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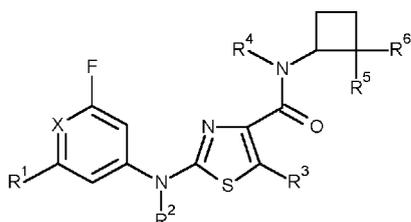
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(54) Title: MICROBIOCIDAL THIAZOLE DERIVATIVES

(57) Abstract: Compounds of the formula (I), (I) wherein the substituents are as
defined in claim 1, useful as pesticides, and especially fungicides.



(I)



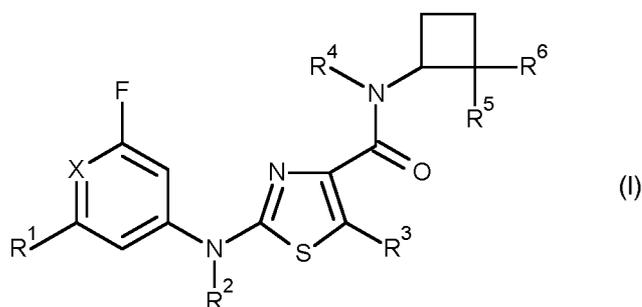
WO 2019/105933 A1

Microbiocidal thiazole derivatives

The present invention relates to microbiocidal thiazole derivatives, e.g., as active ingredients, which have microbiocidal activity, in particular fungicidal activity. The invention also relates to the preparation of these thiazole derivatives, to agrochemical compositions which comprise at least one of the thiazole derivatives and to uses of the thiazole derivatives or compositions thereof in agriculture or horticulture for controlling or preventing the infestation of plants, harvested food crops, seeds or non-living materials by phytopathogenic microorganisms, preferably fungi.

WO 2010/012793 describes amino-thiazole derivatives as pesticidal agents.

According to the present invention, there is provided a compound of formula (I):



wherein,

15

R¹ is halogen, cyano, C₁-C₄alkyl, C₁-C₄alkoxy, or C₁-C₄haloalkyl;

R² is hydrogen, C₁-C₄alkyl, C₁-C₄alkoxy, C₁-C₄haloalkyl, or C₃-C₄cycloalkyl;

20

R³ is halogen, C₁-C₄alkyl, C₁-C₄alkoxy, C₁-C₄haloalkyl, or C₃-C₄cycloalkyl;

R⁴ is hydrogen, C₁-C₄alkyl, C₁-C₄alkoxy, C₁-C₄haloalkyl, or C₃-C₄cycloalkyl;

R⁵ is hydrogen, halogen, C₁-C₆alkyl, C₂-C₆alkenyl, C₂-C₆alkynyl, C₁-C₄haloalkyl, C₂-C₆haloalkenyl, C₂-C₆haloalkynyl, hydroxyC₁-C₄alkyl, cyanoC₁-C₄alkyl, C₃-C₆cycloalkyl, phenyl or heteroaryl, wherein the heteroaryl moiety is a 5- or 6-membered aromatic monocyclic ring comprising 1, 2, 3 or 4 heteroatoms individually selected from nitrogen, oxygen and sulfur, and wherein the, C₃-C₆cycloalkyl, phenyl and heteroaryl moieties are each optionally substituted with 1 to 3 groups represented by R⁷;

30

R⁶ is hydrogen, halogen, C₁-C₆alkyl, C₂-C₆alkenyl, C₂-C₆alkynyl, C₁-C₄haloalkyl, C₂-C₆haloalkenyl, C₂-C₆haloalkynyl, hydroxyC₁-C₄alkyl, cyanoC₁-C₄alkyl, C₃-C₆cycloalkyl, phenyl or heteroaryl, wherein the heteroaryl moiety is a 5- or 6-membered aromatic monocyclic ring comprising 1, 2, 3 or 4 heteroatoms individually selected from nitrogen, oxygen and sulfur, and wherein the C₃-

C₆cycloalkyl, phenyl and heteroaryl moieties are each optionally substituted with 1 to 3 groups represented by R⁷;

5 R⁷ is halogen, cyano, hydroxyl, C₁-C₃alkyl, C₁-C₃alkoxy, or C₃-C₄cycloalkyl;

X is C-H or N;

or a salt or an N-oxide thereof.

10 Surprisingly, it has been found that the novel compounds of formula (I) have, for practical purposes, a very advantageous level of biological activity for protecting plants against diseases that are caused by fungi.

According to a second aspect of the invention, there is provided an agrochemical composition
15 comprising a fungicidally effective amount of a compound of formula (I) according to the present invention. Such an agricultural composition may further comprise at least one additional active ingredient and/or an agrochemically-acceptable diluent or carrier.

According to a third aspect of the invention, there is provided a method of controlling or preventing
20 infestation of useful plants by phytopathogenic microorganisms, wherein a fungicidally effective amount of a compound of formula (I), or a composition comprising this compound as active ingredient, is applied to the plants, to parts thereof or the locus thereof.

According to a fourth aspect of the invention, there is provided the use of a compound of formula
25 (I) as a fungicide. According to this particular aspect of the invention, the use may or may not include methods for the treatment of the human or animal body by surgery or therapy.

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, two or three R⁷ substituents. For
30 example, C₁-C₆alkyl substituted by 1, 2 or 3 halogens, may include, but not be limited to, -CH₂Cl, -CHCl₂, -CCl₃, -CH₂F, -CHF₂, -CF₃, -CH₂CF₃ or -CF₂CH₃ groups. As another example, C₁-C₆alkoxy substituted by 1, 2 or 3 halogens, may include, but not be limited to, CH₂ClO-, CHCl₂O-, CCl₃O-, CH₂FO-, CHF₂O-, CF₃O-, CF₃CH₂O- or CH₃CF₂O- groups.

35 As used herein, the term "hydroxyl" or "hydroxy" means a -OH group.

As used herein, the term "cyano" means a -CN group.

As used herein, the term "halogen" refers to fluorine (fluoro), chlorine (chloro), bromine (bromo) or iodine (iodo).

As used herein, the term "C₁-C₆alkyl" refers to a straight or branched hydrocarbon chain radical
40 consisting solely of carbon and hydrogen atoms, containing no unsaturation, having from one to six carbon atoms, and which is attached to the rest of the molecule by a single bond. "C₁-C₄alkyl" and "C₁-

C₃alkyl" are to be construed accordingly. Examples of C₁-C₆alkyl include, but are not limited to, methyl, ethyl, n-propyl, and the isomers thereof, for example, iso-propyl.

As used herein, the term "C₁-C₄haloalkyl" refers a C₁-C₄alkyl radical as generally defined above substituted by one or more of the same or different halogen atoms. Examples of C₁-C₄haloalkyl include, 5 but are not limited to trifluoromethyl.

As used herein, the term "hydroxyC₁-C₄alkyl" refers a C₁-C₄alkyl radical as generally defined above substituted by one or more hydroxy groups.

As used herein, the term "cyanoC₁-C₄alkyl" refers to a C₁-C₄alkyl radical as generally defined above substituted by one or more cyano groups.

10 As used herein, the term "C₂-C₆alkenyl" refers to a straight or branched hydrocarbon chain radical group consisting solely of carbon and hydrogen atoms, containing at least one double bond that can be of either the (*E*)- or (*Z*)-configuration, having from two to six carbon atoms, which is attached to the rest of the molecule by a single bond. The term "C₂-C₃alkenyl" is to be construed accordingly. Examples of C₂-C₆alkenyl include, but are not limited to, ethenyl (vinyl), prop-1-enyl, prop-2-enyl (allyl), but-1-enyl.

15 As used herein, the term "C₂-C₆alkynyl" refers to a straight or branched hydrocarbon chain radical group consisting solely of carbon and hydrogen atoms, containing at least one triple bond, having from two to six carbon atoms, and which is attached to the rest of the molecule by a single bond. The term "C₂-C₃alkynyl" is to be construed accordingly. Examples of C₂-C₆alkynyl include, but are not limited to, ethynyl, prop-1-ynyl, but-1-ynyl.

20 As used herein, the term "C₂-C₆haloalkenyl" refers to C₂-C₆alkenyl radical as generally defined above substituted by one or more of the same or different halogen atoms. Examples of C₂-C₆haloalkenyl include, but are not limited to 2-fluorovinyl, 2,2-difluorovinyl, 2-chlorovinyl, and 2,2-dichlorovinyl.

As used herein, the term "C₂-C₆haloalkynyl" refers to C₂-C₆alkynyl radical as generally defined above substituted by one or more of the same or different halogen atoms.

25 As used herein, the term "C₁-C₄alkoxy" refers to a radical of the formula -OR_a where R_a is a C₁-C₄alkyl radical as generally defined above. "C₁-C₃alkoxy" is to be construed accordingly. Examples of C₁-C₄alkoxy include, but are not limited to, methoxy, ethoxy, 1-methylethoxy (iso-propoxy), and propoxy.

As used herein, the term "C₃-C₆cycloalkyl" refers to a radical which is a monocyclic saturated ring system and which contains 3 to 6 carbon atoms. The term "C₃-C₄cycloalkyl" is to be construed 30 accordingly. Examples of C₃-C₆cycloalkyl include, but are not limited to, cyclopropyl, 1-methylcyclopropyl, 2-methylcyclopropyl, cyclobutyl, 1-methylcyclobutyl, 1,1-dimethylcyclobutyl, 2-methylcyclobutyl, and 2,2-dimethylcyclobutyl.

As used herein, the term "heteroaryl" refers to a 5- or 6-membered aromatic monocyclic ring radical which comprises 1, 2, 3 or 4 heteroatoms individually selected from nitrogen, oxygen and sulfur. 35 Examples of heteroaryl include, but are not limited to, furanyl, pyrrolyl, thienyl, pyrazolyl, imidazolyl, thiazolyl, isothiazolyl, oxazolyl, isoxazolyl, triazolyl, tetrazolyl, pyrazinyl, pyridazinyl, pyrimidyl or pyridyl.

