF FORMULA I,
35 thiocyclam (798) + COMPOUND OF FORMULA I, thiocyclam hydrogen oxalate (798) +
COMPOUND OF FORMULA I, thiodicarb (799) + COMPOUND OF FORMULA I,
thiofanox (800) + COMPOUND OF FORMULA I, thiometon (801) + COMPOUND OF
FORMULA I, thionazin (1434) + COMPOUND OF FORMULA I, thiosultap (803) +
COMPOUND OF FORMULA I, thiosultap-sodium (803) + COMPOUND OF FORMULA I,
40 thuringiensin (alternative name) [CCN] + COMPOUND OF FORMULA I, tolfenpyrad (809)
+ COMPOUND OF FORMULA I, tralomethrin (812) + COMPOUND OF FORMULA I,

transfluthrin (813) + COMPOUND OF FORMULA I, transpermethrin (1440) + COMPOUND OF FORMULA I, triamiphos (1441) + COMPOUND OF FORMULA I, triazamate (818) + COMPOUND OF FORMULA I, triazophos (820) + COMPOUND OF FORMULA I, triazuron (alternative name) + COMPOUND OF FORMULA I, trichlorfon (824) +
5 COMPOUND OF FORMULA I, trichlormetaphos-3 (alternative name) [CCN] + COMPOUND OF FORMULA I, trichloronat (1452) + COMPOUND OF FORMULA I, trifenofos (1455) + COMPOUND OF FORMULA I, triflumuron (835) + COMPOUND OF FORMULA I, trimethacarb (840) + COMPOUND OF FORMULA I, triprene (1459) + COMPOUND OF FORMULA I, vamidothion (847) + COMPOUND OF FORMULA I,
10 vaniliprole [CCN] + COMPOUND OF FORMULA I, veratridine (alternative name) (725) + COMPOUND OF FORMULA I, veratrine (alternative name) (725) + COMPOUND OF FORMULA I, XMC (853) + COMPOUND OF FORMULA I, xylylcarb (854) + COMPOUND OF FORMULA I, YI-5302 (compound code) + COMPOUND OF FORMULA I, zeta-cypermethrin (205) + COMPOUND OF FORMULA I, zetamethrin (alternative name) +
15 COMPOUND OF FORMULA I, zinc phosphide (640) + COMPOUND OF FORMULA I, zolaprofos (1469), ZJ0967 (development code) + COMPOUND OF FORMULA I, ZJ3757 (development code) + COMPOUND OF FORMULA I, and ZXI 8901 (development code) (858) + COMPOUND OF FORMULA I,

a molluscicide selected from the group of substances consisting of bis(tributyltin)
20 oxide (IUPAC name) (913) + COMPOUND OF FORMULA I, bromoacetamide [CCN] + COMPOUND OF FORMULA I, calcium arsenate [CCN] + COMPOUND OF FORMULA I, cloethocarb (999) + COMPOUND OF FORMULA I, copper acetoarsenite [CCN] + COMPOUND OF FORMULA I, copper sulfate (172) + COMPOUND OF FORMULA I, fentin (347) + COMPOUND OF FORMULA I, ferric phosphate (IUPAC name) (352) +
25 COMPOUND OF FORMULA I, metaldehyde (518) + COMPOUND OF FORMULA I, methiocarb (530) + COMPOUND OF FORMULA I, niclosamide (576) + COMPOUND OF FORMULA I, niclosamide-olamine (576) + COMPOUND OF FORMULA I, pentachlorophenol (623) + COMPOUND OF FORMULA I, sodium pentachlorophenoxide (623) + COMPOUND OF FORMULA I, tazimcarb (1412) + COMPOUND OF FORMULA I,
30 thiodicarb (799) + COMPOUND OF FORMULA I, tralopyril [CCN] + COMPOUND OF FORMULA I, tributyltin oxide (913) + COMPOUND OF FORMULA I, trifenmorph (1454) + COMPOUND OF FORMULA I, trimethacarb (840) + COMPOUND OF FORMULA I, triphenyltin acetate (IUPAC name) (347) and triphenyltin hydroxide (IUPAC name) (347) + COMPOUND OF FORMULA I,

35 a nematocide selected from the group of substances consisting of AKD-3088 (compound code) + COMPOUND OF FORMULA I, 1,2-dibromo-3-chloropropane

(IUPAC/Chemical Abstracts name) (1045) + COMPOUND OF FORMULA I, 1,2-dichloropropane (IUPAC/ Chemical Abstracts name) (1062) + COMPOUND OF FORMULA I, 1,2-dichloropropane with 1,3-dichloropropene (IUPAC name) (1063) + COMPOUND OF FORMULA I, 1,3-dichloropropene (233) + COMPOUND OF FORMULA I, 3,4-dichlorotetrahydrothiophene 1,1-dioxide (IUPAC/Chemical Abstracts name) (1065) +
5 COMPOUND OF FORMULA I, 3-(4-chlorophenyl)-5-methylrhodanine (IUPAC name) (980) + COMPOUND OF FORMULA I, 5-methyl-6-thioxo-1,3,5-thiadiazinan-3-ylacetic acid (IUPAC name) (1286) + COMPOUND OF FORMULA I, 6-isopentenylaminopurine (alternative name) (210) + COMPOUND OF FORMULA I, abamectin (1) + COMPOUND
10 OF FORMULA I, acetoprole [CCN] + COMPOUND OF FORMULA I, alanycarb (15) + COMPOUND OF FORMULA I, aldicarb (16) + COMPOUND OF FORMULA I, aldoxycarb (863) + COMPOUND OF FORMULA I, AZ 60541 (compound code) + COMPOUND OF FORMULA I, benclothiaz [CCN] + COMPOUND OF FORMULA I, benomyl (62) + COMPOUND OF FORMULA I, butylpyridaben (alternative name) + COMPOUND OF
15 FORMULA I, cadusafos (109) + COMPOUND OF FORMULA I, carbofuran (118) + COMPOUND OF FORMULA I, carbon disulfide (945) + COMPOUND OF FORMULA I, carbosulfan (119) + COMPOUND OF FORMULA I, chloropicrin (141) + COMPOUND OF FORMULA I, chlorpyrifos (145) + COMPOUND OF FORMULA I, cloethocarb (999) + COMPOUND OF FORMULA I, cytokinins (alternative name) (210) + COMPOUND OF
20 FORMULA I, dazomet (216) + COMPOUND OF FORMULA I, DBCP (1045) + COMPOUND OF FORMULA I, DCIP (218) + COMPOUND OF FORMULA I, diamidafos (1044) + COMPOUND OF FORMULA I, dichlofenthion (1051) + COMPOUND OF FORMULA I, dicliphos (alternative name) + COMPOUND OF FORMULA I, dimethoate (262) + COMPOUND OF FORMULA I, doramectin (alternative name) [CCN] +
25 COMPOUND OF FORMULA I, emamectin (291) + COMPOUND OF FORMULA I, emamectin benzoate (291) + COMPOUND OF FORMULA I, eprinomectin (alternative name) [CCN] + COMPOUND OF FORMULA I, ethoprophos (312) + COMPOUND OF FORMULA I, ethylene dibromide (316) + COMPOUND OF FORMULA I, fenamiphos (326) + COMPOUND OF FORMULA I, fenpyrad (alternative name) + COMPOUND OF
30 FORMULA I, fensulfothion (1158) + COMPOUND OF FORMULA I, fluensulfone (CAS. Reg. No.: 318290-98-1) + COMPOUND OF FORMULA I, fosthiazate (408) + COMPOUND OF FORMULA I, fosthietan (1196) + COMPOUND OF FORMULA I, furfural (alternative name) [CCN] + COMPOUND OF FORMULA I, GY-81 (development code) (423) + COMPOUND OF FORMULA I, heterophos [CCN] + COMPOUND OF FORMULA I,
35 imicyafos [CCN] + COMPOUND OF FORMULA I, imicyafos (alternative name) [CCN] + COMPOUND OF FORMULA I, iodomethane (IUPAC name) (542) + COMPOUND OF

FORMULA I, isamidofos (1230) + COMPOUND OF FORMULA I, isazofos (1231) +
COMPOUND OF FORMULA I, ivermectin (alternative name) [CCN] + COMPOUND OF
FORMULA I, kinetin (alternative name) (210) + COMPOUND OF FORMULA I,
mecarphon (1258) + COMPOUND OF FORMULA I, metam (519) + COMPOUND OF
5 FORMULA I, metam-potassium (alternative name) (519) + COMPOUND OF FORMULA I,
metam-sodium (519) + COMPOUND OF FORMULA I, methyl bromide (537) +
COMPOUND OF FORMULA I, methyl isothiocyanate (543) + COMPOUND OF FORMULA
I, milbemycin oxime (alternative name) [CCN] + COMPOUND OF FORMULA I,
moxidectin (alternative name) [CCN] + COMPOUND OF FORMULA I, *Myrothecium*
10 *verrucaria* composition (alternative name) (565) + COMPOUND OF FORMULA I, NC-184
(compound code) + COMPOUND OF FORMULA I, oxamyl (602) + COMPOUND OF
FORMULA I, phorate (636) + COMPOUND OF FORMULA I, phosphamidon (639) +
COMPOUND OF FORMULA I, phosphocarb [CCN] + COMPOUND OF FORMULA I,
sebufos (alternative name) + COMPOUND OF FORMULA I, selamectin (alternative name)
15 [CCN] + COMPOUND OF FORMULA I, spinosad (737) + COMPOUND OF FORMULA I,
terbam (alternative name) + COMPOUND OF FORMULA I, terbufos (773) + COMPOUND
OF FORMULA I, tetrachlorothiophene (IUPAC/ Chemical Abstracts name) (1422) +
COMPOUND OF FORMULA I, thiafenox (alternative name) + COMPOUND OF FORMULA
I, thionazin (1434) + COMPOUND OF FORMULA I, triazophos (820) + COMPOUND OF
20 FORMULA I, triazuron (alternative name) + COMPOUND OF FORMULA I, xlenols
[CCN] + COMPOUND OF FORMULA I, YI-5302 (compound code) and zeatin (alternative
name) (210) + COMPOUND OF FORMULA I,

a nitrification inhibitor selected from the group of substances consisting of potassium
ethylxanthate [CCN] and nitrapyrin (580) + COMPOUND OF FORMULA I,

25 a plant activator selected from the group of substances consisting of acibenzolar (6) +
COMPOUND OF FORMULA I, acibenzolar-S-methyl (6) + COMPOUND OF FORMULA I,
probenazole (658) and *Reynoutria sachalinensis* extract (alternative name) (720) +
COMPOUND OF FORMULA I,

a rodenticide selected from the group of substances consisting of 2-isovalerylindan-
30 1,3-dione (IUPAC name) (1246) + COMPOUND OF FORMULA I, 4-(quinoxalin-2-
ylamino)benzenesulfonamide (IUPAC name) (748) + COMPOUND OF FORMULA I, alpha-
chlorohydrin [CCN] + COMPOUND OF FORMULA I, aluminium phosphide (640) +
COMPOUND OF FORMULA I, antu (880) + COMPOUND OF FORMULA I, arsenous
oxide (882) + COMPOUND OF FORMULA I, barium carbonate (891) + COMPOUND OF
35 FORMULA I, bisthiosemi (912) + COMPOUND OF FORMULA I, brodifacoum (89) +
COMPOUND OF FORMULA I, bromadiolone (91) + COMPOUND OF FORMULA I,

bromethalin (92) + COMPOUND OF FORMULA I, calcium cyanide (444) + COMPOUND OF FORMULA I, chloralose (127) + COMPOUND OF FORMULA I, chlorophacinone (140) + COMPOUND OF FORMULA I, cholecalciferol (alternative name) (850) + COMPOUND OF FORMULA I, coumachlor (1004) + COMPOUND OF FORMULA I, coumafuryl (1005) + COMPOUND OF FORMULA I, coumatetralyl (175) + COMPOUND OF FORMULA I, crimidine (1009) + COMPOUND OF FORMULA I, difenacoum (246) + COMPOUND OF FORMULA I, difethialone (249) + COMPOUND OF FORMULA I, diphacinone (273) + COMPOUND OF FORMULA I, ergocalciferol (301) + COMPOUND OF FORMULA I, floucoumafen (357) + COMPOUND OF FORMULA I, fluoroacetamide (379) + COMPOUND OF FORMULA I, flupropadine (1183) + COMPOUND OF FORMULA I, flupropadine hydrochloride (1183) + COMPOUND OF FORMULA I, gamma-HCH (430) + COMPOUND OF FORMULA I, HCH (430) + COMPOUND OF FORMULA I, hydrogen cyanide (444) + COMPOUND OF FORMULA I, iodomethane (IUPAC name) (542) + COMPOUND OF FORMULA I, lindane (430) + COMPOUND OF FORMULA I, magnesium phosphide (IUPAC name) (640) + COMPOUND OF FORMULA I, methyl bromide (537) + COMPOUND OF FORMULA I, norbormide (1318) + COMPOUND OF FORMULA I, phosacetim (1336) + COMPOUND OF FORMULA I, phosphine (IUPAC name) (640) + COMPOUND OF FORMULA I, phosphorus [CCN] + COMPOUND OF FORMULA I, pindone (1341) + COMPOUND OF FORMULA I, potassium arsenite [CCN] + COMPOUND OF FORMULA I, pyrinuron (1371) + COMPOUND OF FORMULA I, scilliroside (1390) + COMPOUND OF FORMULA I, sodium arsenite [CCN] + COMPOUND OF FORMULA I, sodium cyanide (444) + COMPOUND OF FORMULA I, sodium fluoroacetate (735) + COMPOUND OF FORMULA I, strychnine (745) + COMPOUND OF FORMULA I, thallium sulfate [CCN] + COMPOUND OF FORMULA I, warfarin (851) and zinc phosphide (640) + COMPOUND OF FORMULA I,

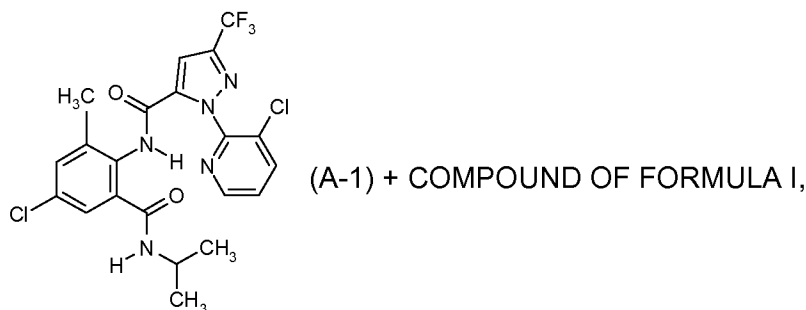
a synergist selected from the group of substances consisting of 2-(2-butoxyethoxy)-ethyl piperonylate (IUPAC name) (934) + COMPOUND OF FORMULA I, 5-(1,3-benzodioxol-5-yl)-3-hexylcyclohex-2-enone (IUPAC name) (903) + COMPOUND OF FORMULA I, farnesol with nerolidol (alternative name) (324) + COMPOUND OF FORMULA I, MB-599 (development code) (498) + COMPOUND OF FORMULA I, MGK 264 (development code) (296) + COMPOUND OF FORMULA I, piperonyl butoxide (649) + COMPOUND OF FORMULA I, piprotal (1343) + COMPOUND OF FORMULA I, propyl isomer (1358) + COMPOUND OF FORMULA I, S421 (development code) (724) + COMPOUND OF FORMULA I, sesamex (1393) + COMPOUND OF FORMULA I, sesasmolin (1394) and sulfoxide (1406) + COMPOUND OF FORMULA I,

an animal repellent selected from the group of substances consisting of anthraquinone (32) + COMPOUND OF FORMULA I, chloralose (127) + COMPOUND OF FORMULA I, copper naphthenate [CCN] + COMPOUND OF FORMULA I, copper oxychloride (171) + COMPOUND OF FORMULA I, diazinon (227) + COMPOUND OF FORMULA I, dicyclopentadiene (chemical name) (1069) + COMPOUND OF FORMULA I, guazatine (422) + COMPOUND OF FORMULA I, guazatine acetates (422) + COMPOUND OF FORMULA I, methiocarb (530) + COMPOUND OF FORMULA I, pyridin-4-amine (IUPAC name) (23) + COMPOUND OF FORMULA I, thiram (804) + COMPOUND OF FORMULA I, trimethacarb (840) + COMPOUND OF FORMULA I, zinc naphthenate [CCN] and ziram (856) + COMPOUND OF FORMULA I,

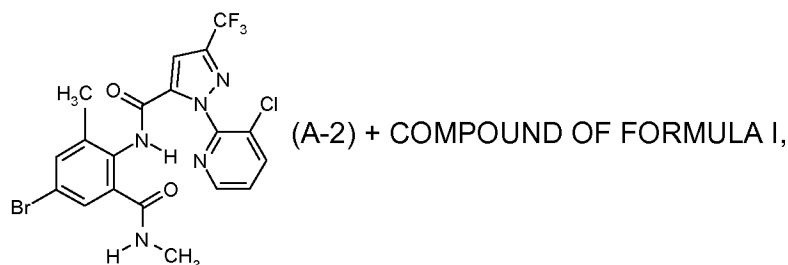
a virucide selected from the group of substances consisting of imanin (alternative name) [CCN] and ribavirin (alternative name) [CCN] + COMPOUND OF FORMULA I,

a wound protectant selected from the group of substances consisting of mercuric oxide (512) + COMPOUND OF FORMULA I, octhilinone (590) and thiophanate-methyl (802) + COMPOUND OF FORMULA I,

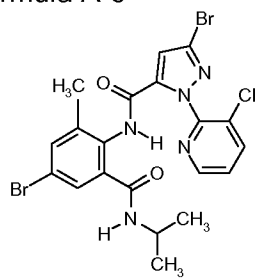
an insecticide selected from the group consisting of the compound of the formula A-1



20 the formula A-2

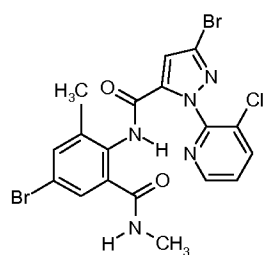


the formula A-3



(A-3) + COMPOUND OF FORMULA I,

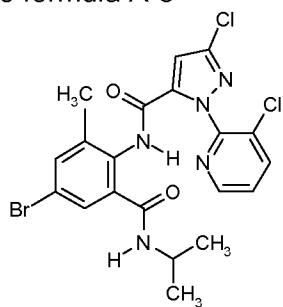
the formula A-4



(A-4) + COMPOUND OF FORMULA I,

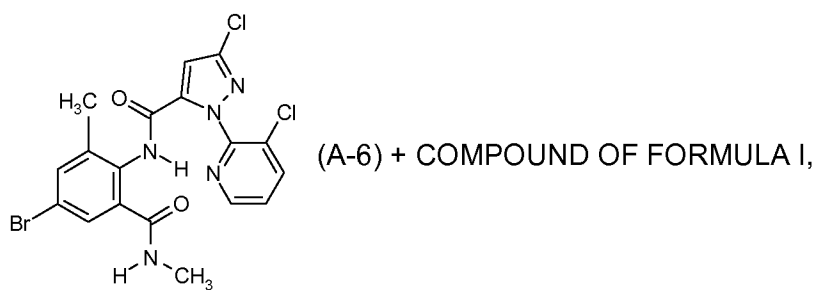
5

10 the formula A-5



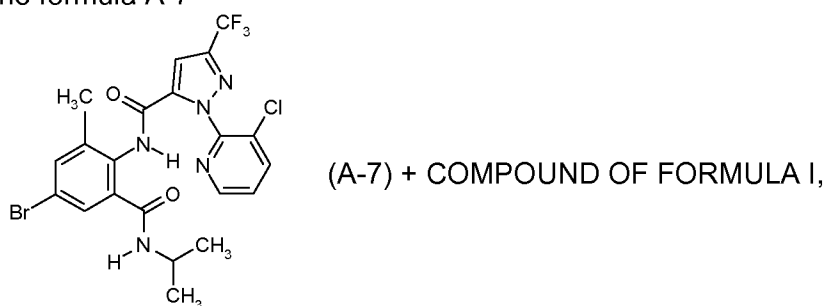
(A-5) + COMPOUND OF FORMULA I,

the formula A-6

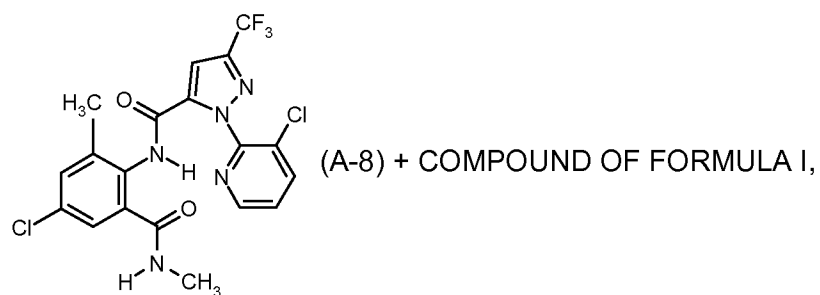


5

the formula A-7

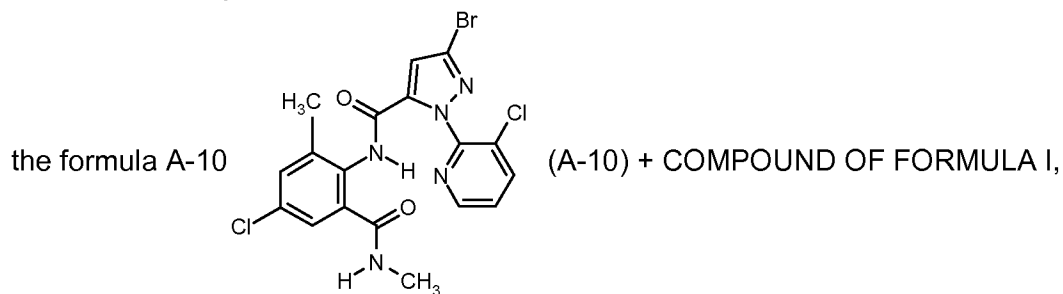
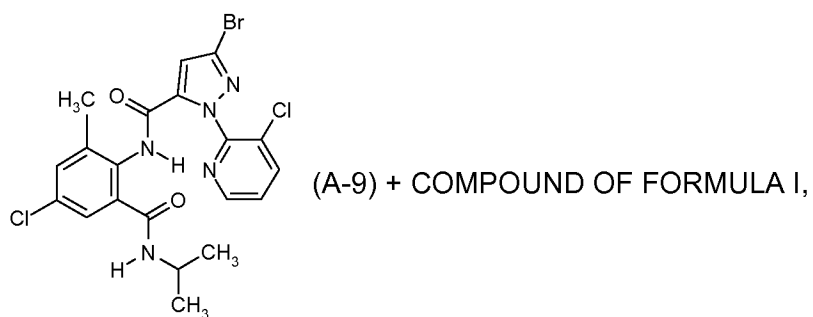


the formula A-8

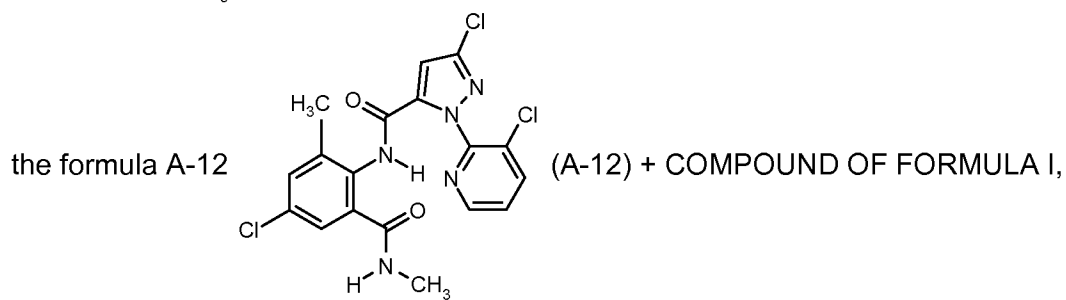
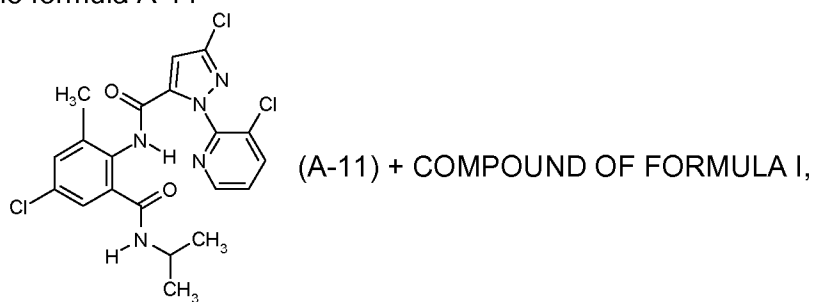


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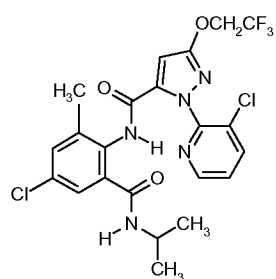
the formula A-9



5 the formula A-11

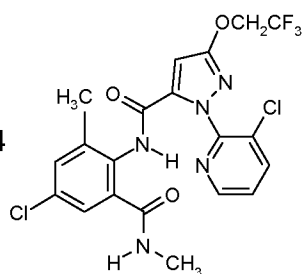


the formula A-13



(A-13) + COMPOUND OF FORMULA I,

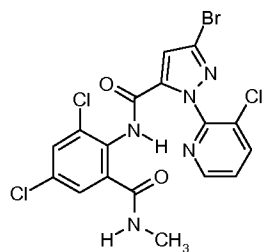
the formula A-14



(A-14) + COMPOUND OF FORMULA I,

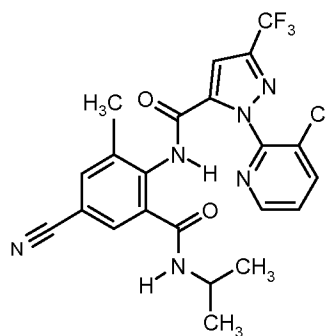
5

10 the formula A-15



(A-15) + COMPOUND OF FORMULA I,

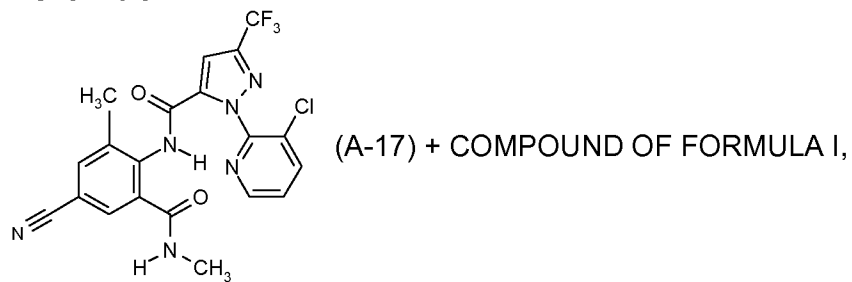
the formula A-16



(A-16) + COMPOUND OF FORMULA I,

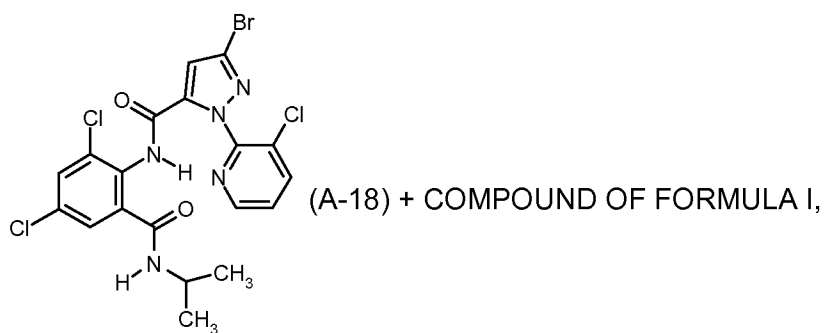
15

the formula A-17



5

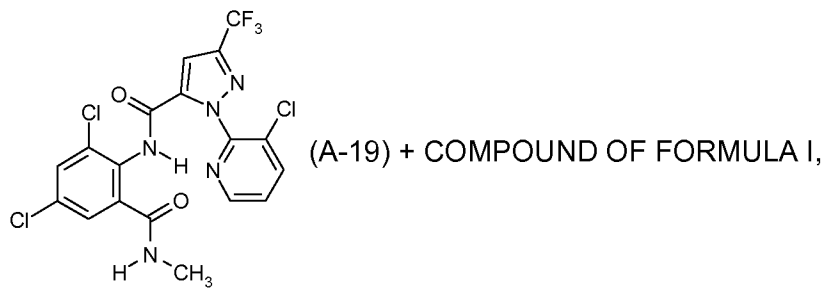
the formula A-18



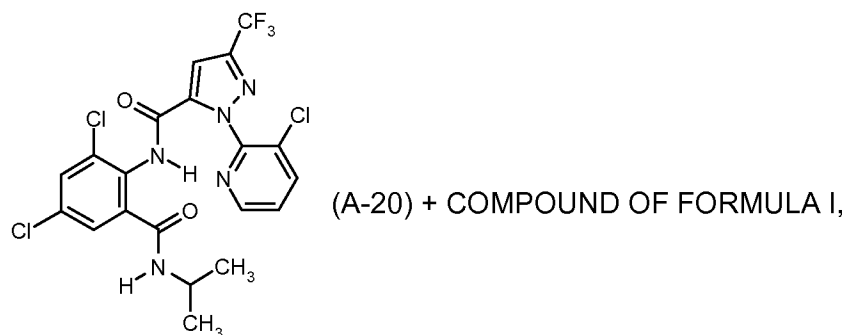
10

the formula A-19

15



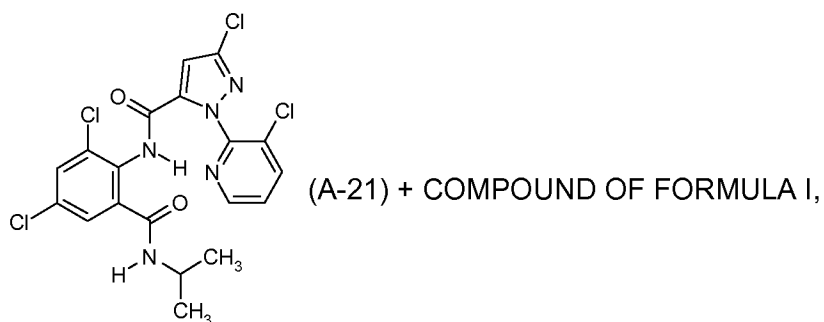
the formula A-20



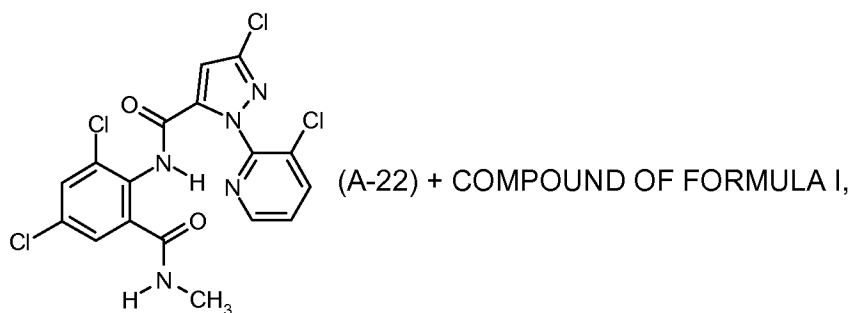
5

the formula A-21

10

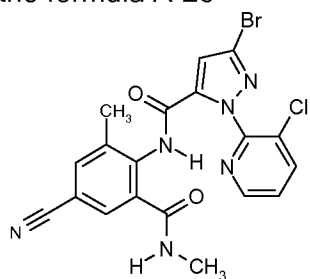


the formula A-22



15

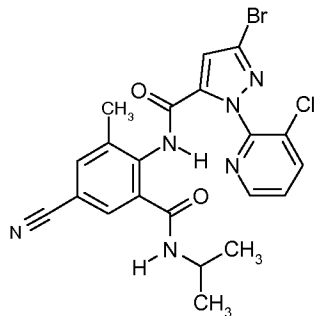
the formula A-23



(A-23) + COMPOUND OF FORMULA I,

5

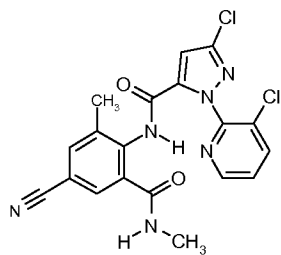
the formula A-24



(A-24) + COMPOUND OF FORMULA I,

10

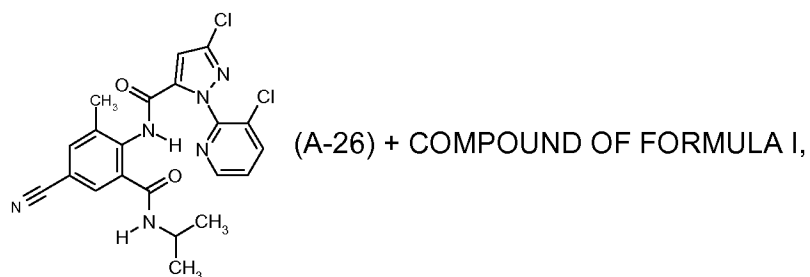
the formula A-25



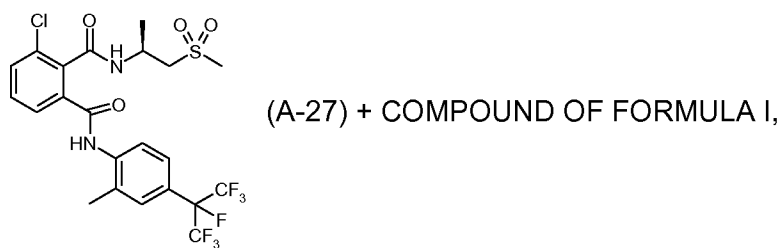
(A-25) + COMPOUND OF FORMULA I,

15

the formula A-26

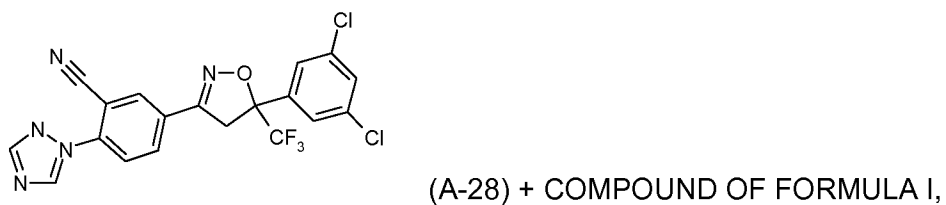


and the formula A-27



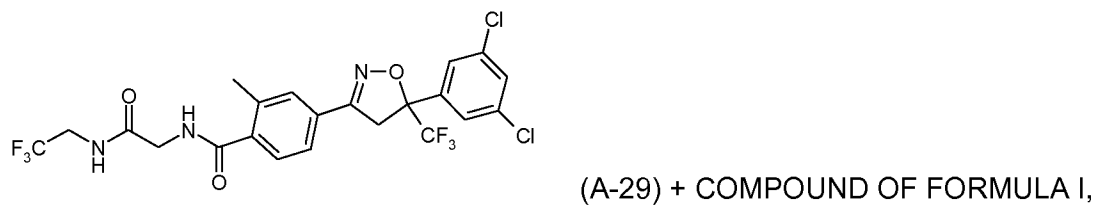
5

an insecticide selected from the group consisting of the compound of the formula A-28