The presence of one or more possible asymmetric carbon atoms in a compound of formula (I) means that the compounds may occur in optically isomeric forms, i.e., enantiomeric or diastereomeric 40 forms. Also, atropisomers may occur as a result of restricted rotation about a single bond. Formula (I) is intended to include all those possible isomeric forms and mixtures thereof. The present invention

includes all those possible isomeric forms and mixtures thereof for a compound of formula (I). Likewise, formula (I) is intended to include all possible tautomers. The present invention includes all possible tautomeric forms for a compound of formula (I).

In each case, the compounds of formula (I) according to the invention are in free form, in oxidized
5 form as an N-oxide, or in salt form, e.g., an agronomically usable salt form.

N-oxides are oxidized forms of tertiary amines or oxidized forms of nitrogen-containing heteroaromatic compounds. They are described for instance in the book "Heterocyclic N-oxides" by A. Albin and S. Pietra, CRC Press, Boca Raton (1991).

10 The following list provides definitions, including preferred definitions, for substituents R¹, R², R³, R⁴, R⁵, R⁶, R⁷, and X with reference to compounds of formula (I). For any one of these substituents, any of the definitions given below may be combined with any definition of any other substituent given below or elsewhere in this document.

15 R¹ is halogen, cyano, C₁-C₄alkyl, C₁-C₄alkoxy, or C₁-C₄haloalkyl. Preferably, R¹ is halogen, cyano, or C₁-C₃alkyl, more preferably chloro, fluoro, bromo, methyl, ethyl or isopropyl. Even more preferably, R¹ is chloro or fluoro, and most preferably fluoro.

R² is hydrogen, C₁-C₄alkyl, C₁-C₄alkoxy, C₁-C₄haloalkyl, or C₃-C₄cycloalkyl. Preferably, R² is
20 hydrogen, C₁-C₃alkyl, C₁-C₃alkoxy, or C₃-C₄cycloalkyl, more preferably, hydrogen, C₁-C₃alkyl, C₁-C₃alkoxy, even more preferably, hydrogen, methyl, ethyl, methoxy or ethoxy. More preferably still, R² is hydrogen or methoxy, and most preferably hydrogen.

R³ is halogen, C₁-C₄alkyl, C₁-C₄alkoxy, C₁-C₄haloalkyl, or C₃-C₄cycloalkyl. Preferably, R³ is
25 halogen, C₁-C₃alkyl, C₁-C₃alkoxy, C₁-C₃haloalkyl, or C₃-C₄cycloalkyl, more preferably, halogen, C₁-C₃alkyl, C₁-C₃alkoxy, C₁-C₃haloalkyl, even more preferably, halogen or C₁-C₃alkyl. More preferably still, R³ is chloro, fluoro or methyl, even more preferably still chloro or methyl, and most preferably R³ is methyl.

30 R⁴ is hydrogen, C₁-C₄alkyl, C₁-C₄alkoxy, C₁-C₄haloalkyl, or C₃-C₄cycloalkyl. Preferably, R⁴ is hydrogen, C₁-C₃alkyl, C₁-C₃alkoxy, or C₃-C₄cycloalkyl, more preferably, hydrogen, C₁-C₃alkyl, C₁-C₃alkoxy, even more preferably, hydrogen, methyl, ethyl, methoxy or ethoxy. More preferably still, R⁴ is hydrogen or methoxy, and most preferably hydrogen.

35 R⁵ is hydrogen, halogen, C₁-C₆alkyl, C₂-C₆alkenyl, C₂-C₆alkynyl, C₁-C₄haloalkyl, C₂-C₆haloalkenyl, C₂-C₆haloalkynyl, hydroxyC₁-C₄alkyl, cyanoC₁-C₄alkyl, C₃-C₆cycloalkyl, phenyl or heteroaryl, wherein the heteroaryl moiety is a 5- or 6-membered aromatic monocyclic ring comprising 1, 2, 3 or 4 heteroatoms individually selected from nitrogen, oxygen and sulfur, and wherein the, C₃-C₆cycloalkyl, phenyl and heteroaryl moieties are each optionally substituted with 1 to 3 groups
40 represented by R⁷.

Preferably, R⁵ is hydrogen, halogen, C₁-C₆alkyl, C₂-C₆alkynyl, C₃-C₄cycloalkyl, or phenyl, wherein the C₃-C₄cycloalkyl and phenyl moieties are each optionally substituted with 1 to 3 groups represented by R⁷. More preferably, R⁵ is hydrogen, halogen, C₁-C₃alkyl, C₂-C₃alkynyl, or phenyl, wherein the phenyl moiety is optionally substituted with 1 or 2 groups represented by R⁷. Even more preferably, R⁵ is hydrogen, chloro, fluoro, bromo, methyl, ethyl, isopropyl, prop-2-ynyl, or phenyl, wherein the phenyl moiety is optionally substituted with 1 or 2 groups represented by R⁷. More preferably still, R⁵ is hydrogen, chloro, fluoro, methyl, ethyl, prop-2-ynyl, phenyl, 4-fluorophenyl or 4-chlorophenyl, and most preferably, hydrogen or methyl.

10 R⁶ is hydrogen, halogen, C₁-C₆alkyl, C₂-C₆alkenyl, C₂-C₆alkynyl, C₁-C₄haloalkyl, C₂-C₆haloalkenyl, C₂-C₆haloalkynyl, hydroxyC₁-C₄alkyl, cyanoC₁-C₄alkyl, C₃-C₆cycloalkyl, phenyl or heteroaryl, wherein the heteroaryl moiety is a 5- or 6-membered aromatic monocyclic ring comprising 1, 2, 3 or 4 heteroatoms individually selected from nitrogen, oxygen and sulfur, and wherein the C₃-C₆cycloalkyl, phenyl and heteroaryl moieties are each optionally substituted with 1 to 3 groups
15 represented by R⁷.

Preferably, R⁶ is hydrogen, halogen, C₁-C₆alkyl, C₂-C₆alkenyl, C₂-C₆alkynyl, C₃-C₆cycloalkyl, or phenyl, wherein the heteroaryl moiety is a 5- or 6-membered aromatic monocyclic ring comprising 1, 2, or 3 heteroatoms individually selected from nitrogen, oxygen and sulfur, and wherein the C₃-
20 C₆cycloalkyl, phenyl and heteroaryl moieties are each optionally substituted with 1 to 3 groups represented by R⁷. More preferably, R⁶ is hydrogen, halogen, C₁-C₃alkyl, C₂-C₃alkenyl, C₂-C₃alkynyl, C₃-C₄cycloalkyl, phenyl or heteroaryl, wherein the heteroaryl moiety is a 5-membered aromatic monocyclic ring comprising 1 or 2 heteroatoms individually selected from nitrogen, oxygen and sulfur, and wherein the C₃-C₄cycloalkyl, phenyl and heteroaryl moieties are each optionally substituted with 1
25 or 2 groups represented by R⁷. Even more preferably, R⁶ is hydrogen, chloro, fluoro, bromo, methyl, ethyl, isopropyl, prop-2-enyl, prop-2-ynyl, cyclopropyl, cyclobutyl, phenyl, or thienyl, wherein the phenyl and thienyl moieties are each optionally substituted with 1 or 2 groups represented by R⁷. More preferably still, R⁶ is hydrogen, chloro, fluoro, methyl, ethyl, prop-2-enyl, prop-2-ynyl, cyclopropyl, cyclobutyl, phenyl, 4-fluorophenyl, 2,4-difluorophenyl, 4-chlorophenyl, 2,4-dichlorophenyl, or 3-methyl-
30 2-thienyl, and most preferably, methyl, 2,4-difluorophenyl, 4-chlorophenyl, 2,4-dichlorophenyl, or 3-methyl-2-thienyl.

R⁷ is halogen, cyano, hydroxyl, C₁-C₃alkyl, C₁-C₃alkoxy, or C₃-C₄cycloalkyl. Preferably, R⁷ is halogen, C₁-C₃alkyl, or C₁-C₃alkoxy, more preferably, chloro, fluoro, bromo, methyl, ethyl, isopropyl,
35 methoxy, ethoxy or isopropoxy, even more preferably, chloro, fluoro, bromo, methyl, or ethyl. More preferably still, R⁷ is chloro, fluoro or methyl.

In one embodiment, when R⁵ is hydrogen or C₁-C₃alkyl, R⁶ is C₁-C₃alkyl, phenyl, or thienyl, wherein the phenyl and thienyl moieties are each optionally substituted with 1 or 2 groups selected from
40 R⁷. Preferably, when R⁵ is hydrogen or methyl, R⁶ is C₁-C₃alkyl, phenyl, or thienyl, wherein the phenyl and thienyl moieties are each optionally substituted with 1 or 2 groups selected from R⁷. More preferably,

when R⁵ is hydrogen or methyl, R⁶ is methyl, 4-chlorophenyl, 2,4-dichlorophenyl, 2,4-difluorophenyl or 3-methyl-2-thienyl.

X is C-H or N. In one embodiment X is C-H. In another embodiment X is N.

5

In a compound of formula (I) according to the present invention, preferably:

R¹ is halogen;

R² and R⁴ are each independently hydrogen or C₁-C₃alkoxy;

R³ is halogen or C₁-C₃alkyl;

10

R⁵ is hydrogen, halogen, C₁-C₃alkyl, C₂-C₃alkynyl, or phenyl, wherein the phenyl moiety is optionally substituted with 1 or 2 groups represented by R⁷;

R⁶ is hydrogen, halogen, C₁-C₃alkyl, C₂-C₃alkenyl, C₂-C₃alkynyl, phenyl, or heteroaryl, wherein the heteroaryl moiety is a 5-membered aromatic monocyclic ring comprising 1 sulfur atom, and wherein the phenyl and heteroaryl moieties are each optionally substituted with 1 or 2 groups represented by R⁷;

15

R⁷ is chloro, fluoro, bromo, methyl, ethyl, isopropyl, methoxy, ethoxy or isopropoxy; and

X is C-H or N.