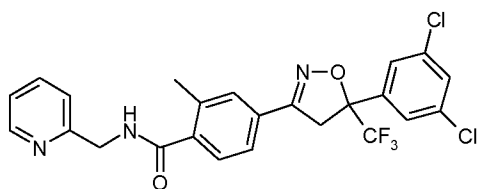


10

and the formula A-29

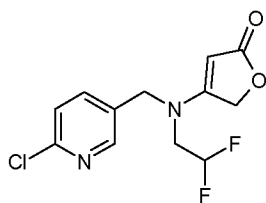


and the formula A-30



(A-30) + COMPOUND OF FORMULA I,

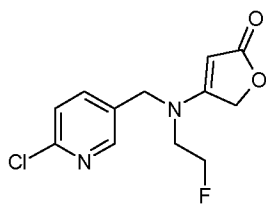
an insecticide selected from the group consisting of the compound of the formula A-31



5

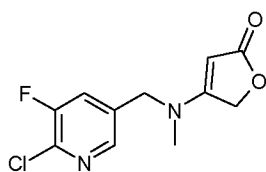
(A-31) + COMPOUND OF FORMULA I,

the formula A-32



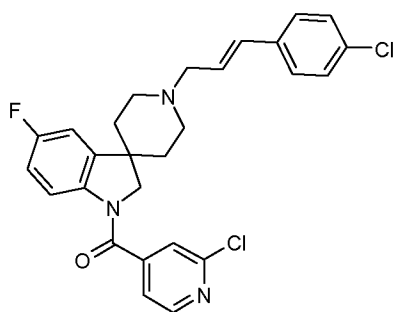
(A-32) + COMPOUND OF FORMULA I,

10 the formula A-33



(A-33) + COMPOUND OF FORMULA I,

and an insecticide of the formula A-34



(A-34) + COMPOUND OF FORMULA I.

15

The references in brackets behind the active ingredients, e.g. [3878-19-1] refer to the Chemical Abstracts Registry number. The compounds of the formula A-1 to A-26 are

described in WO 03/015518 or in WO 04/067528. The compound of the formula A-27 is described in WO 06/022225 and in WO 07/112844. The above described mixing partners are known. Where the active ingredients are included in "The Pesticide Manual" [The Pesticide Manual - A World Compendium; Thirteenth Edition; Editor: C. D. S. Tomlin; The British Crop Protection Council], they are described therein under the entry number given in round brackets hereinabove for the particular compound; for example, the compound "abamectin" is described under entry number (1). Where "[CCN]" is added hereinabove to the particular compound, the compound in question is included in the "Compendium of Pesticide Common Names", which is accessible on the internet [A. Wood; Compendium of Pesticide Common Names, Copyright © 1995-2004]; for example, the compound "acetoprole" is described under the internet address <http://www.alanwood.net/pesticides/acetoprole.html>.

Most of the active ingredients described above are referred to hereinabove by a so-called "common name", the relevant "ISO common name" or another "common name" being used in individual cases. If the designation is not a "common name", the nature of the designation used instead is given in round brackets for the particular compound; in that case, the IUPAC name, the IUPAC/Chemical Abstracts name, a "chemical name", a "traditional name", a "compound name" or a "development code" is used or, if neither one of those designations nor a "common name" is used, an "alternative name" is employed. "CAS Reg. No" means the Chemical Abstracts Registry Number.

The compounds of formula I according to the invention can also be used in combination with one or more fungicides. In particular, in the following mixtures of the compounds of formula I with fungicides, the term COMPOUND OF FORMULA I preferably refers to a compound selected from one of the Table 1:

COMPOUND OF FORMULA I + (*E*)-*N*-methyl-2-[2-(2,5-dimethylphenoxy)methyl]phenyl]-2-methoxy-iminoacetamide (SSF-129), COMPOUND OF FORMULA I + 4-bromo-2-cyano-*N,N*-dimethyl-6-trifluoromethylbenzimidazole-1-sulphonamide, COMPOUND OF FORMULA I + α -[*N*-(3-chloro-2,6-xylyl)-2-methoxyacetamido]- γ -butyrolactone, COMPOUND OF FORMULA I + 4-chloro-2-cyano-*N,N*-dimethyl-5-*p*-tolylimidazole-1-sulfonamide (IKF-916, cyamidazosulfamid), COMPOUND OF FORMULA I + 3,5-dichloro-*N*-(3-chloro-1-ethyl-1-methyl-2-oxopropyl)-4-methylbenzamide (RH-7281, zoxamide), COMPOUND OF FORMULA I + *N*-allyl-4,5,-dimethyl-2-trimethylsilylthiophene-3-carboxamide (MON65500), COMPOUND OF FORMULA I + *N*-(1-cyano-1,2-dimethylpropyl)-2-(2,4-dichlorophenoxy)propionamide (AC382042), COMPOUND OF FORMULA I + *N*-(2-methoxy-5-pyridyl)-cyclopropane carboxamide, COMPOUND OF

FORMULA I + acibenzolar, COMPOUND OF FORMULA I + alanycarb, COMPOUND OF
FORMULA I + aldimorph, COMPOUND OF FORMULA I + ametoctradin, COMPOUND OF
FORMULA I + amisulbrom, COMPOUND OF FORMULA I + anilazine, COMPOUND OF
FORMULA I + azaconazole, COMPOUND OF FORMULA I + azoxystrobin, COMPOUND
5 OF FORMULA I + benalaxyl, COMPOUND OF FORMULA I + benalaxyl-M, COMPOUND
OF FORMULA I + benomyl, COMPOUND OF FORMULA I + benthiavalicarb, COMPOUND
OF FORMULA I + benzodiflupyr, COMPOUND OF FORMULA I + benzovindiflupyr,
COMPOUND OF FORMULA I + biloxazol, COMPOUND OF FORMULA I + bitertanol,
COMPOUND OF FORMULA I + bixafen, COMPOUND OF FORMULA I + blasticidin S,
10 COMPOUND OF FORMULA I + boscalid, COMPOUND OF FORMULA I + bromuconazole,
COMPOUND OF FORMULA I + bupirimate, COMPOUND OF FORMULA I + captafol,
COMPOUND OF FORMULA I + captan, COMPOUND OF FORMULA I + carbendazim,
COMPOUND OF FORMULA I + carbendazim chlorhydrate, COMPOUND OF FORMULA I +
carboxin, COMPOUND OF FORMULA I + carpropamid, carvone, COMPOUND OF
15 FORMULA I + CGA41396, COMPOUND OF FORMULA I + CGA41397, COMPOUND OF
FORMULA I + chinomethionate, COMPOUND OF FORMULA I + chlazafenone,
COMPOUND OF FORMULA I + chlorodincarb, COMPOUND OF FORMULA I +
chlorothalonil, COMPOUND OF FORMULA I + chlorozolinate, COMPOUND OF FORMULA I
+ clozylacon, COMPOUND OF FORMULA I + copper containing compounds such as
20 copper oxychloride, copper oxyquinolate, copper sulphate, copper tallate and Bordeaux
mixture, COMPOUND OF FORMULA I + coumoxystrobin, COMPOUND OF FORMULA I +
cyazofamid, COMPOUND OF FORMULA I + cyflufenamid, COMPOUND OF FORMULA I +
cymoxanil, COMPOUND OF FORMULA I + cyproconazole, COMPOUND OF FORMULA I +
cyprodinil, COMPOUND OF FORMULA I + debacarb, COMPOUND OF FORMULA I +
25 di-2-pyridyl disulphide 1,1'-dioxide, COMPOUND OF FORMULA I + dicloaminstrobin,
COMPOUND OF FORMULA I + diclofenoxystrobin, COMPOUND OF FORMULA I +
dichlofluanid, COMPOUND OF FORMULA I + diclomezine, COMPOUND OF FORMULA I +
dicloran, COMPOUND OF FORMULA I + diethofencarb, COMPOUND OF FORMULA I +
difenoconazole, COMPOUND OF FORMULA I + difenzoquat, COMPOUND OF FORMULA I
30 + diflumetorim, COMPOUND OF FORMULA I + O,O-di-iso-propyl-S-benzyl thiophosphate,
COMPOUND OF FORMULA I + dimefluazole, COMPOUND OF FORMULA I +
dimetconazole, COMPOUND OF FORMULA I + dimethomorph, COMPOUND OF
FORMULA I + dimethirimol, COMPOUND OF FORMULA I + dimoxystrobin, COMPOUND
OF FORMULA I + diniconazole, COMPOUND OF FORMULA I + dinocap, COMPOUND OF
35 FORMULA I + dithianon, COMPOUND OF FORMULA I + dodecyl dimethyl ammonium
chloride, COMPOUND OF FORMULA I + dodemorph, COMPOUND OF FORMULA I +

dodine, COMPOUND OF FORMULA I + doguadine, COMPOUND OF FORMULA I + edifenphos, COMPOUND OF FORMULA I + enoxastrobin, COMPOUND OF FORMULA I + epoxiconazole, COMPOUND OF FORMULA I + ethirimol, COMPOUND OF FORMULA I + ethyl(Z)-N-benzyl-N([methyl(methyl-thioethylideneaminooxycarbonyl)amino]thio)-β

5 -alaninate, COMPOUND OF FORMULA I + etridiazole, COMPOUND OF FORMULA I + famoxadone, COMPOUND OF FORMULA I + fenamidone (RPA407213), COMPOUND OF FORMULA I + fenaminstrobin, COMPOUND OF FORMULA I + fenarimol, COMPOUND OF FORMULA I + fenbuconazole, COMPOUND OF FORMULA I + fenfuram, COMPOUND OF FORMULA I + fenhexamid (KBR2738), COMPOUND OF FORMULA I + fenoxanil,

10 COMPOUND OF FORMULA I + fenoxystrobin, COMPOUND OF FORMULA I + fenpiclonil, COMPOUND OF FORMULA I + fenpropidin, COMPOUND OF FORMULA I + fenpropimorph, COMPOUND OF FORMULA I + fenpyrazamine, COMPOUND OF FORMULA I + fenpyrazamine/ipfenpyrazolone, COMPOUND OF FORMULA I + fentin acetate, COMPOUND OF FORMULA I + fentin hydroxide, COMPOUND OF FORMULA I +

15 ferbam, COMPOUND OF FORMULA I + ferimzone, COMPOUND OF FORMULA I + fluazinam, COMPOUND OF FORMULA I + fludioxonil, COMPOUND OF FORMULA I + flufenoxystrobin, COMPOUND OF FORMULA I + flumetover, COMPOUND OF FORMULA I + flumorph, COMPOUND OF FORMULA I + fluopicolide, COMPOUND OF FORMULA I + fluopyram, COMPOUND OF FORMULA I + fluoxastrobin, COMPOUND OF FORMULA I +

20 fluoroimide, COMPOUND OF FORMULA I + fluquinconazole, COMPOUND OF FORMULA I + flusilazole, COMPOUND OF FORMULA I + flutianil, COMPOUND OF FORMULA I + flutolanil, COMPOUND OF FORMULA I + flutriafol, COMPOUND OF FORMULA I + fluxapyroxad, COMPOUND OF FORMULA I + folpet, COMPOUND OF FORMULA I + fosetyl, COMPOUND OF FORMULA I + fosetyl-aluminium, COMPOUND OF FORMULA I +

25 fuberidazole, COMPOUND OF FORMULA I + furalaxyl, COMPOUND OF FORMULA I + furametpyr, COMPOUND OF FORMULA I + guazatine, COMPOUND OF FORMULA I + hexaconazole, COMPOUND OF FORMULA I + hydroxyisoxazole, COMPOUND OF FORMULA I + hymexazole, COMPOUND OF FORMULA I + imazalil, COMPOUND OF FORMULA I + imibenconazole, COMPOUND OF FORMULA I + iminoctadine, COMPOUND

30 OF FORMULA I + iminoctadine triacetate, COMPOUND OF FORMULA I + ipconazole, COMPOUND OF FORMULA I + iprobenfos, COMPOUND OF FORMULA I + iprodione, COMPOUND OF FORMULA I + iprovalicarb (SZX0722), COMPOUND OF FORMULA I + isopropanyl butyl carbamate, COMPOUND OF FORMULA I + isoprothiolane, COMPOUND OF FORMULA I + isopyrazam, COMPOUND OF FORMULA I + isotianil, COMPOUND OF FORMULA I + kasugamycin, COMPOUND OF FORMULA I + kresoxim-methyl,

35 COMPOUND OF FORMULA I + LY186054, COMPOUND OF FORMULA I + LY211795,

COMPOUND OF FORMULA I + LY248908, COMPOUND OF FORMULA I + mancozeb,
COMPOUND OF FORMULA I + mandipropamid, COMPOUND OF FORMULA I + maneb,
COMPOUND OF FORMULA I + mefenoxam, COMPOUND OF FORMULA I + mepanipyrim,
COMPOUND OF FORMULA I + mepronil, COMPOUND OF FORMULA I + meptyldinocap,
5 COMPOUND OF FORMULA I + metalaxyl, COMPOUND OF FORMULA I + metconazole,
COMPOUND OF FORMULA I + metiram, COMPOUND OF FORMULA I + metiram-zinc,
COMPOUND OF FORMULA I + metominostrobin, COMPOUND OF FORMULA I +
metrafenone, COMPOUND OF FORMULA I + myclobutanil, COMPOUND OF FORMULA I +
neoasozin, COMPOUND OF FORMULA I + nickel dimethyldithiocarbamate, COMPOUND
10 OF FORMULA I + nicobifen, COMPOUND OF FORMULA I + nitrothal-/isopropyl,
COMPOUND OF FORMULA I + nuarimol, COMPOUND OF FORMULA I + ofurace,
COMPOUND OF FORMULA I + organomercury compounds, COMPOUND OF FORMULA I
+ orysastrobin, COMPOUND OF FORMULA I + oxadixyl, COMPOUND OF FORMULA I +
oxasulfuron, COMPOUND OF FORMULA I + oxolinic acid, COMPOUND OF FORMULA I +
15 oxpoconazole, COMPOUND OF FORMULA I + oxycarboxin, COMPOUND OF FORMULA I
+ pefurazoate, COMPOUND OF FORMULA I + penconazole, COMPOUND OF FORMULA I
+ pencycuron, COMPOUND OF FORMULA I + penflufen, COMPOUND OF FORMULA I +
penthiopyrad, COMPOUND OF FORMULA I + phenazin oxide, COMPOUND OF FORMULA
I + phosetyl-Al, COMPOUND OF FORMULA I + phosphorus acids, COMPOUND OF
20 FORMULA I + phthalide, COMPOUND OF FORMULA I + picoxystrobin (ZA1963),
COMPOUND OF FORMULA I + polyoxin D, COMPOUND OF FORMULA I + polyram,
COMPOUND OF FORMULA I + probenazole, COMPOUND OF FORMULA I + prochloraz,
COMPOUND OF FORMULA I + procymidone, COMPOUND OF FORMULA I +
propamocarb, COMPOUND OF FORMULA I + propiconazole, COMPOUND OF FORMULA
25 I + propineb, COMPOUND OF FORMULA I + propionic acid, COMPOUND OF FORMULA I
+ proquinazid, COMPOUND OF FORMULA I + prothioconazole, COMPOUND OF
FORMULA I + pyraclostrobin, COMPOUND OF FORMULA I + pyraoxystrobin, COMPOUND
OF FORMULA I + pyrazophos, COMPOUND OF FORMULA I + pyribencarb, COMPOUND
OF FORMULA I + pyrifenox, COMPOUND OF FORMULA I + pyrimethanil, COMPOUND OF
30 FORMULA I + pyrisoxazole, COMPOUND OF FORMULA I + pyroquilon, COMPOUND OF
FORMULA I + pyroxyfur, COMPOUND OF FORMULA I + pyrrolnitrin, COMPOUND OF
FORMULA I + quaternary ammonium compounds, COMPOUND OF FORMULA I +
quinomethionate, COMPOUND OF FORMULA I + quinoxifen, COMPOUND OF FORMULA
I + quintozene, COMPOUND OF FORMULA I + sedaxane, COMPOUND OF FORMULA I +
35 sipconazole (F-155), COMPOUND OF FORMULA I + sodium pentachlorophenate,
COMPOUND OF FORMULA I + spiroxamine, COMPOUND OF FORMULA I + streptomycin,

COMPOUND OF FORMULA I + sulphur, COMPOUND OF FORMULA I + tebuconazole, COMPOUND OF FORMULA I + tecloftalam, COMPOUND OF FORMULA I + tecnazene, COMPOUND OF FORMULA I + terbufloquin, COMPOUND OF FORMULA I + tetraconazole, COMPOUND OF FORMULA I + thiabendazole, COMPOUND OF FORMULA I + thifluzamid, COMPOUND OF FORMULA I + 2-(thiocyanomethylthio)benzothiazole, COMPOUND OF FORMULA I + thiophanate-methyl, COMPOUND OF FORMULA I + thiram, COMPOUND OF FORMULA I + tiadinil, COMPOUND OF FORMULA I + timibenconazole, COMPOUND OF FORMULA I + tolclofos-methyl, COMPOUND OF FORMULA I + tolylfluanid, COMPOUND OF FORMULA I + triadimefon, COMPOUND OF FORMULA I + triadimenol, COMPOUND OF FORMULA I + triazbutil, COMPOUND OF FORMULA I + triazoxide, COMPOUND OF FORMULA I + triclopyricarb, COMPOUND OF FORMULA I + tricyclazole, COMPOUND OF FORMULA I + tridemorph, COMPOUND OF FORMULA I + trifloxystrobin, COMPOUND OF FORMULA I + triforine, COMPOUND OF FORMULA I + triflumizole, COMPOUND OF FORMULA I + triticonazole, COMPOUND OF FORMULA I + validamycin A, COMPOUND OF FORMULA I + valiphenal, COMPOUND OF FORMULA I + vapam, COMPOUND OF FORMULA I + vinclozolin, COMPOUND OF FORMULA I + zineb and COMPOUND OF FORMULA I + ziram.

The compounds of formula I may be mixed with soil, peat or other rooting media for the protection of plants against seed-borne, soil-borne or foliar fungal diseases.

The compounds of formula I according to the invention can also be used in combination with one or more other synergists. In particular, the following mixtures of the COMPOUND OF FORMULA I, where this term preferably refers to a compound selected from one of the

Table 1, are important:

COMPOUND OF FORMULA I + piperonyl butoxide, COMPOUND OF FORMULA I + sesamex, COMPOUND OF FORMULA I + safroxan and COMPOUND OF FORMULA I + dodecyl imidazole.

The compounds of formula I according to the invention can also be used in combination with one or more other herbicides. In particular, the following mixtures of the COMPOUND OF FORMULA I, where this term preferably refers to a compound selected from one of the Table 1, are important:

COMPOUND OF FORMULA I + acetochlor, COMPOUND OF FORMULA I + acifluorfen, COMPOUND OF FORMULA I + acifluorfen-sodium, COMPOUND OF FORMULA I + aclonifen, COMPOUND OF FORMULA I + acrolein, COMPOUND OF FORMULA I +

alachlor, COMPOUND OF FORMULA I + alloxydim, COMPOUND OF FORMULA I + allyl alcohol, COMPOUND OF FORMULA I + ametryn, COMPOUND OF FORMULA I + amicarbazone, COMPOUND OF FORMULA I + amidosulfuron, COMPOUND OF FORMULA I + aminocyclopyrachlor, COMPOUND OF FORMULA I + aminopyralid, 5 COMPOUND OF FORMULA I + amitrole, COMPOUND OF FORMULA I + ammonium sulfamate, COMPOUND OF FORMULA I + anilofos, COMPOUND OF FORMULA I + asulam, COMPOUND OF FORMULA I + atraton, COMPOUND OF FORMULA I + atrazine, COMPOUND OF FORMULA I + azimsulfuron, COMPOUND OF FORMULA I + BCPC, COMPOUND OF FORMULA I + beflubutamid, COMPOUND OF FORMULA I + benazolin, 10 COMPOUND OF FORMULA I + bencarbazone, COMPOUND OF FORMULA I + benfluralin, COMPOUND OF FORMULA I + benfuresate, COMPOUND OF FORMULA I + bensulfuron, COMPOUND OF FORMULA I + bensulfuron-methyl, COMPOUND OF FORMULA I + bensulide, COMPOUND OF FORMULA I + bentazone, COMPOUND OF FORMULA I + benzfendizone, COMPOUND OF FORMULA I + benzobicyclon, COMPOUND OF 15 FORMULA I + benzofenap, COMPOUND OF THE FORMULA I + bicyclopyrone, COMPOUND OF FORMULA I + bifenox, COMPOUND OF FORMULA I + bilanafos, COMPOUND OF FORMULA I + bispyribac, COMPOUND OF FORMULA I + bispyribac-sodium, COMPOUND OF FORMULA I + borax, COMPOUND OF FORMULA I + bromacil, COMPOUND OF FORMULA I + bromobutide, COMPOUND OF FORMULA I + bromoxynil, 20 COMPOUND OF FORMULA I + butachlor, COMPOUND OF FORMULA I + butafenacil, COMPOUND OF FORMULA I + butamifos, COMPOUND OF FORMULA I + butralin, COMPOUND OF FORMULA I + butroxydim, COMPOUND OF FORMULA I + butylate, COMPOUND OF FORMULA I + cacodylic acid, COMPOUND OF FORMULA I + calcium chlorate, COMPOUND OF FORMULA I + cafenstrole, COMPOUND OF FORMULA I + 25 carbetamide, COMPOUND OF FORMULA I + carfentrazone, COMPOUND OF FORMULA I + carfentrazone-ethyl, COMPOUND OF FORMULA I + CDEA, COMPOUND OF FORMULA I + CEPC, COMPOUND OF FORMULA I + chlorflurenol, COMPOUND OF FORMULA I + chlorflurenol-methyl, COMPOUND OF FORMULA I + chloridazon, COMPOUND OF FORMULA I + chlorimuron, COMPOUND OF FORMULA I + chlorimuron-ethyl, 30 COMPOUND OF FORMULA I + chloroacetic acid, COMPOUND OF FORMULA I + chlorotoluron, COMPOUND OF FORMULA I + chlorpropham, COMPOUND OF FORMULA I + chlorsulfuron, COMPOUND OF FORMULA I + chlorthal, COMPOUND OF FORMULA I + chlorthal-dimethyl, COMPOUND OF FORMULA I + cinidon-ethyl, COMPOUND OF FORMULA I + cinmethylin, COMPOUND OF FORMULA I + cinosulfuron, COMPOUND OF 35 FORMULA I + cisanilide, COMPOUND OF FORMULA I + clethodim, COMPOUND OF FORMULA I + clodinafop, COMPOUND OF FORMULA I + clodinafop-propargyl,

COMPOUND OF FORMULA I + clomazone, COMPOUND OF FORMULA I + clomeprop,
COMPOUND OF FORMULA I + clopyralid, COMPOUND OF FORMULA I + cloransulam,
COMPOUND OF FORMULA I + cloransulam-methyl, COMPOUND OF FORMULA I + CMA,
COMPOUND OF FORMULA I + 4-CPB, COMPOUND OF FORMULA I + CPMF,
5 COMPOUND OF FORMULA I + 4-CPP, COMPOUND OF FORMULA I + CPPC,
COMPOUND OF FORMULA I + cresol, COMPOUND OF FORMULA I + cumyluron,
COMPOUND OF FORMULA I + cyanamide, COMPOUND OF FORMULA I + cyanazine,
COMPOUND OF FORMULA I + cycloate, COMPOUND OF FORMULA I + cyclosulfamuron,
COMPOUND OF FORMULA I + cycloxydim, COMPOUND OF FORMULA I + cyhalofop,
10 COMPOUND OF FORMULA I + cyhalofop-butyl, COMPOUND OF FORMULA I + 2,4-D,
COMPOUND OF FORMULA I + 3,4-DA, COMPOUND OF FORMULA I + daimuron,
COMPOUND OF FORMULA I + dalapon, COMPOUND OF FORMULA I + dazomet,
COMPOUND OF FORMULA I + 2,4-DB, COMPOUND OF FORMULA I + 3,4-DB,
COMPOUND OF FORMULA I + 2,4-DEB, COMPOUND OF FORMULA I + desmedipham,
15 COMPOUND OF FORMULA I + dicamba, COMPOUND OF FORMULA I + dichlobenil,
COMPOUND OF FORMULA I + ortho-dichlorobenzene, COMPOUND OF FORMULA I +
para-dichlorobenzene, COMPOUND OF FORMULA I + dichlorprop, COMPOUND OF
FORMULA I + dichlorprop-P, COMPOUND OF FORMULA I + diclofop, COMPOUND OF
FORMULA I + diclofop-methyl, COMPOUND OF FORMULA I + diclosulam, COMPOUND
20 OF FORMULA I + difenzoquat, COMPOUND OF FORMULA I + difenzoquat metilsulfate,
COMPOUND OF FORMULA I + diflufenican, COMPOUND OF FORMULA I + diflufenzopyr,
COMPOUND OF FORMULA I + dimefuron, COMPOUND OF FORMULA I + dimepiperate,
COMPOUND OF FORMULA I + dimethachlor, COMPOUND OF FORMULA I +
dimethametryn, COMPOUND OF FORMULA I + dimethenamid, COMPOUND OF
25 FORMULA I + dimethenamid-P, COMPOUND OF FORMULA I + dimethipin, COMPOUND
OF FORMULA I + dimethylarsinic acid, COMPOUND OF FORMULA I + dinitramine,
COMPOUND OF FORMULA I + dinoterb, COMPOUND OF FORMULA I + diphenamid,
COMPOUND OF FORMULA I + diquat, COMPOUND OF FORMULA I + diquat dibromide,
COMPOUND OF FORMULA I + dithiopyr, COMPOUND OF FORMULA I + diuron,
30 COMPOUND OF FORMULA I + DNOC, COMPOUND OF FORMULA I + 3,4-DP,
COMPOUND OF FORMULA I + DSMA, COMPOUND OF FORMULA I + EBEP,
COMPOUND OF FORMULA I + endothal, COMPOUND OF FORMULA I + EPTC,
COMPOUND OF FORMULA I + esprocarb, COMPOUND OF FORMULA I + ethalfluralin,
COMPOUND OF FORMULA I + ethametsulfuron, COMPOUND OF FORMULA I +
35 ethametsulfuron-methyl, COMPOUND OF FORMULA I + ethofumesate, COMPOUND OF
FORMULA I + ethoxyfen, COMPOUND OF FORMULA I + ethoxysulfuron, COMPOUND OF

FORMULA I + etobenzanid, COMPOUND OF FORMULA I + fenoxaprop-P, COMPOUND OF FORMULA I + fenoxaprop-P-ethyl, COMPOUND OF FORMULA I + fentrazamide, COMPOUND OF FORMULA I + ferrous sulfate, COMPOUND OF FORMULA I + flamprop-M, COMPOUND OF FORMULA I + flazasulfuron, COMPOUND OF FORMULA I +

5 florasulam, COMPOUND OF FORMULA I + fluazifop, COMPOUND OF FORMULA I + fluazifop-butyl, COMPOUND OF FORMULA I + fluazifop-P, COMPOUND OF FORMULA I + fluazifop-P-butyl, COMPOUND OF FORMULA I + flucarbazone, COMPOUND OF FORMULA I + flucarbazone-sodium, COMPOUND OF FORMULA I + flucetosulfuron, COMPOUND OF FORMULA I + fluchloralin, COMPOUND OF FORMULA I + flufenacet,

10 COMPOUND OF FORMULA I + flufenpyr, COMPOUND OF FORMULA I + flufenpyr-ethyl, COMPOUND OF FORMULA I + flumetsulam, COMPOUND OF FORMULA I + flumiclorac, COMPOUND OF FORMULA I + flumiclorac-pentyl, COMPOUND OF FORMULA I + flumioxazin, COMPOUND OF FORMULA I + fluometuron, COMPOUND OF FORMULA I + fluoroglycofen, COMPOUND OF FORMULA I + fluoroglycofen-ethyl, COMPOUND OF

15 FORMULA I + flupropanate, COMPOUND OF FORMULA I + flupyrsulfuron, COMPOUND OF FORMULA I + flupyrsulfuron-methyl-sodium, COMPOUND OF FORMULA I + flurenol, COMPOUND OF FORMULA I + fluridone, COMPOUND OF FORMULA I + flurochloridone, COMPOUND OF FORMULA I + fluroxypyr, COMPOUND OF FORMULA I + flurtamone, COMPOUND OF FORMULA I + fluthiacet, COMPOUND OF FORMULA I + fluthiacet-

20 methyl, COMPOUND OF FORMULA I + fomesafen, COMPOUND OF FORMULA I + foramsulfuron, COMPOUND OF FORMULA I + fosamine, COMPOUND OF FORMULA I + glufosinate, COMPOUND OF FORMULA I + glufosinate-ammonium, COMPOUND OF FORMULA I + glufosinate-P, COMPOUND OF FORMULA I + glyphosate, COMPOUND OF FORMULA I + glyphosate-trimesium, COMPOUND OF FORMULA I + halosulfuron,

25 COMPOUND OF FORMULA I + halosulfuron-methyl, COMPOUND OF FORMULA I + haloxyfop, COMPOUND OF FORMULA I + haloxyfop-P, COMPOUND OF FORMULA I + HC-252, COMPOUND OF FORMULA I + hexazinone, COMPOUND OF FORMULA I + imazamethabenz, COMPOUND OF FORMULA I + imazamethabenz-methyl, COMPOUND OF FORMULA I + imazamox, COMPOUND OF FORMULA I + imazapic, COMPOUND OF

30 FORMULA I + imazapyr, COMPOUND OF FORMULA I + imazaquin, COMPOUND OF FORMULA I + imazethapyr, COMPOUND OF FORMULA I + imazosulfuron, COMPOUND OF FORMULA I + indanofan, COMPOUND OF FORMULA I + indaziflam, COMPOUND OF FORMULA I + iodomethane, COMPOUND OF FORMULA I + iodosulfuron, COMPOUND OF FORMULA I + iodosulfuron-methyl-sodium, COMPOUND OF FORMULA I +

35 iofensulfuron, COMPOUND OF FORMULA I + ioxynil, COMPOUND OF FORMULA I + ipfencarbazone, COMPOUND OF FORMULA I + isoproturon, COMPOUND OF FORMULA I