More preferably, R¹ is halogen;

20

R² and R⁴ are each independently hydrogen;

R³ is C₁-C₃alkyl;

R⁵ is hydrogen or C₁-C₃alkyl;

R⁶ is C₁-C₃alkyl, phenyl, or heteroaryl, wherein the heteroaryl moiety is a 5-membered aromatic monocyclic ring comprising 1 sulfur atom, and wherein the phenyl and heteroaryl moieties are each optionally substituted with 1 or 2 groups represented by R⁷;

25

R⁷ is chloro, fluoro, or methyl; and

X is N.

Even more preferably, R¹ is fluoro;

30

R² and R⁴ are each independently hydrogen;

R³ is methyl;

R⁵ is hydrogen or methyl;

R⁶ is methyl, 4-chlorophenyl, 2,4-dichlorophenyl, 2,4-difluorophenyl or 3-methyl-2-thienyl; and

X is N.

35

In one set of embodiments, R¹ is halogen;

R² and R⁴ are each independently hydrogen;

R³ is C₁-C₃alkyl;

R⁵ is hydrogen or C₁-C₃alkyl;

R⁶ is hydrogen, C₁-C₃alkyl, phenyl, or heteroaryl, wherein the heteroaryl moiety is a 5-membered aromatic monocyclic ring comprising 1 sulfur atom, and wherein the phenyl and heteroaryl moieties are each optionally substituted with 1 or 2 groups represented by R⁷;

R⁷ is chloro, fluoro, or methyl; and

5 X is N.

In another set of embodiments, R¹ is fluoro;

R² and R⁴ are each independently hydrogen;

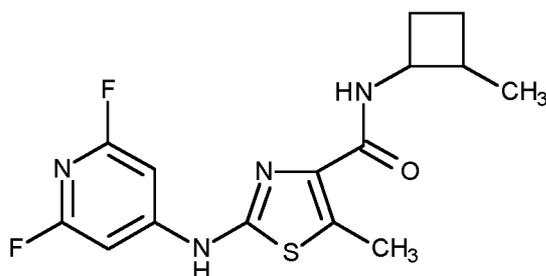
R³ is methyl;

10 R⁵ is hydrogen or methyl;

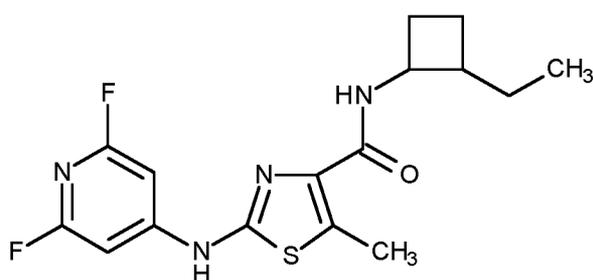
R⁶ is hydrogen, methyl, 4-chlorophenyl, 2,4-dichlorophenyl, 2,4-difluorophenyl or 3-methyl-2-thienyl; and

X is N.

15 Preferably, the compound according to formula (I) is selected from:

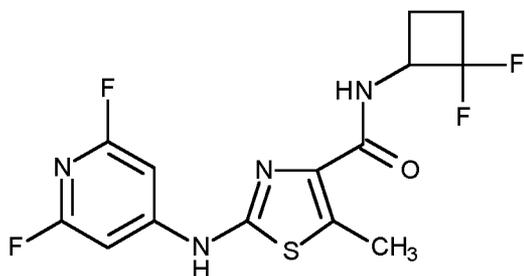


2-[(2,6-difluoro-4-pyridyl)amino]-5-methyl-N-(2-methylcyclobutyl)thiazole-4-carboxamide (compound 1.c.19);

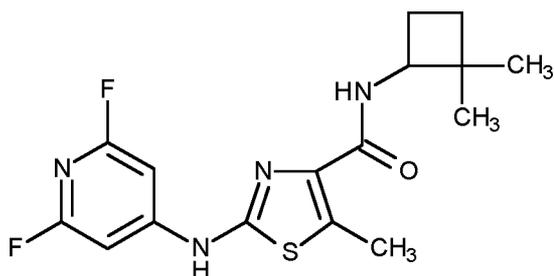


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2-[(2,6-difluoro-4-pyridyl)amino]-N-(2-ethylcyclobutyl)-5-methyl-thiazole-4-carboxamide (compound 1.d.19);



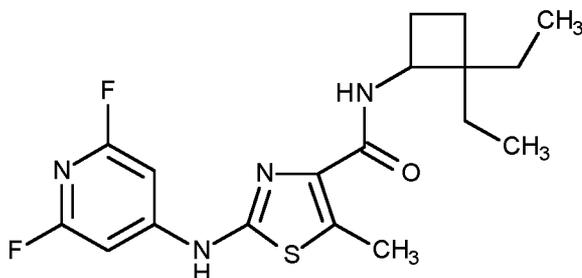
N-(2,2-difluorocyclobutyl)-2-[(2,6-difluoro-4-pyridyl)amino]-5-methyl-thiazole-4-carboxamide (compound 1.p.19);



5

2-[(2,6-difluoro-4-pyridyl)amino]-N-(2,2-dimethylcyclobutyl)-5-methyl-thiazole-4-carboxamide (compound 1.r.19); and

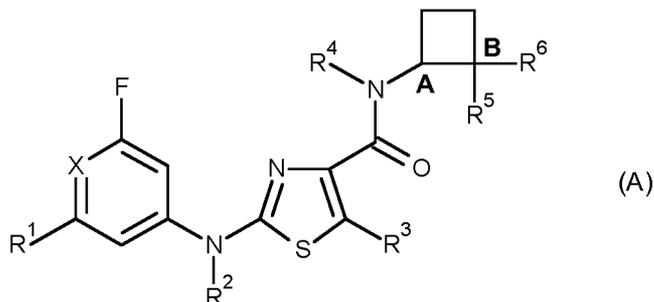
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N-(2,2-diethylcyclobutyl)-2-[(2,6-difluoro-4-pyridyl)amino]-5-methyl-thiazole-4-carboxamide (compound 1.s.19).

15

The compounds of formula (I) according to the present invention may possess two chiral centres at carbon atoms **A** and **B** as outlined below in formula (A).

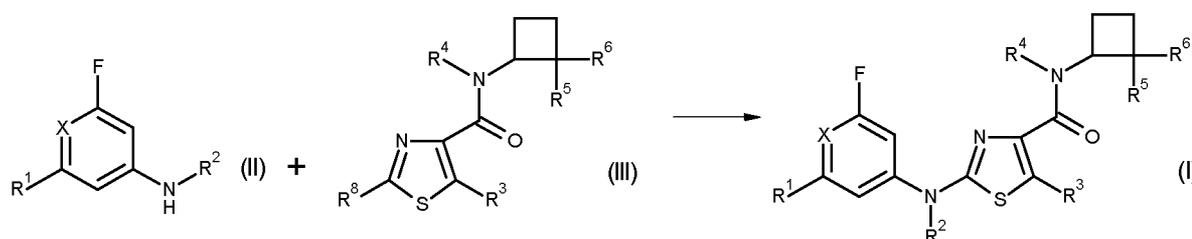


Accordingly, as already indicated, the compounds of formula (I) may exist in various diastereomeric forms, i.e., with (S,S)-, (S,R)-, (R,R)-, or (R,S)- configurations present at the **A** and **B** carbons, respectively. In particular, each of these configurations may be evident for compounds of formula (I) in relation to the specific combinations of definitions for R¹, R², R³, R⁴, R⁵, R⁶, R⁷, and X for each compound described in Table 1 (a compound of formulae (1.a.01 - 1.a.32) to (1.z.01 - 1.z.32)) or a compound of formula (I) described in Table 2 (below).

Compounds of the present invention can be made as shown in the following schemes, in which, unless otherwise stated, the definition of each variable is as defined above for a compound of formula (I).

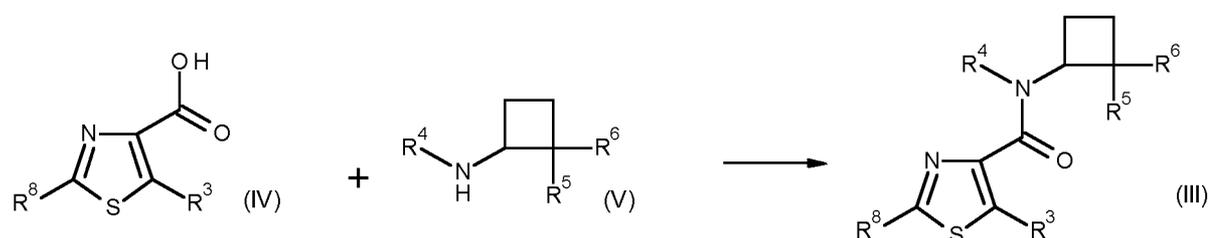
The compounds of formula (I) according to the invention, wherein R¹, R², R³, R⁴, R⁵, R⁶ and X are as defined for formula (I), can be obtained by transformation of a compound of formula (II), wherein R¹, R² and X are as defined for formula (I), with a compound of formula (III), wherein R³, R⁴, R⁵ and R⁶ are as defined for formula (I) and R⁸ is bromo or iodo, either by thermal heating, or with the aid of a base or under the conditions of the transition metal catalysed Buchwald-Hartwig amination. This is shown in Scheme 1 below.

Scheme 1



The compounds of formula (III), wherein R³, R⁴, R⁵ and R⁶ are as defined for formula (I) and R⁸ is bromo or iodo, can be obtained by transformation of a compound of formula (IV), wherein R³ is as defined for formula (I) and R⁸ is bromo or iodo, and a compound of formula (V), wherein R⁴, R⁵ and R⁶ are as defined for formula (I), and with a peptide coupling agent. This is shown in Scheme 2 below.

Scheme 2

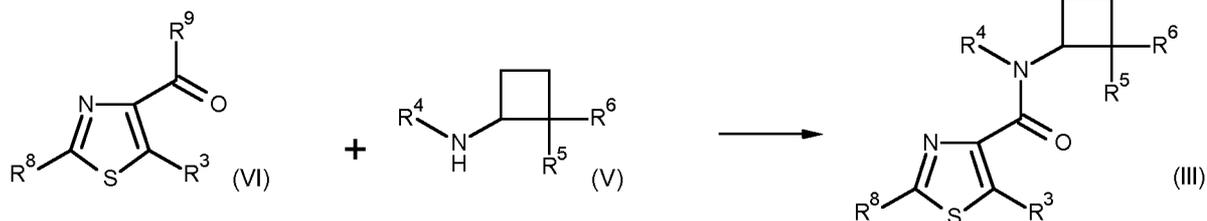


25

Alternatively, the compounds of formula (III), wherein R³, R⁴, R⁵ and R⁶ are as defined for formula (I) and R⁸ is bromo or iodo, can be obtained by transformation of a compound of formula (VI), wherein R³ is as defined for formula (I), R⁸ is bromo or iodo, and R⁹ is fluoro or chloro, and a compound of formula (V), wherein R⁴, R⁵ and R⁶ are as defined for formula (I), and with a base. This is shown in Scheme 3 below.

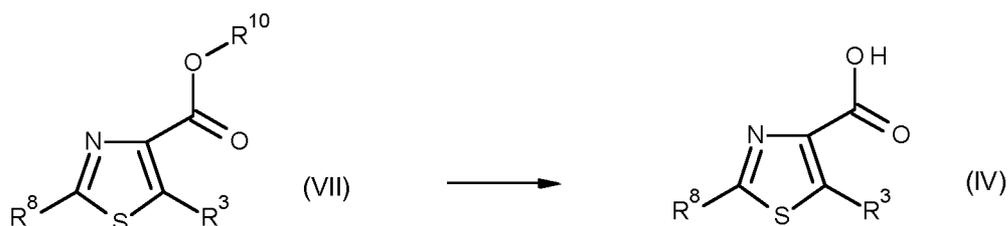
30

Scheme 3



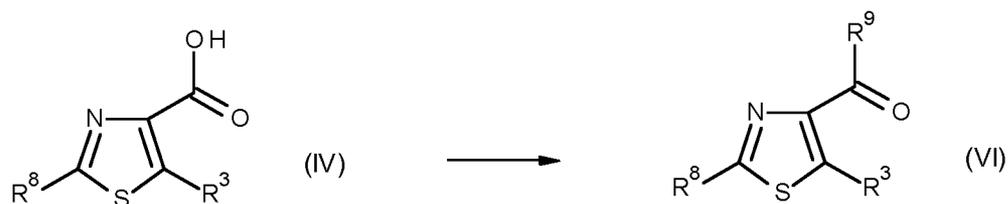
The compounds of formula (IV), wherein R^3 is as defined for formula (I) and R^8 is bromo or iodo, can be obtained by transformation of a compound of formula (VII), wherein R^3 is as defined for formula (I), R^8 is bromo or iodo, and R^{10} is C_1 - C_6 alkyl, and with a base. This is shown in Scheme 4 below.

Scheme 4



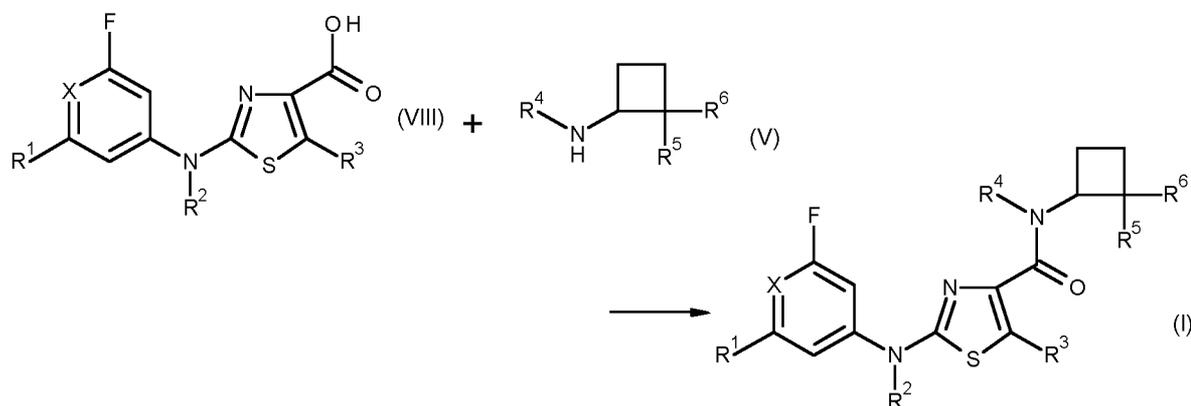
The compounds of formula (VI), wherein R^3 is as defined for formula (I), R^8 is bromo or iodo and R^9 is fluoro or chloro, can be obtained by transformation of a compound of formula (IV), wherein R^3 is as defined for formula (I), R^8 is bromo or iodo, and with a halogenation agent. This is shown in Scheme 5 below.

Scheme 5



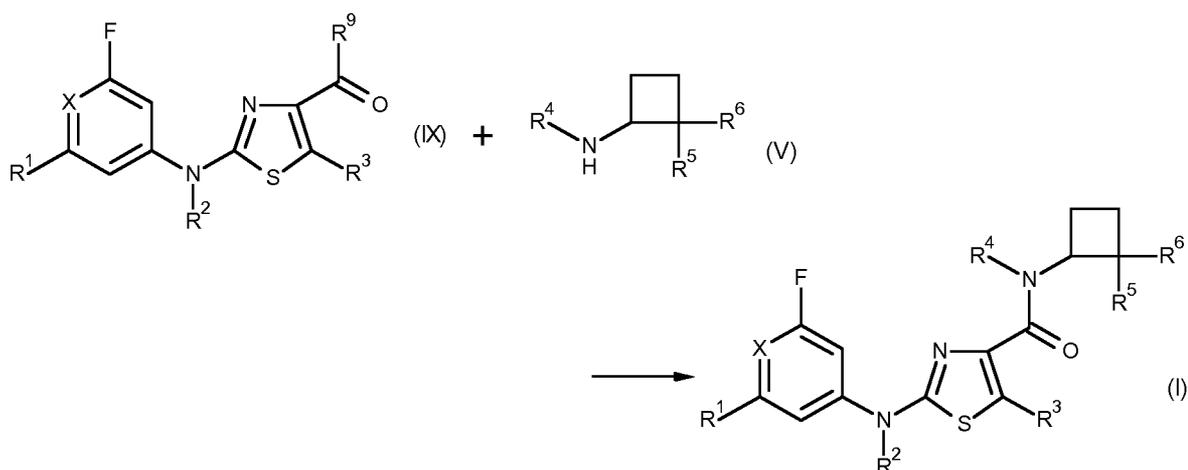
Alternatively, the compounds of formula (I), wherein R^1 , R^2 , R^3 , R^4 , R^5 , R^6 and X are as defined for formula (I), can be obtained by transformation of a compound of formula (VIII), wherein R^1 , R^2 , R^3 and X are as defined for formula (I), with a compound of formula (V), wherein R^4 , R^5 and R^6 are as defined for formula (I), and with a peptide coupling agent. This is shown in Scheme 6 below.

Scheme 6



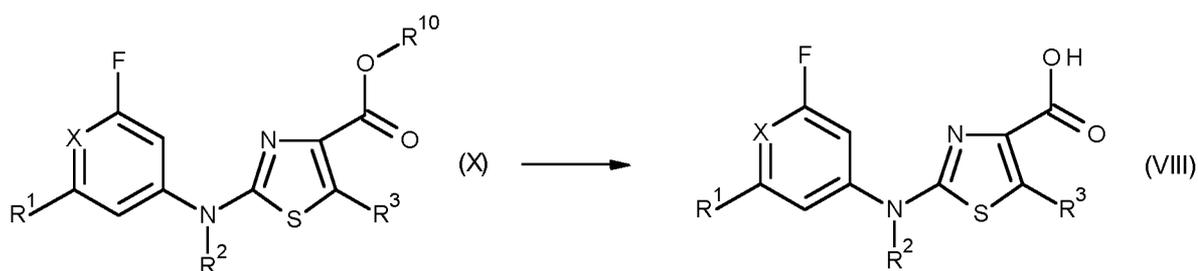
Alternatively, the compounds of formula (I), wherein R¹, R², R³, R⁴, R⁵, R⁶ and X are as defined for formula (I), can be obtained by transformation of a compound of formula (IX), wherein R¹, R², R³ and X are as defined for formula (I), and R⁹ is fluoro or chloro, with a compound of formula (V), wherein R⁴, R⁵ and R⁶ are as defined for formula (I), and with a base. This is shown in Scheme 7 below.

Scheme 7



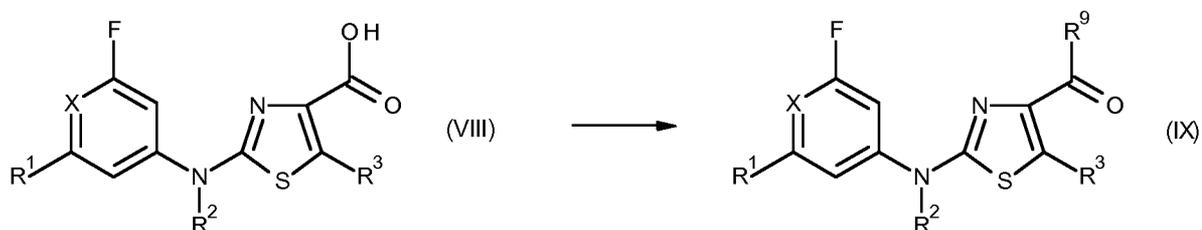
The compounds of formula (VIII), wherein R¹, R², R³ and X are as defined for formula (I), can be obtained by transformation of a compound of formula (X), wherein R¹, R², R³ and X are as defined for formula (I) and R¹⁰ is C₁-C₆alkyl, and with a base. This is shown in Scheme 8 below.