+ isouron, COMPOUND OF FORMULA I + isoxaben, COMPOUND OF FORMULA I +
isoxachlortole, COMPOUND OF FORMULA I + isoxaflutole, COMPOUND OF FORMULA I
+ karbutilate, COMPOUND OF FORMULA I + lactofen, COMPOUND OF FORMULA I +
lenacil, COMPOUND OF FORMULA I + linuron, COMPOUND OF FORMULA I + MAA,
5 COMPOUND OF FORMULA I + MAMA, COMPOUND OF FORMULA I + MCPA,
COMPOUND OF FORMULA I + MCPA-thioethyl, COMPOUND OF FORMULA I + MCPB,
COMPOUND OF FORMULA I + mecoprop, COMPOUND OF FORMULA I + mecoprop-P,
COMPOUND OF FORMULA I + mefenacet, COMPOUND OF FORMULA I + mefluidide,
COMPOUND OF FORMULA I + mesosulfuron, COMPOUND OF FORMULA I +
10 mesosulfuron-methyl, COMPOUND OF FORMULA I + mesotrione, COMPOUND OF
FORMULA I + metam, COMPOUND OF FORMULA I + metamifop, COMPOUND OF
FORMULA I + metamitron, COMPOUND OF FORMULA I + metazachlor, COMPOUND OF
FORMULA I + methabenzthiazuron, COMPOUND OF FORMULA I + methylarsonic acid,
COMPOUND OF FORMULA I + methyldymron, COMPOUND OF FORMULA I + methyl
15 isothiocyanate, COMPOUND OF FORMULA I + metiozolin, COMPOUND OF FORMULA I +
metobenzuron, COMPOUND OF FORMULA I + metolachlor, COMPOUND OF FORMULA I
+ S-metolachlor, COMPOUND OF FORMULA I + metosulam, COMPOUND OF FORMULA I
+ metoxuron, COMPOUND OF FORMULA I + metribuzin, COMPOUND OF FORMULA I +
metsulfuron, COMPOUND OF FORMULA I + metsulfuron-methyl, COMPOUND OF
20 FORMULA I + MK-616, COMPOUND OF FORMULA I + molinate, COMPOUND OF
FORMULA I + monolinuron, COMPOUND OF FORMULA I + MSMA, COMPOUND OF
FORMULA I + naproanilide, COMPOUND OF FORMULA I + napropamide, COMPOUND
OF FORMULA I + naptalam, COMPOUND OF FORMULA I + neburon, COMPOUND OF
FORMULA I + nicosulfuron, COMPOUND OF FORMULA I + nonanoic acid, COMPOUND
25 OF FORMULA I + norflurazon, COMPOUND OF FORMULA I + oleic acid (fatty acids),
COMPOUND OF FORMULA I + orbencarb, COMPOUND OF FORMULA I +
orthosulfamuron, COMPOUND OF FORMULA I + oryzalin, COMPOUND OF FORMULA I +
oxadiargyl, COMPOUND OF FORMULA I + oxadiazon, COMPOUND OF FORMULA I +
oxasulfuron, COMPOUND OF FORMULA I + oxaziclomefone, COMPOUND OF FORMULA
30 I + oxyfluorfen, COMPOUND OF FORMULA I + paraquat, COMPOUND OF FORMULA I +
paraquat dichloride, COMPOUND OF FORMULA I + pebulate, COMPOUND OF FORMULA
I + pendimethalin, COMPOUND OF FORMULA I + penoxsulam, COMPOUND OF
FORMULA I + pentachlorophenol, COMPOUND OF FORMULA I + pentanochlor,
COMPOUND OF FORMULA I + pentoxazone, COMPOUND OF FORMULA I + pethoxamid,
35 COMPOUND OF FORMULA I + petroleum oils, COMPOUND OF FORMULA I +
phenmedipham, COMPOUND OF FORMULA I + phenmedipham-ethyl, COMPOUND OF

FORMULA I + picloram, COMPOUND OF FORMULA I + picolinafen, COMPOUND OF
FORMULA I + pinoxaden, COMPOUND OF FORMULA I + piperophos, COMPOUND OF
FORMULA I + potassium arsenite, COMPOUND OF FORMULA I + potassium azide,
COMPOUND OF FORMULA I + pretilachlor, COMPOUND OF FORMULA I + primisulfuron,
5 COMPOUND OF FORMULA I + primisulfuron-methyl, COMPOUND OF FORMULA I +
prodiamine, COMPOUND OF FORMULA I + profluazol, COMPOUND OF FORMULA I +
profoxydim, COMPOUND OF FORMULA I + prometon, COMPOUND OF FORMULA I +
prometryn, COMPOUND OF FORMULA I + propachlor, COMPOUND OF FORMULA I +
propanil, COMPOUND OF FORMULA I + propaquizafop, COMPOUND OF FORMULA I +
10 propazine, COMPOUND OF FORMULA I + propham, COMPOUND OF FORMULA I +
propisochlor, COMPOUND OF FORMULA I + propoxycarbazone, COMPOUND OF
FORMULA I + propoxycarbazone-sodium, COMPOUND OF FORMULA I + propyrisulfuron,
COMPOUND OF FORMULA I + propyzamide, COMPOUND OF FORMULA I +
prosulfocarb, COMPOUND OF FORMULA I + prosulfuron, COMPOUND OF FORMULA I +
15 pyraclonil, COMPOUND OF FORMULA I + pyraflufen, COMPOUND OF FORMULA I +
pyraflufen-ethyl, COMPOUND OF FORMULA I + pyrasulfutole, COMPOUND OF FORMULA
I + pyrazolynate, COMPOUND OF FORMULA I + pyrazosulfuron, COMPOUND OF
FORMULA I + pyrazosulfuron-ethyl, COMPOUND OF FORMULA I + pyrazoxyfen,
COMPOUND OF FORMULA I + pyribenzoxim, COMPOUND OF FORMULA I + pyributicarb,
20 COMPOUND OF FORMULA I + pyridafol, COMPOUND OF FORMULA I + pyridate,
COMPOUND OF FORMULA I + pyriftalid, COMPOUND OF FORMULA I + pyriminobac,
COMPOUND OF FORMULA I + pyriminobac-methyl, COMPOUND OF FORMULA I +
pyrimisulfan, COMPOUND OF FORMULA I + pyriothiobac, COMPOUND OF FORMULA I +
pyriothiobac-sodium, COMPOUND OF FORMULA I + pyroxsulam, COMPOUND OF
25 FORMULA I + pyroxasulfone, COMPOUND OF FORMULA I + quinclo rac, COMPOUND OF
FORMULA I + quinmerac, COMPOUND OF FORMULA I + quincloamine, COMPOUND OF
FORMULA I + quizalofop, COMPOUND OF FORMULA I + quizalofop-P, COMPOUND OF
FORMULA I + rimsulfuron, COMPOUND OF FORMULA I + saflufenacil, COMPOUND OF
FORMULA I + sethoxydim, COMPOUND OF FORMULA I + siduron, COMPOUND OF
30 FORMULA I + simazine, COMPOUND OF FORMULA I + simetryn, COMPOUND OF
FORMULA I + SMA, COMPOUND OF FORMULA I + sodium arsenite, COMPOUND OF
FORMULA I + sodium azide, COMPOUND OF FORMULA I + sodium chlorate,
COMPOUND OF FORMULA I + sulcotrione, COMPOUND OF FORMULA I + sulfentrazone,
COMPOUND OF FORMULA I + sulfometuron, COMPOUND OF FORMULA I +
35 sulfometuron-methyl, COMPOUND OF FORMULA I + sulfosate, COMPOUND OF
FORMULA I + sulfosulfuron, COMPOUND OF FORMULA I + sulfuric acid, COMPOUND OF

FORMULA I + tar oils, COMPOUND OF FORMULA I + 2,3,6-TBA, COMPOUND OF
 FORMULA I + TCA, COMPOUND OF FORMULA I + TCA-sodium, COMPOUND OF
 FORMULA I + tebuthiuron, COMPOUND OF FORMULA I + tefuryltrione, COMPOUND OF
 FORMULA I + tembotrione, COMPOUND OF FORMULA I + tepraloxym, COMPOUND OF
 5 FORMULA I + terbacil, COMPOUND OF FORMULA I + terbutylazine, COMPOUND OF
 FORMULA I + terbuthylazine, COMPOUND OF FORMULA I + terbutryn, COMPOUND OF
 FORMULA I + thenylchlor, COMPOUND OF FORMULA I + thiazopyr, COMPOUND OF
 FORMULA I + thien carbazole, COMPOUND OF FORMULA I + thien carbazole-methyl,
 COMPOUND OF FORMULA I + thifensulfuron, COMPOUND OF FORMULA I +
 10 thifensulfuron-methyl, COMPOUND OF FORMULA I + thiobencarb, COMPOUND OF
 FORMULA I + tiocarbazil, COMPOUND OF FORMULA I + topramezone, COMPOUND OF
 FORMULA I + tralkoxydim, COMPOUND OF FORMULA I + triafamone, COMPOUND OF
 FORMULA I + tri-allate, COMPOUND OF FORMULA I + triasulfuron, COMPOUND OF
 FORMULA I + triaziflam, COMPOUND OF FORMULA I + tribenuron, COMPOUND OF
 15 FORMULA I + tribenuron-methyl, COMPOUND OF FORMULA I + tricamba, COMPOUND
 OF FORMULA I + triclopyr, COMPOUND OF FORMULA I + trietazine, COMPOUND OF
 FORMULA I + trifloxysulfuron, COMPOUND OF FORMULA I + trifloxysulfuron-sodium,
 COMPOUND OF FORMULA I + trifluralin, COMPOUND OF FORMULA I + triflusulfuron,
 COMPOUND OF FORMULA I + triflusulfuron-methyl, COMPOUND OF FORMULA I +
 20 trihydroxytriazine, COMPOUND OF FORMULA I + tritosulfuron, COMPOUND OF
 FORMULA I + [3-[2-chloro-4-fluoro-5-(1-methyl-6-trifluoromethyl-2,4-dioxo-1,2,3,4-
 tetrahydropyrimidin-3-yl)phenoxy]-2-pyridyloxy]acetic acid ethyl ester (CAS RN 353292-31-
 6), COMPOUND OF FORMULA I + 4-[(4,5-dihydro-3-methoxy-4-methyl-5-oxo)-1H-1,2,4-
 triazol-1-ylcarbonylsulfamoyl]-5-methylthiophene-3-carboxylic acid (BAY636), COMPOUND
 25 OF FORMULA I + BAY747 (CAS RN 335104-84-2), COMPOUND OF FORMULA I +
 topramezone (CAS RN 210631-68-8), COMPOUND OF FORMULA I + 4-hydroxy-3-[[2-[(2-
 methoxyethoxy)methyl]-6-(trifluoromethyl)-3-pyridinyl]carbonyl]-bicyclo[3.2.1]oct-3-en-2-one
 (CAS RN 352010-68-5), COMPOUND OF FORMULA I + 4-hydroxy-3-[[2-(3-
 methoxypropyl)-6-(difluoromethyl)-3-pyridinyl]carbonyl]-bicyclo[3.2.1]oct-3-en-2-one and
 30 COMPOUND OF FORMULA I + ZJ0273.

The compounds of formula (I) according to the invention can also be used in combination
 with safeners. Preferably, in these mixtures, the compound of the formula (I) is one of those
 compounds listed in Table 1 above. The following mixtures with safeners, especially, come
 35 into consideration:

compound of formula (I) + cloquintocet-mexyl, compound of formula (I) + cloquintocet acid and salts thereof, compound of formula (I) + cyprosulfamide, compound of formula (I) + fenchlorazole-ethyl, compound of formula (I) + fenchlorazole acid and salts thereof, compound of formula (I) + mefenpyr-diethyl, compound of formula (I) + mefenpyr diacid, compound of formula (I) + isoxadifen-ethyl, compound of formula (I) + isoxadifen acid, compound of formula (I) + furilazole, compound of formula (I) + furilazole R isomer, compound of formula (I) + benoxacor, compound of formula (I) + dichlormid, compound of formula (I) + AD-67, compound of formula (I) + oxabetrinil, compound of formula (I) + cyometrinil, compound of formula (I) + cyometrinil Z-isomer, compound of formula (I) + fenclorim, compound of formula (I) + cyprosulfamide, compound of formula (I) + naphthalic anhydride, compound of formula (I) + flurazole, compound of formula (I) + N-(2-methoxybenzoyl)-4-[(methylaminocarbonyl)amino]benzenesulfonamide, compound of formula (I) + CL 304,415, compound of formula (I) + dicyclonon, compound of formula (I) + fluxofenim, compound of formula (I) + DKA-24, compound of formula (I) + R-29148 and compound of formula (I) + PPG-1292. A safening effect can also be observed for the mixtures compound of the formula (I) + dymron, compound of the formula (I) + MCPA, compound of the formula (I) + mecoprop and compound of the formula (I) + mecoprop-P.

In the above-mentioned mixtures of compounds of formula I, in particular a compound selected from said Table 1, with other insecticides, fungicides, herbicides, safeners, adjuvants and the like, the mixing ratios can vary over a large range and are, preferably 100:1 to 1:6000, especially 50:1 to 1:50, more especially 20:1 to 1:20, even more especially 10:1 to 1:10. Those mixing ratios are understood to include, on the one hand, ratios by weight and also, on other hand, molar ratios.

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The mixtures can advantageously be used in the above-mentioned formulations (in which case "active ingredient" relates to the respective mixture of compound of formula I with the mixing partner).

Some mixtures may comprise active ingredients which have significantly different physical, chemical or biological properties such that they do not easily lend themselves to the same conventional formulation type. In these circumstances other formulation types may be prepared. For example, where one active ingredient is a water insoluble solid and the other a water insoluble liquid, it may nevertheless be possible to disperse each active ingredient in the same continuous aqueous phase by dispersing the solid active ingredient as a suspension (using a preparation analogous to that of an SC) but dispersing the liquid active

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ingredient as an emulsion (using a preparation analogous to that of an EW). The resultant composition is a suspoemulsion (SE) formulation.

5 The mixtures comprising a compound of formula I selected from Table T1 and one or more active ingredients as described above can be applied, for example, in a single "ready-mix" form, in a combined spray mixture composed from separate formulations of the single active ingredient components, such as a "tank-mix", and in a combined use of the single active ingredients when applied in a sequential manner, i.e. one after the other with a reasonably short period, such as a few hours or days. The order of applying the compounds of formula I
10 selected from Table T1 and the active ingredients as described above is not essential for working the present invention.

A compound of the formula (I) in a preferred embodiment, independent of any other embodiments, is in the form of a plant propagation material treating (or protecting)
15 composition, wherein said plant propagation material protecting composition may comprises additionally a colouring agent. The plant propagation material protecting composition or mixture may also comprise at least one polymer from water-soluble and water-dispersible film-forming polymers that improve the adherence of the active ingredients to the treated plant propagation material, which polymer generally has an average molecular weight of at
20 least 10,000 to about 100,000.

Examples of application methods for the compounds of the invention and compositions thereof, that is the methods of controlling pests in the agriculture, are spraying, atomizing, dusting, brushing on, dressing, scattering or pouring - which are to be selected to suit the
25 intended aims of the prevailing circumstances.

One method of application in agriculture is application to the foliage of the plants (foliar application), it being possible to select frequency and rate of application to match the danger of infestation with the pest/fungi in question. Alternatively, the active ingredient can
30 reach the plants via the root system (systemic action), by applying the compound to the locus of the plants, for example by application of a liquid composition of the compound into the soil (by drenching), or by applying a solid form of the compound in the form of granules to the soil (soil application). In the case of paddy rice plants, such granules can be metered into the flooded paddy-field. The application of the compounds of the present invention to
35 the soil is a preferred application method.

Typical rates of application per hectare is generally 1 to 2000 g of active ingredient per hectare, in particular 10 to 1000 g/ha, preferably 10 to 600 g/ha, such as 50 to 300 g/ha.

The compounds of the invention and compositions thereof are also suitable for the protection of plant propagation material, for example seeds, such as fruit, tubers or kernels, or nursery plants, against pests of the abovementioned type. The propagation material can be treated with the compound prior to planting, for example seed can be treated prior to sowing. Alternatively, the compound can be applied to seed kernels (coating), either by soaking the kernels in a liquid composition or by applying a layer of a solid composition. It is also possible to apply the compositions when the propagation material is planted to the site of application, for example into the seed furrow during drilling. These treatment methods for plant propagation material and the plant propagation material thus treated are further subjects of the invention. Typical treatment rates would depend on the plant and pest/fungi to be controlled and are generally between 1 to 200 grams per 100 kg of seeds, preferably between 5 to 150 grams per 100 kg of seeds, such as between 10 to 100 grams per 100 kg of seeds. The application of the compounds of the present invention to seeds is a preferred application method.

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

The present invention also comprises seeds coated or treated with or containing a compound of formula I. The term "coated or treated with and/or containing" generally signifies that the active ingredient is for the most part on the surface of the seed at the time of application, although a greater or lesser part of the ingredient may penetrate into the seed material, depending on the method of application. When the said seed product is (re)planted, it may absorb the active ingredient. In an embodiment, the present invention makes available a plant propagation material adhered thereto with a compound of formula (I). Further, it is hereby made available, a composition comprising a plant propagation material treated with a compound of formula (I).

Seed treatment comprises all suitable seed treatment techniques known in the art, such as seed dressing, seed coating, seed dusting, seed soaking and seed pelleting. The seed treatment application of the compound formula I, which is a preferred application method, can be carried out by any known methods, such as spraying or by dusting the seeds before sowing or during the sowing/planting of the seeds.