Scheme 8



The compounds of formula (IX), wherein R¹, R², R³ and X are as defined for formula (I), and R⁹ is fluoro or chloro, can be obtained by transformation of a compound of formula (VIII), wherein R¹, R², R³ and X are as defined for formula (I), and with a halogenation agent. This is shown in Scheme 9 below.

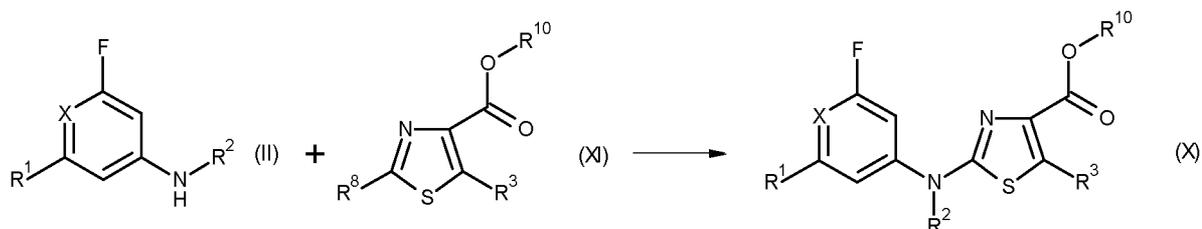
Scheme 9



The compounds of formula (X) according to the invention, wherein R^1 , R^2 , R^3 and X are as defined for formula (I) and R^{10} is C_1 - C_6 alkyl, can be obtained by transformation of a compound of formula (II), wherein R^1 , R^2 and X are as defined for formula (I), with a compound of formula (XI), wherein R^3 is as defined for formula (I), R^8 is bromo or iodo, and R^{10} is C_1 - C_6 alkyl, either by thermal heating, or with the aid of a base or under the conditions of the transition metal catalysed Buchwald-Hartwig amination. This is shown in Scheme 10 below.

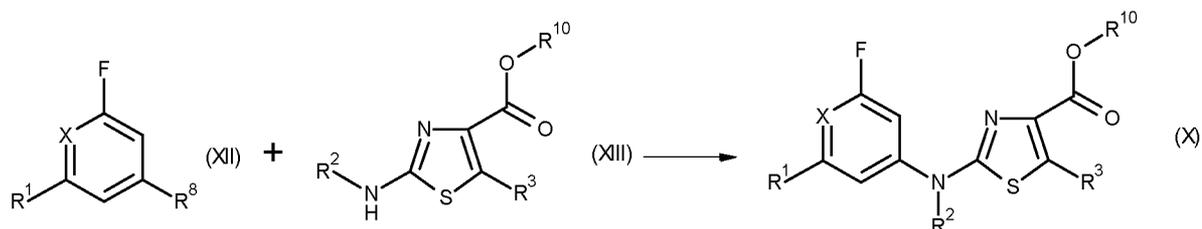
10

Scheme 10



Alternatively, the compounds of formula (X), wherein R^1 , R^2 , R^3 and X are as defined for formula (I) and R^{10} is C_1 - C_6 alkyl, can be obtained by transformation of a compound of formula (XII), wherein R^1 and X are as defined for formula (I) and R^8 is bromo or iodo, with a compound of formula (XIII), wherein R^2 and R^3 and as defined for formula (I), and R^{10} is C_1 - C_6 alkyl, under the conditions of the transition metal catalysed Buchwald-Hartwig amination. This is shown in Scheme 11 below.

Scheme 11

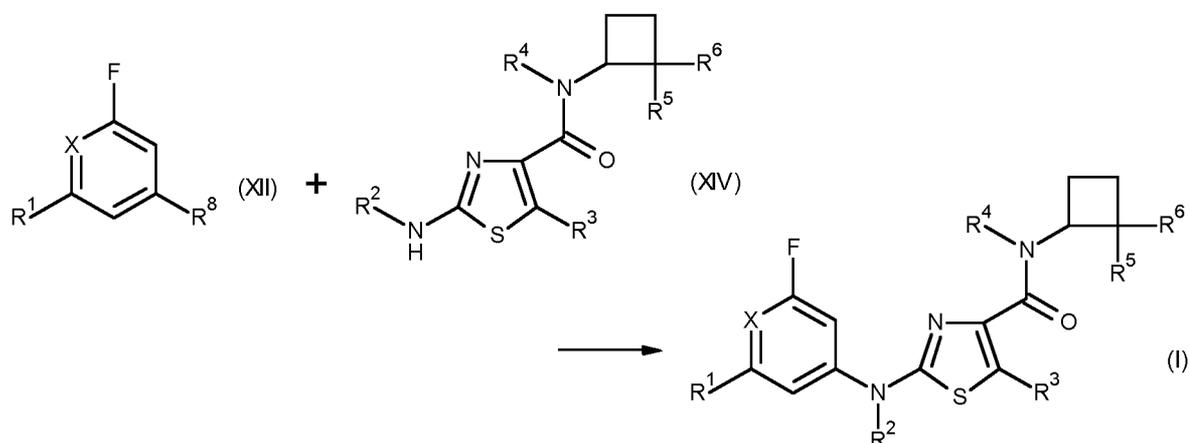


20

Alternatively, the compounds of formula (I) according to the invention, wherein R^1 , R^2 , R^3 , R^4 , R^5 , R^6 and X are as defined for formula (I), can be obtained by transformation of a compound of formula (XII), wherein R^1 and X are as defined for formula (I), and R^8 is bromo or iodo, with a compound of formula (XIV), wherein R^2 , R^3 , R^4 , R^5 and R^6 are as defined for formula (I), under the conditions of the transition metal catalysed Buchwald-Hartwig amination. This is shown in Scheme 12 below.

25

Scheme 12



Surprisingly, it has now been found that the novel compounds of formula (I) have, for practical purposes, a very advantageous level of biological activity for protecting plants against diseases that are caused by fungi.

5 The compounds of formula (I) can be used in the agricultural sector and related fields of use, e.g., as active ingredients for controlling plant pests or on non-living materials for control of spoilage microorganisms or organisms potentially harmful to man. The novel compounds are distinguished by excellent activity at low rates of application, by being well tolerated by plants and by being environmentally safe. They have very useful curative, preventive and systemic properties and may be used for protecting numerous cultivated plants. The compounds of formula (I) can be used to inhibit or destroy the pests that occur on plants or parts of plants (fruit, blossoms, leaves, stems, tubers, roots) of different crops of useful plants, while at the same time protecting also those parts of the plants that grow later, e.g., from phytopathogenic microorganisms.

15 The present invention further relates to a method for controlling or preventing infestation of plants or plant propagation material and/or harvested food crops susceptible to microbial attack by treating plants or plant propagation material and/or harvested food crops wherein an effective amount a compound of formula (I) is applied to the plants, to parts thereof or the locus thereof.

It is also possible to use the compounds of formula (I) as fungicide. The term "fungicide" as used herein means a compound that controls, modifies, or prevents the growth of fungi. The term "fungicidally effective amount" means the quantity of such a compound or combination of such compounds that is capable of producing an effect on the growth of fungi. Controlling or modifying effects include all deviation from natural development, such as killing, retardation and the like, and prevention includes barrier or other defensive formation in or on a plant to prevent fungal infection.

25 It is also possible to use compounds of formula (I) as dressing agents for the treatment of plant propagation material, e.g., seed, such as fruits, tubers or grains, or plant cuttings (e.g., rice), for the protection against fungal infections, as well as against phytopathogenic fungi occurring in the soil. The propagation material can be treated with a composition comprising a compound of formula (I) before planting: seed, e.g., can be dressed before being sown.

30 The active ingredients according to the invention can also be applied to grains (coating), either by impregnating the seeds in a liquid formulation or by coating them with a solid formulation. The composition can also be applied to the planting site when the propagation material is being planted,

e.g., to the seed furrow during sowing. The invention relates also to such methods of treating plant propagation material and to the plant propagation material so treated.

Furthermore, the compounds according to present invention can be used for controlling fungi in related areas, for example in the protection of technical materials, including wood and wood related 5 technical products, in food storage, in hygiene management.

In addition, the invention could be used to protect non-living materials from fungal attack, e.g., lumber, wall boards and paint.

The compounds of formula (I) may be, for example, effective against fungi and fungal vectors of disease as well as phytopathogenic bacteria and viruses. These fungi and fungal vectors of disease as 10 well as phytopathogenic bacteria and viruses are for example:

Absidia corymbifera, Alternaria spp, Aphanomyces spp, Ascochyta spp, Aspergillus spp. including A. flavus, A. fumigatus, A. nidulans, A. niger, A. terreus, Aureobasidium spp. including A. pullulans, Blastomyces dermatitidis, Blumeria graminis, Bremia lactucae, Botryosphaeria spp. including B. 15 dothidea, B. obtusa, Botrytis spp. including B. cinerea, Candida spp. including C. albicans, C. glabrata, C. krusei, C. lusitanae, C. parapsilosis, C. tropicalis, Cephalosporium fragrans, Ceratocystis spp, Cercospora spp. including C. arachidicola, Cercosporidium personatum, Cladosporium spp, Claviceps purpurea, Coccidioides immitis, Cochliobolus spp, Colletotrichum spp. including C. musae, Cryptococcus neoformans, Diaporthe spp, Didymella spp, Drechslera spp, Elsinoe spp, 20 Epidermophyton spp, Erwinia amylovora, Erysiphe spp. including E. cichoracearum, Eutypa lata, Fusarium spp. including F. culmorum, F. graminearum, F. langsethiae, F. moniliforme, F. oxysporum, F. proliferatum, F. subglutinans, F. solani, Gaeumannomyces graminis, Gibberella fujikuroi, Gloeodes pomigena, Gloeosporium musarum, Glomerella cingulate, Guignardia bidwellii, Gymnosporangium juniperi-virginianae, Helminthosporium spp, Hemileia spp, Histoplasma spp. including H. capsulatum, 25 Laetisaria fuciformis, Leptographium lindbergii, Leveillula taurica, Lophodermium seeditiosum, Microdothium nivale, Microsporium spp, Monilinia spp, Mucor spp, Mycosphaerella spp. including M. graminicola, M. pomi, Oncobasidium theobromaeon, Ophiostoma piceae, Paracoccidioides spp, Penicillium spp. including P. digitatum, P. italicum, Petriellidium spp, Peronosclerospora spp. Including P. maydis, P. philippinensis and P. sorghi, Peronospora spp, Phaeosphaeria nodorum, Phakopsora 30 pachyrhizi, Phellinus igniarius, Phialophora spp, Phoma spp, Phomopsis viticola, Phytophthora spp. including P. infestans, Plasmopara spp. including P. halstedii, P. viticola, Pleospora spp., Podosphaera spp. including P. leucotricha, Polymyxa graminis, Polymyxa betae, Pseudocercospora herpotrichoides, Pseudomonas spp, Pseudoperonospora spp. including P. cubensis, P. humuli, Pseudopeziza tracheiphila, Puccinia Spp. including P. hordei, P. recondita, P. striiformis, P. triticina, 35 Pyrenopeziza spp, Pyrenophora spp, Pyricularia spp. including P. oryzae, Pythium spp. including P. ultimum, Ramularia spp, Rhizoctonia spp, Rhizomucor pusillus, Rhizopus arrhizus, Rhynchosporium spp, Scedosporium spp. including S. apiospermum and S. prolificans, Schizothyrium pomi, Sclerotinia spp, Sclerotium spp, Septoria spp, including S. nodorum, S. tritici, Sphaerotheca macularis, Sphaerotheca fusca (Sphaerotheca fuliginea), Sporothrix spp, Stagonospora nodorum, Stemphylium 40 spp., Stereum hirsutum, Thanatephorus cucumeris, Thielaviopsis basicola, Tilletia spp, Trichoderma spp., including T. harzianum, T. pseudokoningii, T. viride, Trichophyton spp, Typhula spp, Uncinula

necator, Urocystis spp, Ustilago spp, Venturia spp. including V. inaequalis, Verticillium spp, and Xanthomonas spp.

Within the scope of present invention, target crops and/or useful plants to be protected typically
5 comprise perennial and annual crops, such as berry plants for example blackberries, blueberries, cranberries, raspberries and strawberries; cereals for example barley, maize (corn), millet, oats, rice, rye, sorghum triticale and wheat; fibre plants for example cotton, flax, hemp, jute and sisal; field crops for example sugar and fodder beet, coffee, hops, mustard, oilseed rape (canola), poppy, sugar cane, sunflower, tea and tobacco; fruit trees for example apple, apricot, avocado, banana, cherry, citrus,
10 nectarine, peach, pear and plum; grasses for example Bermuda grass, bluegrass, bentgrass, centipede grass, fescue, ryegrass, St. Augustine grass and Zoysia grass; herbs such as basil, borage, chives, coriander, lavender, lovage, mint, oregano, parsley, rosemary, sage and thyme; legumes for example beans, lentils, peas and soya beans; nuts for example almond, cashew, ground nut, hazelnut, peanut, pecan, pistachio and walnut; palms for example oil palm; ornamentals for example flowers, shrubs and
15 trees; other trees, for example cacao, coconut, olive and rubber; vegetables for example asparagus, aubergine, broccoli, cabbage, carrot, cucumber, garlic, lettuce, marrow, melon, okra, onion, pepper, potato, pumpkin, rhubarb, spinach and tomato; and vines for example grapes.

The term "useful plants" is to be understood as including also useful plants that have been rendered tolerant to herbicides like bromoxynil or classes of herbicides (such as, for example, HPPD
20 inhibitors, ALS inhibitors, for example primisulfuron, prosulfuron and trifloxysulfuron, EPSPS (5-enolpyrovyl-shikimate-3-phosphate-synthase) inhibitors, GS (glutamine synthetase) inhibitors or PPO (protoporphyrinogen-oxidase) 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 conventional methods of breeding (mutagenesis) is Clearfield® summer rape (Canola). Examples of
25 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®, Herculex I® and LibertyLink®.

The term "useful plants" is to be understood as including also useful plants which have been so
30 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.

Examples of such plants are: YieldGard® (maize variety that expresses a CryIA(b) toxin);
35 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) toxin); Bollgard I® (cotton variety
40 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); NatureGard® Agrisure® GT Advantage (GA21 glyphosate-tolerant trait), Agrisure® CB Advantage (Bt11 corn borer (CB) trait), Agrisure® RW (corn rootworm trait) and Protecta®.

5 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 one or more selectively acting toxins, such as are known, for example, from toxin-producing bacteria, especially those of the genus *Bacillus*.

10 Toxins that can be expressed by such transgenic plants include, for example, insecticidal proteins from *Bacillus cereus* or *Bacillus popilliae*; or insecticidal proteins from *Bacillus thuringiensis*, such as δ -endotoxins, e.g. Cry1Ab, Cry1Ac, Cry1F, Cry1Fa2, Cry2Ab, Cry3A, Cry3Bb1 or Cry9C, or vegetative insecticidal proteins (Vip), e.g. Vip1, Vip2, Vip3 or Vip3A; or insecticidal proteins of bacteria colonising nematodes, for example *Photorhabdus* spp. or *Xenorhabdus* spp., such as *Photorhabdus*
15 *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 protease inhibitors, patatin, cystatin, papain inhibitors; ribosome-inactivating proteins (RIP), such as ricin, maize-RIP, abrin, luffin, saporin or bryodin;
20 steroid metabolism enzymes, such as 3-hydroxysteroidoxidase, 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, stilbene synthase, bibenzyl synthase, chitinases and glucanases.

25 In the context of the present invention there are to be understood by δ -endotoxins, for example Cry1Ab, Cry1Ac, Cry1F, Cry1Fa2, Cry2Ab, Cry3A, Cry3Bb1 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 recombinantly by a new combination of different domains of those proteins (see, for example, WO 02/15701). Truncated toxins, for example a truncated Cry1Ab, are
30 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 Cry3A055, a cathepsin-G-recognition sequence is inserted into a Cry3A toxin (see WO 03/018810).

35 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, EP-A-451 878 and WO 03/052073.

The processes for the preparation of such transgenic plants are generally known to the person
40 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 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.
5 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 (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 Cry1Ab toxin); YieldGard Rootworm® (maize
10 variety that expresses a Cry3Bb1 toxin); YieldGard Plus® (maize variety that expresses a Cry1Ab and a Cry3Bb1 toxin); Starlink® (maize variety that expresses a Cry9C toxin); Herculex I® (maize variety that expresses a Cry1Fa2 toxin and the enzyme phosphinothricine N-acetyltransferase (PAT) to achieve tolerance to the herbicide glufosinate ammonium); NuCOTN 33B® (cotton variety that expresses a
15 Cry1Ac toxin); Bollgard I® (cotton variety that expresses a Cry1Ac toxin); Bollgard II® (cotton variety that expresses a Cry1Ac and a Cry2Ab toxin); VipCot® (cotton variety that expresses a Vip3A and a Cry1Ab toxin); NewLeaf® (potato variety that expresses a Cry3A toxin); NatureGard®, Agrisure® GT Advantage (GA21 glyphosate-tolerant trait), Agrisure® CB Advantage (Bt11 corn borer (CB) trait) and Protecta®.

20 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
25 expression of a truncated Cry1Ab toxin. Bt11 maize also 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, France, registration number C/FR/96/05/10. Genetically modified *Zea mays* which has been rendered resistant
30 to attack by the European corn borer (*Ostrinia nubilalis* and *Sesamia nonagrioides*) by transgenic expression of a Cry1Ab toxin. Bt176 maize also transgenically expresses the enzyme PAT to achieve tolerance to the herbicide glufosinate ammonium.

3. **MIR604 Maize** from Syngenta Seeds SAS, Chemin de l'Hobit 27, F-31 790 St. Sauveur, France,
35 registration number C/FR/96/05/10. Maize which has been rendered insect-resistant by transgenic expression of a modified Cry3A toxin. This toxin is Cry3A055 modified by insertion of a cathepsin-G-protease recognition sequence. The preparation of such transgenic maize plants is described in WO 03/018810.

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 Cry3Bb1 toxin and has resistance to certain Coleoptera insects.
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 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 Cry1Ab toxin obtained from *Bacillus thuringiensis subsp. kurstaki* which brings about tolerance to certain Lepidoptera, include the European corn borer.

20

The term "locus" as used herein means fields in or on which plants are growing, or where seeds of cultivated plants are sown, or where seed will be placed into the soil. It includes soil, seeds, and seedlings, as well as established vegetation.

The term "plants" refers to all physical parts of a plant, including seeds, seedlings, saplings, roots, tubers, stems, stalks, foliage, and fruits.

The term "plant propagation material" is understood to denote generative parts of the plant, such as seeds, which can be used for the multiplication of the latter, and vegetative material, such as cuttings or tubers, for example potatoes. There may be mentioned for example seeds (in the strict sense), roots, fruits, tubers, bulbs, rhizomes and 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 immersion. Preferably "plant propagation material" is understood to denote seeds.

Pesticidal agents referred to herein using their common name are known, for example, from "The Pesticide Manual", 15th Ed., British Crop Protection Council 2009.