Compounds of this invention are effective for controlling nematode, insect, acarid pests and/or fungal pathogens of agronomic plants, both growing and harvested, when employed alone, they may also be used in combination with other biological active agents used in agriculture, such as one or more nematicides, insecticides, acaricides, fungicides, bactericides, plant activator, molluscicide, and pheromones (whether chemical or biological). Mixing the compounds of the invention or the compositions thereof in the use form as pesticides with other pesticides frequently results in a broader pesticidal spectrum of action. For example, the formula (I) compounds of this invention may be used effectively in conjunction or combination with pyrethroids, neonicotinoids, macrolides, diamides, phosphates, carbamates, cyclodienes, formamidines, phenol tin compounds, chlorinated hydrocarbons, benzoylphenyl ureas, pyrroles and the like.

The activity of the compositions according to the invention can be broadened considerably, and adapted to prevailing circumstances, by adding, for example, one or more insecticidally, acaricidally, nematocidally and/or fungicidally active agents. The combinations compounds of formula (I) with other insecticidally, acaricidally, nematocidally and/or fungicidally active agents may also have further surprising advantages which can also be described, in a wider sense, as synergistic activity. For example, better tolerance by plants, reduced phytotoxicity, pests or fungi can be controlled in their different development stages or better behaviour during their production, for example during grinding or mixing, during their storage or during their use.

In a further aspect of the invention, there is provided a method of combating and controlling insects from the Aphididae family which are resistant to a neonicotinoid insecticide, which method comprises applying a compound of the formula (I) in free form or in agrochemically acceptable salt form to said neonicotinoid resistant insects.

By virtue of the surprising ability of a compound of the formula (I) to control such neonicotinoid resistant insects, the invention also provides a method of protecting a crop of useful plants, wherein said crop is susceptible to and/or under attack from such insects which are resistant to a neonicotinoid insecticide. Such a method involves applying to said crop, treating a plant propagation material of said crop with, and/or applying to said insects, a compound of the formula (I) in free form or in agrochemically acceptable salt form.

Since a compound of the formula (I) does not exhibit cross-resistance to neonicotinoid resistant aphids, it may be used in a resistance management strategy with a view to controlling resistance to the neonicotinoid class of insecticides. Such a strategy may involve alternating applications of a compound of the formula (I) and a neonicotinoid

insecticide, to said insects or to a crop of useful plants susceptible to and/or under attack from said insects. Such a strategy can be applied either on an application by application alternation (including different types of application, such as treatment of plant propagation material and foliar spray), or seasonal/crop alternation basis (e.g. use of a compound according to claim 1 on a first crop/for control in a first growing season, and use a
5 neonicotinoid insecticide for a subsequent crop/growing season, or *vice versa*), and this forms yet a further aspect of the invention.

As mentioned herein, not only are insects from the *Aphididae* family pests of a number of commercially important crops, the viruses that these insects carry also pose a threat. With the emergence of resistance to neonicotinoid insecticides, the severity of this
10 threat has increased. Thus, a further aspect of the invention provides a method of controlling a plant virus in a crop of useful plants susceptible to and/or under attack by neonicotinoid resistant insects which carry said plant virus, which method comprises applying to said crop, treating a plant propagation material of said crop with, and/or applying
15 to said insects, the compound of the formula (I) in free form or in agrochemically acceptable salt form. Examples of plant viruses that may be controlled according to this aspect of the invention include Sobemovirus, Caulimovirus (Caulimoviridae), Closterovirus (Closteroviridae), Sequivirus (Sequiviridae), Enamovirus (Luteoviridae), Luteovirus (Luteoviridae), Polerovirus (Luteoviridae), Umbravirus, Nanovirus (Nanoviridae),
20 Cytorhabdovirus (Rhabdoviridae), Nucleorhabdovirus (Rhabdoviridae).

Methods of the invention as described herein may also involve a step of assessing whether insects are resistant to neonicotinoid insecticides and/or whether said insects carry a plant virus. This step will in general involve collecting a sample of insects from the area (e.g. crop, field, habitat) to be treated, before actually applying the compound of the formula
25 (I), and testing (for example using any suitable phenotypic, biochemical or molecular biological technique applicable) for resistance/sensitivity and/or the presence or absence of a virus.

The term neonicotinoid insecticide as used herein refers to any insecticidal compound that acts at the insect nicotinic acetylcholine receptor, and in particular refers to
30 those compounds classified as neonicotinoid insecticides according to Yamamoto (1996, Agrochem Jpn 68:14-15). Examples of neonicotinoid insecticides include those in Group 4A of the IRAC (insecticide resistance action committee, Crop Life) mode of action classification scheme, e.g. acetamiprid, clothianidin, dinotefuran, imidacloprid, nitenpyram, thiacloprid, and thiamethoxam, as well as any compound having the same mode of action.

35 By the terms "control" or "controlling" as applied to insects, it is meant that the targeted insects are repelled from or less attracted to the crops to be protected.

Additionally, as applied to insects, the terms "control" or "controlling" may also refer to the inability, or reduced ability, of the insects to feed or lay eggs. These terms may further include that the targeted insects are killed.

Thus the method of the invention may involve the use of an amount of the active ingredient that is sufficient to repel insects (i.e a repellently effective amount of active ingredient), an amount of the active ingredient that is sufficient to stop insects feeding, or it may involve the use of an insecticidally effective amount of active ingredient (i.e. an amount sufficient to kill insects), or any combination of the above effects. Where the terms "control" or "controlling" are applied to viruses it is meant that the level of viral infection of a crop of useful plants is lower than would be observed in the absence of any application of the compound of the formula (I).

The terms "applying" and "application" are understood to mean direct application to the insect to be controlled, as well as indirect application to said insect, for example through application to the crop or plant on which the insect acts as pest, or to the locus of said crop or insect, or indeed through treatment of the plant propagation material of said crop of plant.

Thus the compound of the formula (I) may be applied by any of the known means of applying pesticidal compounds. For example, it may be applied, formulated or unformulated, to the pests or to a locus of the pests (such as a habitat of the pests, or a growing plant liable to infestation by the pests) or to any part of the plant, including the foliage, stems, branches or roots, to the plant propagation material, such as seed, before it is planted or to other media in which plants are growing or are to be planted (such as soil surrounding the roots, the soil generally, paddy water or hydroponic culture systems), directly or it may be sprayed on, dusted on, applied by dipping, applied as a cream or paste formulation, applied as a vapour or applied through distribution or incorporation of a composition (such as a granular composition or a composition packed in a water-soluble bag) in soil or an aqueous environment.

The methods of the invention are particularly applicable to the control of neonicotinoid resistant insects (and neonicotinoid resistance in insects) of the family Aphididae, such as: *Acyrtosiphum pisum*, *Aphis citricola*, *Aphis craccivora*, *Aphis fabae*, *Aphis frangulae*, *Aphis glycines*, *Aphis gossypii*, *Aphis nasturtii*, *Aphis pomi*, *Aphis spiraeicola*, *Aulacorthum solani*, *Brachycaudus helichrysi*, *Brevicoryne brassicae*, *Diuraphis noxia*, *Dysaphis devectora*, *Dysaphis plantaginea*, *Eriosoma lanigerum*, *Hyalopterus pruni*, *Lipaphis erysimi*, *Macrosiphum avenae*, *Macrosiphum euphorbiae*, *Macrosiphum rosae*, *Myzus cerasi* F., *Myzus nicotianae*, *Myzus persicae*, *Nasonovia ribisnigri*, *Pemphigus bursarius*, *Phorodon humuli*, *Rhopalosiphum insertum* Wa, *Rhopalosiphum maidis* Fitch, *Rhopalosiphum padi* L., *Schizaphis graminum* Rond., *Sitobion avenae*, *Toxoptera aurantii*,

Toxoptera citricola, Phylloxera vitifoliae, Acyrthosiphon dirhodum, Acyrthosiphon solani, Aphis forbesi, Aphis grossulariae, Aphis idaei, Aphis illinoisensis, Aphis maidiradicis, Aphis ruborum, Aphis schneideri, Brachycaudus persicaecola, Cavariella aegopodii Scop., Cryptomyzus galeopsidis, Cryptomyzus ribis, Hyadaphis pseudobrassicae, Hyalopterus amygdali, Hyperomyzus pallidus, Macrosiphoniella sanborni, Metopolophium dirhodum, Myzus malisuctus, Myzus varians, Neotoxoptera sp, Nippolachnus piri Mats., Oregma lanigera Zehnter, Rhopalosiphum fitchii Sand., Rhopalosiphum nymphaeae, Rhopalosiphum sacchari Ze, Sappaphis piricola Okam. + T, Schizaphis piricola, Toxoptera theobromae Sch, and Phylloxera coccinea.

Specific examples of neonicotinoid resistant aphids include Acyrthosiphum pisum, Aphis citricola, Aphis craccivora, Aphis fabae, Aphis frangulae, Aphis glycines, Aphis gossypii, Aphis nasturtii, Aphis pomi, Aphis spiraecola, Aulacorthum solani, Brachycaudus helichrysi, Brevicoryne brassicae, Diuraphis noxia, Dysaphis devector, Dysaphis plantaginea, Eriosoma lanigerum, Hyalopterus pruni, Lipaphis erysimi, Macrosiphum avenae, Macrosiphum euphorbiae, Macrosiphum rosae, Myzus cerasi F., Myzus nicotianae, Myzus persicae, Nasonovia ribisnigri, Pemphigus bursarius, Phorodon humuli, Rhopalosiphum insertum Wa, Rhopalosiphum maidis Fitch, Rhopalosiphum padi L., Schizaphis graminum Rond., Sitobion avenae, Toxoptera aurantii, Toxoptera citricola, and Phylloxera vitifoliae.

In an embodiment, the neonicotinoid resistant aphids are one or more of Aphis gossypii and Myzus persicae.

Since the methods of the invention have the effect of controlling insect pest and or viral infestation in crops of useful plants, said methods may also be viewed as methods of improving and/or maintaining plant health in said crops or as methods of increasing/maintaining the well-being of a crop.

Crops of useful plants that may be protected according to the invention, and to which the compound of the formula (I) may be applied in accordance with the invention, include: cereals, such as wheat, barley, rye, oats, rice, maize (fodder maize and sugar maize / sweet and field corn) or sorghum; beet, such as sugar or fodder beet; fruit, for example pomaceous fruit, stone fruit, tree nut or soft fruit, such as apples, pears, plums, peaches, bananas, almonds, walnuts, pistachios, cherries or berries, for example strawberries, raspberries or blackberries; leguminous crops, such as beans, lentils, peas or soya; oil crops, such as oilseed rape, mustard, poppies, olives, sunflowers, coconut, castor, cocoa or ground nuts; cucurbits, such as pumpkins, marrow, cucumbers or melons; fibre plants, such as cotton, flax, hemp or jute; citrus fruit, such as oranges, lemons, clementines, grapefruit or tangerines; vegetables, such as spinach, lettuce, asparagus, cabbages, iceberg, carrots,

onions, tomatoes, paprika, potatoes or bell peppers; Lauraceae, such as avocado, Cinnamonum or camphor; and also tobacco, nuts, coffee, eggplants, sugarcane, tea, pepper, grapevines, hops, the plantain family, latex plants, lawn, turf, fodder grass, and ornamentals, such as petunias, geranium/pelargoniums, pansies and impatiens; and shrubs, broad-leaved trees and evergreens, such as conifers.

Crops of useful plants are to be understood as including those which are/have been made tolerant to herbicides or classes of herbicide (such as, for example, imidazolinones such as imazamox, as is the case with Clearfield® Rice) and/or insecticide or classes of insecticide, and/or which have acquired a so-called “output” trait (e.g. improved storage stability, higher nutritional value, improved yield etc.) by conventional plant-breeding or genetic engineering methods.

Thus useful plants include those where the plants are transgenic, or where the plants have inherited a trait as a consequence of the introduction at least one transgene in their lineage.

Table below lists key aphids and crops they target.

PEST	COMMON NAME	EXAMPLES OF CROPS
<i>Acyrtosiphum pisum</i>	Pea aphid	pea
<i>Aphis citricola</i>	Citrus aphid	citrus
<i>Aphis craccivora</i>	Cowpea aphid	vegetables, beans, sugarbeet
<i>Aphis fabae</i>	Black bean aphid	vegetables, beans, sugarbeet
<i>Aphis frangulae</i>	Breaking buckthorn aphid	cotton potato
<i>Aphis glycines</i>	Soybean aphid	soybean
<i>Aphis gossypii</i>	Cotton aphid	cotton, vegetables, citrus, potato
<i>Aphis nasturtii</i>	Buckthorn aphid	potato
<i>Aphis pomi</i>	Green apple aphid	apple
<i>Aphis spiraecola</i>	Green citrus aphid	apple, citrus, papaya
<i>Aulacorthum solani</i>	Foxglove aphid	citrus, sugar beet
<i>Brachycaudus helichrysi</i>	Plum aphid	peach, stone fruits
<i>Brevicoryne brassicae</i>	Cabbage aphid	brassica
<i>Diuraphis noxia</i>	Russian wheat aphid	cereals
<i>Dysaphis devecta</i>	Leaf-curling aphid	pome fruits
<i>Dysaphis plantaginea</i>	Rosy apple aphid	pome fruits, stone fruits
<i>Eriosoma lanigerum</i>	Woolly apple aphid	pome fruits, stone fruits
<i>Hyalopterus pruni</i>	Mealy plum aphid	stone fruits
<i>Lipaphis erysimi</i>	False cabbage aphid	brassica
<i>Macrosiphum avenae</i>	Grain aphid	cereals
<i>Macrosiphum euphorbiae</i>	Potato aphid	potato, sugar beet, vegetables
<i>Macrosiphum rosae</i>	Rose aphid	ornamentals
<i>Myzus cerasi</i> F.	Black cherry aphid	cherry, stone fruits

Myzus nicotianae	Tobacco aphid	tobacco
Myzus persicae	Peach aphid	peach, deciduous fruits, vegetables, sugarbeet, potato, cereals, sugarcane, maize, ornamentals
Myzus persicae	Green peach aphid	peach, deciduous fruits, vegetables, sugarbeet, potato, cereals, sugarcane, maize, ornamentals
Nasonovia ribisnigri	Lettuce aphid	vegetables
Pemphigus bursarius	Lettuce root aphid	vegetables
Phorodon humuli	Hop aphid	hops
Rhopalosiphum insertum Wa	Apple-grass aphid	Deciduous fruits, ornamentals
Rhopalosiphum maidis Fitch	Corn leaf aphid	Maize, cereals
Rhopalosiphum padi L.	Wheat aphid	Maize, cereals
Schizaphis graminum Rond.	Spring grain aphid	cereals
Sitobion avenae	Wheat aphid	cereals
Toxoptera aurantii	Citrus aphid	citrus
Toxoptera citricola	Black citrus aphid	citrus
Phylloxera vitifoliae	Grape Phylloxera	vine

The term "plant propagation material" is understood to denote all the generative parts of the plant, such as seeds, which can be used for the multiplication of the latter and vegetative plant materials such as cuttings and tubers (for example, potatoes).

5 Accordingly, as used herein, part of a plant includes propagation material. There may be mentioned, *e.g.*, the seeds (in the strict sense), roots, fruits, tubers, bulbs, rhizomes, parts of plants. Germinated plants and young plants, which are to be transplanted after germination or after emergence from the soil, may also be mentioned. These young plants may be protected before transplantation by a total or partial treatment by
10 immersion.

Parts of plant and plant organs that grow at later point in time are any sections of a plant that develop from a plant propagation material, such as a seed. Parts of plant, plant organs, and plants can also benefit from the pest damage protection achieved by the application of the compound on to the plant propagation material. In an embodiment,
15 certain parts of a plant and certain plant organs that grow at later point in time can also be considered as plant propagation material, which can themselves be applied (or treated) with the compound; and consequently, the plant, further parts of the plant and further plant organs that develop from the treated parts of plant and treated plant organs can also benefit from the pest damage protection achieved by the application of the
20 compound on to the certain parts of plant and certain plant organs.

Methods for applying or treating pesticidal active ingredients on to plant propagation material, especially seeds, are known in the art, and include dressing, coating, pelleting and soaking application methods of the propagation material. It is preferred that the plant propagation material is a seed.

5 Although it is believed that the present method can be applied to a seed in any physiological state, it is preferred that the seed be in a sufficiently durable state that it incurs no damage during the treatment process. Typically, the seed would be a seed that had been harvested from the field; removed from the plant; and separated from any cob, stalk, outer husk, and surrounding pulp or other non-seed plant material. The seed
10 would preferably also be biologically stable to the extent that the treatment would cause no biological damage to the seed. It is believed that the treatment can be applied to the seed at any time between harvest of the seed and sowing of the seed or during the sowing process (seed directed applications). The seed may also be primed either before or after the treatment.

15 Even distribution of the compound and adherence thereof to the seeds is desired during propagation material treatment. Treatment could vary from a thin film (dressing) of a formulation containing the compound, for example, a mixture of active ingredient(s), on a plant propagation material, such as a seed, where the original size and/or shape are recognizable to an intermediary state (such as a coating) and then to a thicker film (such as
20 pelleting with many layers of different materials (such as carriers, for example, clays; different formulations, such as of other active ingredients; polymers; and colourants) where the original shape and/or size of the seed is no longer recognisable.
into the controlled release material or applied between layers of materials, or both.

 The seed treatment occurs to an unsown seed, and the term "unsown seed" is
25 meant to include seed at any period between the harvest of the seed and the sowing of the seed in the ground for the purpose of germination and growth of the plant.

 Treatment to an unsown seed is not meant to include those practices in which the active ingredient is applied to the soil but would include any application practice that would target the seed during the planting process.

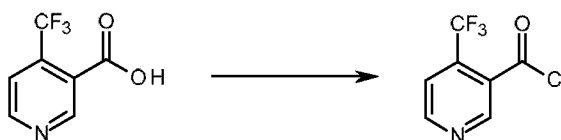
30 Preferably, the treatment occurs before sowing of the seed so that the sown seed has been pre-treated with the compound. In particular, seed coating or seed pelleting are preferred in the treatment of the compound. As a result of the treatment, the compound is adhered on to the seed and therefore available for pest control.

 The treated seeds can be stored, handled, sowed and tilled in the same manner
35 as any other active ingredient treated seed.

The invention is illustrated by the following preparation examples.

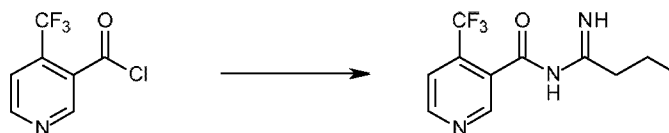
EXAMPLE 1: Preparation of N-butanimidoyl-4-trifluoromethyl-pyridine-3-carboxamide
(Compound T1-021)

Step A: 4-trifluoromethylpyridine-3-carbonyl chloride



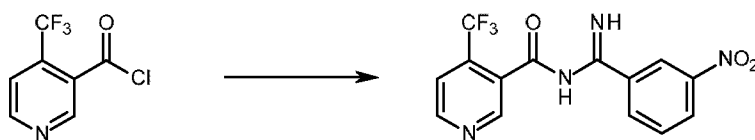
To a suspension of 4-trifluoromethyl nicotinic acid (19.1 g, 100 mmol) in toluene (200 mL) and one drop of DMF at room temperature was slowly added thionyl chloride (10.9 mL, 150 mmol) using a dropping funnel. After completion of the addition, the obtained mixture was heated to reflux for an additional 3 hours. The obtained brown solution was carefully concentrated under reduced pressure followed by Kugelrohr-distillation to give the desired product as an oil. B.p. 100-102 °C/10 mbar.

Step B: N-butanimidoyl-4-methyl-pyridine-3-carboxamide



To a stirred suspension of butanamide hydrochloride (75 mg, 0.61 mmol) in dichloromethane (3.0 mL) at room temperature was added triethylamine (0.26 mL, 1.84 mmol) via syringe. The reaction mixture was cooled to 0 °C and 4-trifluoromethylpyridine-3-carbonyl chloride (141 mg, 0.670 mmol) was added slowly via syringe. After completion of the addition, the reaction mixture was allowed to warm to room temperature and stirred for another 12 h. The reaction mixture was diluted with dichloromethane and silica gel was added. After evaporation of the volatiles, the residual was purified by flash chromatography on silica gel (0-100% EtOAc/cyclohexane) to give the desired product as a white solid. M.p. 80-81 °C.

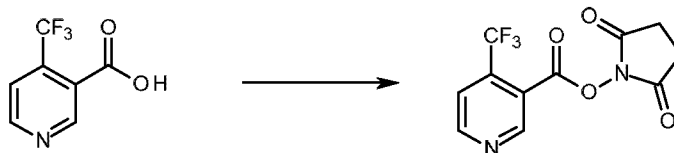
EXAMPLE 2: Preparation of 4-trifluoromethyl-N-(3-nitrobenzenecarboximidoyl)pyridine-3-carboxamide (Compound T1-041)



To a stirred suspension of 3-nitrobenzamidino (100 mg, 0.61 mmol) in dichloromethane (3.0 mL) at room temperature was added triethylamine (0.17 mL, 1.21 mmol) via syringe. The reaction mixture was cooled to 0 °C and 4-trifluoromethylpyridine-3-carbonyl chloride (141 mg, 0.670 mmol) was added slowly via syringe. After completion of the addition, the reaction mixture was allowed to warm to room temperature and stirred for another 12 h. The reaction mixture was diluted with dichloromethane and silica gel was added. After evaporation of the volatiles, the residual was purified by flash chromatography on silica gel (0-100% EtOAc/cyclohexane) to give the desired product as a white solid. M.p. 188-190 °C.

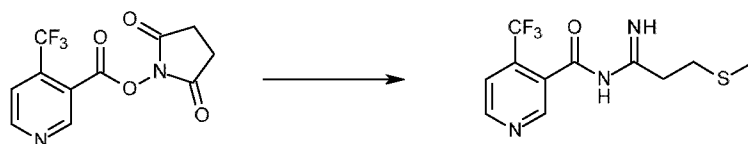
EXAMPLE 3: Preparation of 4-trifluoromethyl-N-(3-methylsulfanylpropanimidoyl)pyridine-3-carboxamide (Compound T1-051)

Step A: (2,5-dioxopyrrolidin-1-yl) 4-trifluoromethylpyridine-3-carboxylate



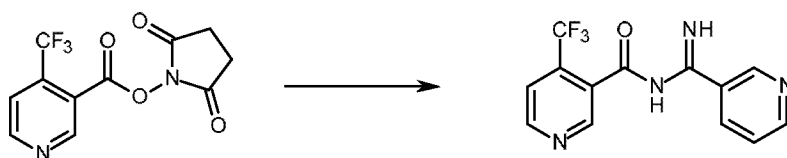
To a solution of 4-trifluoromethyl nicotinic acid (500 mg, 2.62 mmol) and N-hydroxysuccinimide (331 mg, 2.88 mmol) in tetrahydrofuran (20 mL) at 0 °C was slowly added a solution of N,N'-dicyclohexylcarbodiimide (595 mg, 2.88 mmol) in tetrahydrofuran (5.0 mL). After completion of the addition, the obtained mixture was allowed to warm to room temperature and stirring was continued for an additional 12 h. The formed precipitate was filtered and the solution was concentrated under reduced pressure. The residual was dissolved in CHCl₃ and washed with sat. NaHCO₃. The aqueous layer was repeatedly extracted with CHCl₃ and the combined organic layers dried (Na₂SO₄) and evaporated in vacuo. The obtained crude product was washed with cold diethyl ether and to give the desired product as a white solid. M.p. 93-94 °C.

Step B: 4-trifluoromethyl-N-(3-methylsulfanylpropanimidoyl)pyridine-3-carboxamide



To a stirred suspension of 3-methylsulfanylpropanamidine hydrochloride (107 mg, 0.69 mmol) in 1,4-dioxane (3.0 mL) at room temperature was added 1,8-diazabicycloundec-7-ene ("DBU") (0.10 mL, 0.69 mmol) via syringe. The reaction mixture was cooled to 0 °C and (2,5-dioxopyrrolidin-1-yl) 4-trifluoromethylpyridine-3-carboxylate (200 mg, 0.690 mmol) was added in several portions. Stirring at this temperature was continued for another 30 min. Subsequently, the reaction mixture was allowed to warm to room temperature and stirred for another 12 h. The obtained reaction was quenched with water and the aqueous layer was extracted with dichloromethane. The combined organic layers were washed with brine, dried (Na₂SO₄) and, after addition of silica gel, concentrated under reduced pressure. Purification of the residual by flash chromatography on silica gel (0-100% EtOAc/heptane) furnished the desired product as a yellow oil. LC-MS (method_A): RT 0.48 min. [M+H]⁺ 292.

EXAMPLE 4: Preparation of 4-trifluoromethyl-N-(pyridine-3-carboximidoyl)pyridine-3-carboxamide (Compound T1-070)



To a stirred suspension of pyridine-3-carboxamidine hydrochloride (109 mg, 0.69 mmol) in 1,4-dioxane (2.5 mL) at room temperature was added 1,8-diazabicycloundec-7-ene ("DBU") (0.10 mL, 0.69 mmol) via syringe. The reaction mixture was cooled to 0 °C and (2,5-dioxopyrrolidin-1-yl) 4-trifluoromethylpyridine-3-carboxylate (200 mg, 0.690 mmol) was added in several portions. Stirring at this temperature was continued for another 30 min. Subsequently, the reaction mixture was allowed to warm to room temperature and stirred for another 12 h. The obtained reaction was quenched with water and the aqueous layer was extracted with dichloromethane. The combined organic layers were washed with brine, dried (Na₂SO₄) and, after addition of silica gel, concentrated under reduced pressure. Purification

of the residual by flash chromatography on silica gel (50-100% EtOAc/heptane) furnished the desired product as a yellow oil. M.p. 169-170 °C.

- Compounds of the formula I in Table P1 can be prepared by analogous procedures. Either
 5 one of the following LC-MS methods was used to characterize the compounds:

Method A

MS	SQD Mass Spectrometer from Waters (Single quadrupole mass spectrometer) Instrument Parameter: Ionisation method: Electrospray, Polarity: positive and negative ions, Capillary (kV) 3.00, Cone (V) 30, Extractor (V) 2.00, Source Temperature (°C) 150, Desolvation Temperature (°C) 250, Cone Gas Flow (L/h) 0, Desolvation Gas Flow (L/h) 650, Mass range: 100 to 900 Da																			
LC	Acquity UPLC from Waters with binary pump, heated column compartment and diode-array detector. Column: Phenomenex Gemini C18, 3 µm, 30 x 2 mm, Temp: 60 °C DAD Wavelength range (nm): 210 to 500 Solvent Gradient: A = H2O + 5% MeOH + 0.05 % HCOOH B= Acetonitrile + 0.05 % HCOOH <table><tr><td>Time (min)</td><td>A%</td><td>B%</td><td>Flow (mL/min)</td></tr><tr><td>0.00</td><td>100.0</td><td>0.00</td><td>0.850</td></tr><tr><td>1.20</td><td>0.00</td><td>100.0</td><td>0.850</td></tr><tr><td>1.50</td><td>0.00</td><td>100.0</td><td>0.850</td></tr></table>				Time (min)	A%	B%	Flow (mL/min)	0.00	100.0	0.00	0.850	1.20	0.00	100.0	0.850	1.50	0.00	100.0	0.850
Time (min)	A%	B%	Flow (mL/min)																	
0.00	100.0	0.00	0.850																	
1.20	0.00	100.0	0.850																	
1.50	0.00	100.0	0.850																	

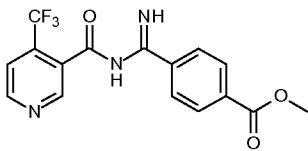
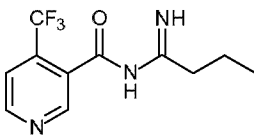
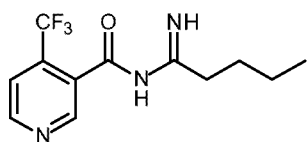
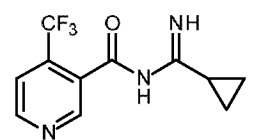
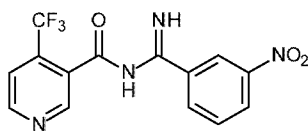
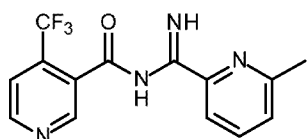
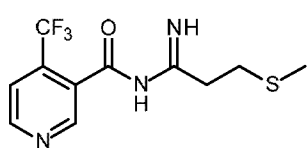
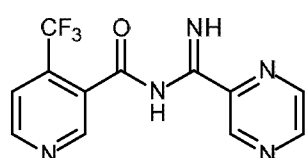
10 Method B

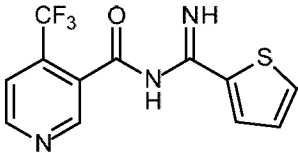
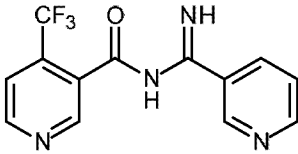
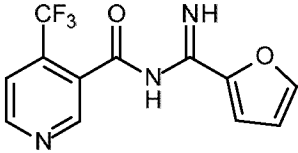
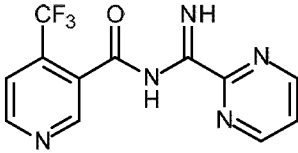
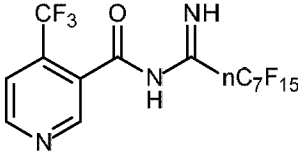
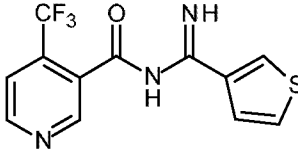
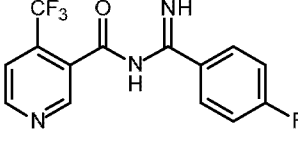
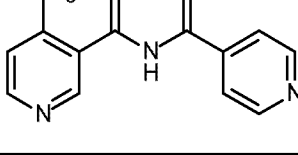
MS	ZQ Mass Spectrometer from Waters (Single quadrupole mass spectrometer) Instrument Parameter: Ionisation method: Electrospray, polarity: positive or negative ions; capillary (kV) 3.00, Cone (V) 30.00, Extractor (V) 2.00, Source Temperature (°C) 100, Desolvation Temperature (°C) 250, Cone Gas Flow (L/h) 50, Desolvation Gas Flow (L/h) 400, mass range: 100 to 900 Da			
LC	HP1100 HPLC from Agilent with quaternary pump, heated column compartment and diode-array detector. Column: Phenomenex Gemini C18, 3 µm, 30 x 3 mm, Temp: 60 °C			

	DAD Wavelength range (nm): 210 to 500			
	Solvent Gradient:			
	A = H ₂ O + 5% MeOH + 0.05 % HCOOH			
	B= Acetonitrile + 0.05 % HCOOH			
	Time (min)	A%	B%	Flow (mL/min)
	0.00	100	0	1.700
	2.00	0	100.0	1.700
	2.80	0	100.0	1.700
	2.90	100	0	1.700
	3.00	100	0	1.700

The characteristic values obtained for each compound were the retention time ("RT", recorded in minutes) and the molecular ion as listed in Table P1.

Table P1. Physical data of compounds I

		No.	LCMS			Melting point (°C)
			Method	RT (min)	m/z	
P1.01		T1.014	A	0.83	352 [M+H] ⁺	107-108
P1.02		T1.021	A	0.40	260 [M+H] ⁺	80-81
P1.03		T1.027	B	0.95	274 [M+H] ⁺	93-95
P1.04		T1.037	B	0.71	274 [M+H] ⁺	oil
P1.05		T1.041	A	0.84	339 [M+H] ⁺	188-190
P1.06		T1.049	A	0.87	309 [M+H] ⁺	105-106
P1.07		T1.051	A	0.48	292 [M+H] ⁺	oil
P1.08		T1.057	A	0.69	296 [M+H] ⁺	103-104

P1.09		T1.068	A	0.77	300 [M+H] ⁺	120-122
P1.10		T1.070	B	1.18	295 [M+H] ⁺	169-170
P1.11		T1.076	A	0.65	284 [M+H] ⁺	oil
P1.12		T1.080	A	0.53	284 [M+H] ⁺	
P1.13		T1.087				104-105
P1.14		T1.101	B	1.29	300 [M+H] ⁺	104-105
P1.15		T1.105	A	0.79	312 [M+H] ⁺	
P1.16		T1.106	A	0.60	295 [M+H] ⁺	115-117

FORMULATION EXAMPLES (% = percent by weight)

<u>Example F1: Emulsion concentrates</u>		a)	b)	c)
5	Active ingredient	25 %	40 %	50 %
	Calcium dodecylbenzenesulfonate	5 %	8 %	6 %
	Castor oil polyethylene glycol ether (36 mol of EO)	5 %	-	-
	Tributylphenoxy polyethylene glycol ether (30 mol of EO)	-	12 %	4 %
	Cyclohexanone	-	15 %	20 %
10	Xylene mixture	65 %	25 %	20 %

Emulsions of any desired concentration can be prepared from such concentrates by dilution with water.

<u>Example F2: Solutions</u>		a)	b)	c)	d)
15	Active ingredient	80 %	10 %	5 %	95 %
	Ethylene glycol monomethyl ether	20 %	-	-	-
	Polyethylene glycol MW 400	-	70 %	-	-
	N-Methylpyrrolid-2-one	-	20 %	-	-
20	Epoxidized coconut oil	-	-	1 %	5 %
	Petroleum ether (boiling range: 160-190°)	-	-	94 %	-

The solutions are suitable for use in the form of microdrops.