The compounds of formula (I) may be used in unmodified form or, preferably, together with the adjuvants conventionally employed in the art of formulation. To this end, they may be conveniently formulated in known manner to emulsifiable concentrates, coatable pastes, directly sprayable or dilutable solutions or suspensions, dilute emulsions, wettable powders, soluble powders, dusts, granulates, and also encapsulations e.g. in polymeric substances. As with the type of the compositions, the methods of application, such as spraying, atomising, dusting, scattering, coating or pouring, are chosen in accordance with the intended objectives and the prevailing circumstances. The compositions

may also contain further adjuvants such as stabilizers, antifoams, viscosity regulators, binders or tackifiers as well as fertilizers, micronutrient donors or other formulations for obtaining special effects.

Suitable carriers and adjuvants, e.g., for agricultural use, can be solid or liquid and are substances useful in formulation technology, e.g. natural or regenerated mineral substances, solvents, dispersants, wetting agents, tackifiers, thickeners, binders or fertilizers. Such carriers are for example described in WO 97/33890.

The compounds of formula (I) are normally used in the form of compositions and can be applied to the crop area or plant to be treated, simultaneously or in succession with further compounds. These further compounds can be, e.g., fertilizers or micronutrient donors or other preparations, which influence the growth of plants. They can also be selective herbicides or non-selective herbicides as well as insecticides, fungicides, bactericides, nematocides, molluscicides or mixtures of several of these preparations, if desired together with further carriers, surfactants or application promoting adjuvants customarily employed in the art of formulation.

The compounds of formula (I) may be used in the form of (fungicidal) compositions for controlling or protecting against phytopathogenic microorganisms, comprising as active ingredient at least one compound of formula (I) or of at least one preferred individual compound as above-defined, in free form or in agrochemically usable salt form, and at least one of the above-mentioned adjuvants.

The invention provides a composition, preferably a fungicidal composition, comprising at least one compound formula (I) an agriculturally acceptable carrier and optionally an adjuvant. An agricultural acceptable carrier is for example a carrier that is suitable for agricultural use. Agricultural carriers are well known in the art. Preferably, said composition may comprise at least one or more pesticidally active compounds, for example an additional fungicidal active ingredient in addition to the compound of formula (I).

The compound of formula (I) may be the sole active ingredient of a composition or it may be admixed with one or more additional active ingredients such as a pesticide, fungicide, synergist, herbicide or plant growth regulator where appropriate. An additional active ingredient may, in some cases, result in unexpected synergistic activities.

Examples of suitable additional active ingredients include the following acycloamino acid fungicides, aliphatic nitrogen fungicides, amide fungicides, anilide fungicides, antibiotic fungicides, aromatic fungicides, arsenical fungicides, aryl phenyl ketone fungicides, benzamide fungicides, benzanilide fungicides, benzimidazole fungicides, benzothiazole fungicides, botanical fungicides, bridged diphenyl fungicides, carbamate fungicides, carbanilate fungicides, conazole fungicides, copper fungicides, dicarboximide fungicides, dinitrophenol fungicides, dithiocarbamate fungicides, dithiolane fungicides, furamide fungicides, furanilide fungicides, hydrazide fungicides, imidazole fungicides, mercury fungicides, morpholine fungicides, organophosphorous fungicides, organotin fungicides, oxathiin fungicides, oxazole fungicides, phenylsulfamide fungicides, polysulfide fungicides, pyrazole fungicides, pyridine fungicides, pyrimidine fungicides, pyrrole fungicides, quaternary ammonium fungicides, quinoline fungicides, quinone fungicides, quinoxaline fungicides, strobilurin fungicides, sulfonanilide fungicides, thiadiazole fungicides, thiazole fungicides, thiazolidine fungicides, thiocarbamate fungicides, thiophene fungicides, triazine fungicides, triazole fungicides, triazolopyrimidine fungicides, urea fungicides, valinamide fungicides, and zinc fungicides.

Examples of suitable additional active ingredients also include the following: 3-difluoromethyl-1-methyl-1H-pyrazole-4-carboxylic acid (9-dichloromethylene-1,2,3,4-tetrahydro-1,4-methanonaphthalen-5-yl)-amide, 3-difluoromethyl-1-methyl-1H-pyrazole-4-carboxylic acid methoxy-[1-methyl-2-(2,4,6-trichlorophenyl)-ethyl]-amide, 1-methyl-3-difluoromethyl-1H-pyrazole-4-carboxylic acid (2-dichloromethylene-3-ethyl-1-methyl-indan-4-yl)-amide (1072957-71-1), 1-methyl-3-difluoromethyl-1H-pyrazole-4-carboxylic acid (4'-methylsulfanyl-biphenyl-2-yl)-amide, 1-methyl-3-difluoromethyl-4H-pyrazole-4-carboxylic acid [2-(2,4-dichlorophenyl)-2-methoxy-1-methyl-ethyl]-amide, (5-Chloro-2,4-dimethyl-pyridin-3-yl)-(2,3,4-trimethoxy-6-methyl-phenyl)-methanone, (5-Bromo-4-chloro-2-methoxypyridin-3-yl)-(2,3,4-trimethoxy-6-methyl-phenyl)-methanone, 2-{2-[(E)-3-(2,6-Dichlorophenyl)-1-methyl-prop-2-en-(E)-ylideneaminoxyethyl]-phenyl}-2-[(Z)-methoxyimino]-N-methyl-acetamide, 3-[5-(4-Chlorophenyl)-2,3-dimethyl-isoxazolidin-3-yl]-pyridine, (E)-N-methyl-2-[2-(2,5-dimethylphenoxyethyl)phenyl]-2-methoxy-iminoacetamide, 4-bromo-2-cyano-N,N-dimethyl-6-trifluoromethylbenzimidazole-1-sulphonamide, a-[N-(3-chloro-2,6-xylyl)-2-methoxyacetamido]-γ-butyrolactone, 4-chloro-2-cyano-N,N-dimethyl-5-p-tolylimidazole-1-sulfonamide, N-allyl-4,5-dimethyl-2-trimethylsilylthiophene-3-carboxamide, N-(1-cyano-1,2-dimethylpropyl)-2-(2,4-dichlorophenoxy)propionamide, N-(2-methoxy-5-pyridyl)-cyclopropane carboxamide, (+-)-cis-1-(4-chlorophenyl)-2-(1H-1,2,4-triazol-1-yl)-cycloheptanol, 2-(1-tert-butyl)-1-(2-chlorophenyl)-3-(1,2,4-triazol-1-yl)-propan-2-ol, 2',6'-dibromo-2-methyl-4-trifluoromethoxy-4'-trifluoromethyl-1,3-thiazole-5-carboxanilide, 1-imidazolyl-1-(4'-chlorophenoxy)-3,3-dimethylbutan-2-one, methyl (E)-2-[2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl]3-methoxyacrylate, methyl (E)-2-[2-[6-(2-thioamidophenoxy)pyrimidin-4-yloxy]phenyl]3-methoxyacrylate, methyl (E)-2-[2-[6-(2-fluorophenoxy)pyrimidin-4-yloxy]phenyl]3-methoxyacrylate, methyl (E)-2-[2-[6-(2,6-difluorophenoxy)pyrimidin-4-yloxy]phenyl]3-methoxyacrylate, methyl (E)-2-[2-[3-(pyrimidin-2-yloxy)phenoxy]phenyl]3-methoxyacrylate, methyl (E)-2-[2-[3-(5-methylpyrimidin-2-yloxy)-phenoxy]phenyl]3-methoxyacrylate, methyl (E)-2-[2-[3-(phenylsulphonyloxy)phenoxy]phenyl]3-methoxyacrylate, methyl (E)-2-[2-[3-(4-nitrophenoxy)phenoxy]phenyl]3-methoxyacrylate, methyl (E)-2-[2-phenoxyphenyl]3-methoxyacrylate, methyl (E)-2-[2-(3,5-dimethyl-benzoyl)pyrrol-1-yl]3-methoxyacrylate, methyl (E)-2-[2-(3-methoxyphenoxy)phenyl]3-methoxyacrylate, methyl (E)-2-[2-(2-phenylethen-1-yl)-phenyl]3-methoxyacrylate, methyl (E)-2-[2-(3,5-dichlorophenoxy)pyridin-3-yl]3-methoxyacrylate, methyl (E)-2-(2-(3-(1,1,2,2-tetrafluoroethoxy)phenoxy)phenyl)-3-methoxyacrylate, methyl (E)-2-(2-[3-(α-hydroxybenzyl)phenoxy]phenyl)-3-methoxyacrylate, methyl (E)-2-(2-(4-phenoxy-pyridin-2-yloxy)phenyl)-3-methoxyacrylate, methyl (E)-2-[2-(3-n-propyloxy-phenoxy)phenyl]3-methoxyacrylate, methyl (E)-2-[2-(3-isopropyloxyphenoxy)phenyl]3-methoxyacrylate, methyl (E)-2-[2-[3-(2-fluorophenoxy)phenoxy]phenyl]3-methoxyacrylate, methyl (E)-2-[2-(3-ethoxyphenoxy)phenyl]3-methoxyacrylate, methyl (E)-2-[2-(4-tert-butyl-pyridin-2-yloxy)phenyl]3-methoxyacrylate, methyl (E)-2-[2-[3-(3-cyanophenoxy)phenoxy]phenyl]3-methoxyacrylate, methyl (E)-2-[2-[(3-methyl-pyridin-2-yloxymethyl)phenyl]3-methoxyacrylate, methyl (E)-2-[2-[6-(2-methyl-phenoxy)pyrimidin-4-yloxy]phenyl]3-methoxyacrylate, methyl (E)-2-[2-(5-bromo-pyridin-2-yloxymethyl)phenyl]3-methoxyacrylate, methyl (E)-2-[2-(3-(3-iodopyridin-2-yloxy)phenoxy)phenyl]3-methoxyacrylate, methyl (E)-2-[2-[6-(2-chloropyridin-3-yloxy)pyrimidin-4-yloxy]phenyl]3-methoxyacrylate, methyl (E)-2-[2-(5,6-dimethylpyrazin-2-yl)methyloximinomethyl]phenyl]3-methoxyacrylate, methyl (E)-2-[2-[6-(6-methylpyridin-2-yloxy)pyrimidin-4-yloxy]phenyl]3-methoxyacrylate, methyl (E)-2-[2-(3-