<u>Example F3: Granules</u>		a)	b)	c)	d)
25	Active ingredient	5 %	10 %	8 %	21 %
	Kaolin	94 %	-	79 %	54 %
	Highly disperse silica	1 %	-	13 %	7 %
30	Attapulgate	-	90 %	-	18 %

The active ingredient is dissolved in dichloromethane, the solution is sprayed onto the carrier(s), and the solvent is subsequently evaporated in vacuo.

<u>Example F4: Dusts</u>		a)	b)
35	Active ingredient	2 %	5 %

Highly disperse silica	1 %	5 %
Talc	97 %	-
Kaolin	-	90 %

- 5 Ready-to-use dusts are obtained by intimately mixing the carriers and the active ingredient.

<u>Example F5: Wettable powders</u>		a)	b)	c)
	Active ingredient	25 %	50 %	75 %
	Sodium lignosulfonate	5 %	5 %	-
10	Sodium lauryl sulfate	3 %	-	5 %
	Sodium diisobutyl naphthalenesulfonate	-	6 %	10 %
	Octylphenoxypolyethylene glycol ether (7-8 mol of EO)	-	2 %	-
	Highly disperse silica	5 %	10 %	10 %
15	Kaolin	62 %	27 %	-

The active ingredient is mixed with the additives and the mixture is ground thoroughly in a suitable mill. This gives wettable powders, which can be diluted with water to give suspensions of any desired concentration.

20

Example F6: Extruder granules

	Active ingredient	10 %
	Sodium lignosulfonate	2 %
	Carboxymethylcellulose	1 %
25	Kaolin	87 %

The active ingredient is mixed with the additives, and the mixture is ground, moistened with water, extruded, granulated and dried in a stream of air.

30 Example F7: Coated granules

	Active ingredient	3 %
	Polyethylene glycol (MW 200)	3 %
	Kaolin	94 %

- 35 In a mixer, the finely ground active ingredient is applied uniformly to the kaolin, which has been moistened with the polyethylene glycol. This gives dust-free coated granules.

Example F8a: Suspension concentrate

	Active ingredient	40 %
	Ethylene glycol	10 %
5	Nonylphenoxypolyethylene glycol ether (15 mol of EO)	6 %
	Sodium lignosulfonate	10 %
	Carboxymethylcellulose	1 %
	37 % aqueous formaldehyde solution	0.2 %
	Silicone oil (75 % aqueous emulsion)	0.8 %
10	Water	32 %

Example F8b: Suspension concentrate

	Active ingredient	10%
	Naphthalenesulfonic acid, sodium salt condensed with formaldehyde	2%
15	Solution of an acrylic graft copolymer in water and propyleneglycole	8%
	Silicone antifoam emulsion	0.5%
	DL-propanediol-(1,2)	3%
	Heteropolysaccharide	0.5%
	1,2-Benzisothiazol-3-one	0.2%
20	Water	75.8%

The finely ground active ingredient is mixed intimately with the additives. Suspensions of any desired concentration can be prepared from the thus resulting suspension concentrate by dilution with water.

25

Example F9: Powders for dry seed treatment

	a)	b)	c)
active ingredient	25 %	50 %	75 %
light mineral oil	5 %	5 %	5 %
highly dispersed silicic acid	5 %	5 %	-
Kaolin	65 %	40 %	-
Talcum	-		20 %

The active ingredient is thoroughly mixed with the adjuvants and the mixture is thoroughly ground in a suitable mill, affording powders that can be used directly for seed treatment.

30 Example F10: Flowable concentrate for seed treatment

active ingredient	40 %
propylene glycol	5 %
copolymer butanol PO/EO	2 %
tristyrenephenole with 10-20 moles EO	2 %
1,2-benzisothiazolin-3-one (in the form of a 20% solution in water)	0.5 %
monoazo-pigment calcium salt	5 %
Silicone oil (in the form of a 75 % emulsion in water)	0.2 %
Water	45.3 %

The finely ground active ingredient is intimately mixed with the adjuvants, giving a suspension concentrate from which suspensions of any desired dilution can be obtained by dilution with water. Using such dilutions, living plants as well as plant propagation material
 5 can be treated and protected against infestation by microorganisms, by spraying, pouring or immersion.

Example F11a: Oil-based suspension concentrate (based on a vegetable oil)

Active ingredient	10%
10 Tristyrylphenole with 16 moles EO	10%
Block copolymer of polyhydroxystearic acid and polyalkylene glycols	2%
AEROSIL 200	1%
Rape seed oil methyl ester	12%
Oleic acid	65%

15

Example F11b: Oil-based suspension concentrate (based on a mineral oil)

Active ingredient	10%
Ethoxylated alcohols, C16-18 and C18-unsatd	5%
Dodecyl-benzene sulfonic acid Ca-salt linear	2.5%
20 2-Pyrrolidinone, 1-ethenylhexadecyl-, homopolymer	1%
Organophilic clay	1%
Mixture of petroleum	80.5%

The finely ground active ingredient is mixed intimately with the additives. Suspensions of
 25 any desired concentration can be prepared from the thus resulting suspension concentrate by dilution with water.

Preferably, the term "active ingredient" used above refers to one of the compounds selected from Table 1 shown above. It also refers to mixtures of the compound of formula I, in

particular a compound selected from said Table 1, with other insecticides, fungicides, herbicides, safeners, adjuvants and the like, which mixtures are specifically disclosed above.

5

BIOLOGICAL EXAMPLES

These examples illustrate the pesticidal/insecticidal properties of compounds of formula I.

10

Example B1: Activity against *Myzus persicae* (green peach aphid)

(mixed population, feeding/residual contact activity, preventive)

Sunflower leaf discs are placed on agar in a 24-well microtiter plate and sprayed with test solutions. After drying, the leaf discs are infested with an aphid population of mixed ages.

15 After an incubation period of 6 days, samples are checked for mortality and special effects (e.g. phytotoxicity).

In this test, compounds listed in the tables above show good activity. In particular compounds P1.01, P1.02, P1.03, P1.04, P1.06, P1.07, P1.08, P1.09, P1.10, P1.11, P1.12, P1.13, P1.14, P1.15, P1.16 show an activity of over 80% at a concentration of 200ppm.

20

Example B2: Activity against *Myzus persicae* (green peach aphid)

(mixed population, systemic/feeding activity, curative)

Pea seedlings, infested with an aphid population of mixed ages, are placed with the roots directly in the test solutions. 6 days after introduction, samples are checked for mortality and
25 special effects on the plant.

In this test, compounds listed in the tables above show good activity. In particular compounds P1.01, P1.02, P1.03, P1.04, P1.05, P1.06, P1.07, P1.08, P1.09, P1.10, P1.11, P1.12, P1.13, P1.14, P1.15, P1.16 show an activity of over 80% at a concentration of 24ppm. (D1)

30

Example B3: Activity against *Frankliniella occidentalis* (Western flower thrips):

mixed population, feeding/residual contact activity, preventative

Sunflower leaf discs are placed on agar in a 24-well microtiter plate and sprayed with test solutions. After drying, the leaf discs are infested with a *Frankliniella* population of mixed
35 ages. After an incubation period of 7 DAT, samples are checked for mortality and special effects (e.g. phytotoxicity).

In this test, compounds listed in the tables above show good activity. In particular compounds P1.02, P1.03, P1.07, P1.08, P1.10, P1.11, P1.12 show an activity of over 80% at a concentration of 200ppm.

- 5 Example B4: Activity against *Myzus persicae* (green peach aphid):
 (mixed population, contact/feeding)

Pea seedlings, infested with a susceptible aphid population of mixed ages, are treated with diluted test solutions in a spray chamber. 6 days after treatment, samples are checked for mortality.

- 10 In this test, compounds listed in the tables above show good activity.

- Example B5: Activity against *Myzus persicae* (green peach aphid):
 (mixed population, contact/feeding)

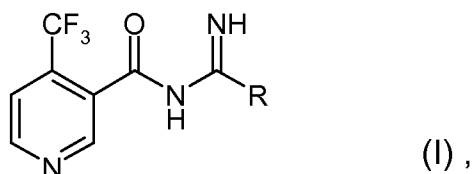
- 15 Pea seedlings, infested with a Neonicotinoid resistant aphid population of mixed ages, are treated with diluted test solutions in a spray chamber. 6 days after treatment, samples are checked for mortality.

In this test, compounds listed in the tables above show good activity.

CLAIMS

1. Compounds of the formula I

5



wherein R is:

-C₁₋₈alkyl,10 -C₂₋₆alkenyl,-C₂₋₆alkynyl,

- a three- to ten-membered mono- or bi-cyclic, saturated, partially unsaturated or aromatic ring system,

15 said C₁₋₈alkyl, C₂₋₆alkenyl, C₂₋₆alkynyl and ring system being optionally interrupted by one or more heteroatoms selected from nitrogen, oxygen or sulphur, and being optionally substituted by one or more substituents independently selected from the group consisting of halogen, cyano, nitro, C₁-C₆alkyl, C₁-C₆alkoxy, C₁-C₆alkylthio, C₁-C₆haloalkyl, C₁-C₆alkylsulfenyl, C₁-C₆alkylsulfonyl, aminosulfonyl, C₁-C₆alkylaminosulfonyl, C₁-C₆di-alkylaminosulfonyl, C₁-C₆alkoxycarbonyl, aminocarbonyl, C₁-C₆alkylaminocarbonyl, C₁-C₆di-alkylaminocarbonyl, C₁-C₆alkylamino, C₁-C₆di-alkylamino, C₁-C₆alkoxycarbonylamino, C₁-C₃haloalkylthio, C₁-C₃haloalkylsulfenyl, C₁-C₃haloalkylsulfonyl, formyl, C₁-C₃haloalkoxy, C₁-C₆alkoxyC₁-C₃alkyl, C₁-C₆alkoxyC₁-C₃alkoxyC₁-C₃alkyl, C₂-C₆alkynyl, C₂-C₆alkenyl, C₁-C₄cyanoalkyl, C₁-C₆alkylcarbonyl, C₁-C₆haloalkylcarbonyl, C₁-C₆alkylsulfonyl, C₃-C₆cycloalkylcarbonyl, C₃-C₆cycloalkyl, wherein a ring methylene group may optionally be

25 replaced by O or S, C₁-C₆alkylcarbonylamino,

and wherein the ring system containing a nitrogen atom is not attached by this nitrogen atom to the imino group, and wherein R is not phenyl, 4-chlorophenyl, 3-methylphenyl and 2-pyridinyl.

30 2. A compound according to claim 1, wherein R is:

- a five- to ten-membered aromatic or partially saturated heterocycle, containing one or more heteroatoms selected from nitrogen, oxygen, or sulphur, or

- a three- to ten-membered fully saturated heterocycle containing one or more heteroatoms selected from nitrogen, oxygen, or sulphur.

3. Compound according to claim 1, wherein R is a five- to ten-membered aromatic heterocycle, containing one or more heteroatoms selected from nitrogen, oxygen, or sulphur, said heterocycle being optionally substituted by halogen, cyano, nitro, C₁-C₆alkyl, C₁-C₆alkoxy, C₁-C₆haloalkyl, C₁-C₆alkoxycarbonyl, and C₁-C₄cyanoalkyl.
4. A compound according to claim 1, wherein R is an heterocycle containing one to two heteroatoms selected from oxygen, nitrogen, or sulphur, wherein nitrogen and sulphur can be substituted as follows: N-R¹, S(O)_n, or S(O)_mN-R², wherein,
- 10 R¹ is hydrogen, formyl, C₁-C₆alkyl, C₁-C₃haloalkyl, C₁-C₃alkoxy, C₆alkoxyC₁-C₃alkyl, C₁-C₆alkoxyC₁-C₃alkoxyC₁-C₃alkyl, C₂-C₆alkynyl, C₁-C₄cyanoalkyl, C₂-C₆alkenyl, phenylC₁-C₄alkyl, C₁-C₆alkylcarbonyl, C₁-C₆haloalkylcarbonyl, C₁-C₆alkoxycarbonyl, phenylC₁-C₅alkylcarbonyl, phenylC₁-C₅alkoxycarbonyl, phenylcarbonyl, C₁-C₆alkylsulfonyl, phenylsulfonyl, or C₃-C₆cycloalkylcarbonyl,
- 15 n is 0, 1 or 2,
m is 0 or 1,
R² is hydrogen, formyl, C₁-C₆alkyl, C₁-C₃haloalkyl, cyano, nitro, C₂-C₆alkynyl, C₁-C₄cyanoalkyl, or C₂-C₆alkenyl.
- 20 5. Compound according to claim 1, wherein R is methyl, ethyl, propyl, isopropyl, n-butyl, isobutyl, sec-butyl, or tert-butyl optionally interrupted by one or more N, O or S, and optionally substituted by halogen, cyano, nitro, C₁-C₆alkyl, C₁-C₆alkoxy, C₁-C₆haloalkyl, C₁-C₆alkoxycarbonyl, or C₁-C₄cyanoalkyl.
- 25 6. Compound according to claim 1, wherein R is C₆₋₁₀ aryl optionally substituted by halogen, cyano, nitro, C₁-C₆alkyl, C₁-C₆alkoxy, C₁-C₆haloalkyl, C₁-C₆alkoxycarbonyl, or C₁-C₄cyanoalkyl.
7. Compound according to claim 1, wherein R is C₂₋₁₀ heteroaryl which contains one or more heteroatom selected from nitrogen, oxygen or sulphur, said heteroaryl being optionally substituted by halogen, cyano, nitro, C₁-C₆alkyl, C₁-C₆alkoxy, C₁-C₆haloalkyl, C₁-C₆alkoxycarbonyl, or C₁-C₄cyanoalkyl.
- 30 8. Compound according to claim 1, wherein R is cycloalkyl and preferably cyclopropyl, cycopentyl or cyclohexyl, which may contain one or more heteroatom selected from nitrogen, oxygen or sulphur.
- 35

9. Compound according to claim 8, wherein said cycloalkyl is substituted by halogen, cyano, nitro, C₁-C₆alkyl, C₁-C₆alkoxy, C₁-C₆haloalkyl, C₁-C₆alkoxycarbonyl, or C₁-C₄cyanoalkyl.

5 10. A pesticidal composition comprising a pesticidal effective amount of at least one compound of formula I according to claim 1.

11. A pesticidal composition according to claim 10, which, in addition to comprising the compound of formula I, comprises formulation adjuvants.

10

12. A pesticidal composition according to claim 10, wherein the formulation adjuvant is an oil of vegetable or animal origin, a mineral oil, alkyl esters of such oils or mixtures of such oils and oil derivatives, or is a fertilizer or an ammonium- or phosphonium salt, optionally in a mixture with the above oils and oil derivatives.

15

13. A pesticidal composition according to claim 10, which, in addition to comprising the compound of formula I, comprises at least one additional insecticide, acaricide, nematocide or molluscicide.

20 14. A pesticidal composition according to claim 10, which, in addition to comprising the compound of formula I, comprises at least one additional fungicide, herbicide, safener or plant growth regulator.

25 15. A method of combating and controlling insects, acarines, nematodes or molluscs which comprises applying an insecticidally, acaricidally, nematocidally or molluscicidally effective amount of a compound of formula I according to claim 1, or a composition containing a compound of formula I according to claim 1, to a pest, a locus of pest, or to a plant susceptible to attack by a pest.

30 16. A method of combating and controlling insects from the Aphididae family, which insects are resistant to a neonicotinoid insecticide, which method comprises applying a compound of formula I according to claim 1 in free form or in agrochemically acceptable form to said neonicotinoid resistant insects.

35 17. A method of protecting a crop of useful plants susceptible to and/or under attack by insects from the Aphididae family, which insects are resistant to a neonicotinoid insecticide, which method comprises applying to said crop, treating a plant propagation material of said

crop with, and/or applying to said neonicotinoid resistant insects, a compound according to claim 1 in free form or in agrochemically acceptable salt form.

18. A method of controlling resistance to one or more neonicotinoid insecticides in insects from the Aphididae family, which comprises alternately applying a compound according to claim 1 and a neonicotinoid insecticide to said insects or to a crop of useful plants susceptible to and/or under attack from said insects.

INTERNATIONAL SEARCH REPORT

International application No

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A. CLASSIFICATION OF SUBJECT MATTER

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ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A01N 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, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	----- WO 2006/008108 A2 (BAYER CROPSCIENCE AG [DE]; FISCHER REINER [DE]; FISCHER RUEDIGER [DE];) 26 January 2006 (2006-01-26) the whole document -----	1



Further documents are listed in the continuation of Box C.



See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

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"&" document member of the same patent family

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Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

de Nooy, Arjan

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2013/053797

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