methoxyphenyl)methyloximinomethyl]-phenyl)-3-methoxyacrylate, methyl (E)-2-{2-(6-(2-azidophenoxy)-pyrimidin-4-yloxy]phenyl)-3-methoxyacrylate, methyl (E),(E)-2-{2-[6-phenylpyrimidin-4-yl)-methyloximinomethyl]phenyl)-3-methoxyacrylate, methyl (E),(E)-2-{2-[(4-chlorophenyl)-methyloximinomethyl]-phenyl)-3-methoxyacrylate, methyl (E)-2-{2-[6-(2-n-propylphenoxy)-1,3,5-triazin-4-yloxy]phenyl)-3-methoxyacrylate, methyl (E),(E)-2-{2-[(3-nitrophenyl)methyloximinomethyl]phenyl)-3-methoxyacrylate, 3-chloro-7-(2-aza-2,7,7-trimethyl-oct-3-en-5-ine), 2,6-dichloro-N-(4-trifluoromethylbenzyl)-benzamide, 3-iodo-2-propinyl alcohol, 4-chlorophenyl-3-iodopropargyl formal, 3-bromo-2,3-diiodo-2-propenyl ethylcarbamate, 2,3,3-triiodoallyl alcohol, 3-bromo-2,3-diiodo-2-propenyl alcohol, 3-iodo-2-propinyl n-butylcarbamate, 3-iodo-2-propinyl n-hexylcarbamate, 3-iodo-2-propinyl cyclohexyl-carbamate, 3-iodo-2-propinyl phenylcarbamate; phenol derivatives, such as tribromophenol, tetrachlorophenol, 3-methyl-4-chlorophenol, 3,5-dimethyl-4-chlorophenol, phenoxyethanol, dichlorophene, o-phenylphenol, m-phenylphenol, p-phenylphenol, 2-benzyl-4-chlorophenol, 5-hydroxy-2(5H)-furanone; 4,5-dichlorodithiazolinone, 4,5-benzodithiazolinone, 4,5-trimethylenedithiazolinone, 4,5-dichloro-(3H)-1,2-dithiol-3-one, 3,5-dimethyl-tetrahydro-1,3,5-thiadiazine-2-thione, N-(2-p-chlorobenzoyl-ethyl)-hexaminium chloride, acibenzolar, acypetacs, alanycarb, albendazole, aldimorph, allicin, allyl alcohol, ametocradin, amisulbrom, amobam, ampropylfos, anilazine, asomate, aureofungin, azaconazole, azafendin, azithiram, azoxystrobin, barium polysulfide, benalaxyl, benalaxyl-M, benodanil, benomyl, benquinox, bentaluron, benthiavalicarb, benthiazole, benzalkonium chloride, benzamacril, benzamorf, benzohydroxamic acid, benzovindiflupyr, berberine, bethoxazin, biloxazol, binapacryl, biphenyl, bitertanol, bithionol, bixafen, blastidicin-S, boscalid, bromothalonil, bromuconazole, bupirimate, buthiobate, butylamine calcium polysulfide, captafol, captan, carbamorph, carbendazim, carbendazim chlorhydrate, carboxin, carpropamid, carvone, CGA41396, CGA41397, chinomethionate, chitosan, chlobenthiazole, chloraniformethan, chloranil, chlorfenazole, chloroneb, chloropicrin, chlorothalonil, chlorozolate, chlozolate, climbazole, clotrimazole, clozylacon, copper containing compounds such as copper acetate, copper carbonate, copper hydroxide, copper naphthenate, copper oleate, copper oxychloride, copper oxyquinolate, copper silicate, copper sulphate, copper tallate, copper zinc chromate and Bordeaux mixture, cresol, cufraneb, cuprobam, cuprous oxide, cyazofamid, cyclofuramid, cycloheximide, cyflufenamid, cymoxanil, cypendazole, cyproconazole, cyprodinil, dazomet, debacarb, decafentin, dehydroacetic acid, di-2-pyridyl disulphide 1, 1'-dioxide, dichlofluanid, diclomezine, dichlone, dicloran, dichlorophen, dichlozoline, diclobutrazol, diclocymet, diethofencarb, difenoconazole, difenzoquat, diflumetorim, O-di-iso-propyl-S-benzyl thiophosphate, dimefluazole, dimetachlone, dimetconazole, dimethomorph, dimethirimol, diniconazole, diniconazole-M, dinobuton, dinocap, dinocron, dinopenton, dinosulfon, dinoterbon, diphenylamine, dipyrithione, disulfiram, ditalimfos, dithianon, dithioether, dodecyl dimethyl ammonium chloride, dodemorph, dodicin, dodine, doguadine, drazoxolon, edifenphos, enestroburin, epoxiconazole, etaconazole, etem, ethaboxam, ethirimol, ethoxyquin, ethilicin, ethyl (Z)-N-benzyl-N ([methyl (methyl-thioethylideneamino-oxycarbonyl) amino] thio)-β-alaninate, etridiazole, famoxadone, fenamidone, fenaminosulf, fenapanil, fenarimol, fenbuconazole, fenfuram, fenhexamid, fenitropan, fenoxanil, fenciclonil, fencicoxamid, fenpropidin, fenpropimorph, fenpyrazamine, fentin acetate, fentin hydroxide, ferbam, ferimzone, fluazinam, fludioxonil, flumetover, flumorph, flupicolide, fluopyram, fluoroimide, flutrimazole, fluoxastrobin, fluquinconazole, flusilazole, flusulfamide, flutanil, flutolanil, flutriafol, fluxapyroxad, folpet, formaldehyde,

fosetyl, fuberidazole, furalaxyl, furametpyr, furcarbanil, furconazole, furfural, furnecyclox, furophanate, glyodin, griseofulvin, guazatine, halacrinat, hexachlorobenzene, hexachlorobutadiene, hexachlorophene, hexaconazole, hexylthiofos, hydrargaphen, hydroxyisoxazole, hymexazole, imazalil, imazalil sulphate, imibenconazole, iminoctadine, iminoctadine triacetate, inezin, iodocarb, ipconazole, 5 ipfentrifluconazole, iprobenfos, iprodione, iprovalicarb, isopropanyl butyl carbamate, isoprothiolane, isopyrazam, isotianil, isovaledione, izopamfos, kasugamycin, kresoxim-methyl, LY186054, LY211795, LY248908, mancozeb, mandipropamid, maneb, mebenil, mecarbinzid, mfenoxam, mfenfentrifluconazole, mepanipyrim, mepronil, mercuric chloride, mercurous chloride, meptyldinocap, metalaxyl, metalaxyl-M, metam, metazoxolon, metconazole, methasulfocarb, methfuroxam, methyl 10 bromide, methyl iodide, methyl isothiocyanate, metiram, metiram-zinc, metominostrobin, metrafenone, metsulfovax, milneb, moroxydine, myclobutanil, myclozolin, nabam, natamycin, neoasozin, nickel dimethyldithiocarbamate, nitrostyrene, nitrothal-iso-propyl, nuarimol, othilinone, ofurace, organomercury compounds, orysastrobin, osthol, oxadixyl, oxasulfuron, oxathiapiprolin, oxine-copper, oxolinic acid, oxpoconazole, oxycarboxin, parinol, pefurazoate, penconazole, pencycuron, penflufen, 15 pentachlorophenol, penthiopyrad, phenamacril, phenazin oxide, phosdiphen, phosetyl-Al, phosphorus acids, phthalide, picoxystrobin, piperalin, polycarbamate, polyoxin D, polyoxrim, polyram, probenazole, prochloraz, procymidone, propamidine, propamocarb, propiconazole, propineb, propionic acid, proquinazid, prothiocarb, prothioconazole, pydiflumetofen, pyracarbolid, pyraclostrobin, pyrametrostrobin, pyraoxystrobin, pyrazophos, pyribencarb, pyridinitril, pyrifenox, pyrimethanil, 20 pyriofenone, pyroquilon, pyroxychlor, pyroxyfur, pyrrolnitrin, quaternary ammonium compounds, quinacetol, quinazamid, quinconazole, quinomethionate, quinoxyfen, quintozene, rabenzazole, santonin, sedaxane, silthiofam, simeconazole, sipconazole, sodium pentachlorophenate, spiroxamine, streptomycin, sulphur, sultropen, tebuconazole, tebfloquin, tecloftalam, tecnazene, tecoram, tetraconazole, thiabendazole, thiadifluor, thicyofen, thifluzamide, 2- (thiocyanomethylthio) 25 benzothiazole, thiophanate-methyl, thioquinox, thiram, tiadinil, timibenconazole, tioxyimid, tolclufos-methyl, tolylfluanid, triadimefon, triadimenol, triamiphos, triarimol, triazbutil, triazoxide, tricyclazole, tridemorph, trifloxystrobin, triflumazole, triforine, triflumizole, triticonazole, uniconazole, urbacide, validamycin, valifenalate, vapam, vinclozolin, zarilamid, zineb, ziram, and zoxamide.

The compounds of the invention may also be used in combination with anthelmintic agents. 30 Such anthelmintic agents include, compounds selected from the macrocyclic lactone class of compounds such as ivermectin, avermectin, abamectin, emamectin, eprinomectin, doramectin, selamectin, moxidectin, nemadectin and milbemycin derivatives as described in EP-357460, EP-444964 and EP-594291. Additional anthelmintic agents include semisynthetic and biosynthetic avermectin/milbemycin derivatives such as those described in US-5015630, WO-9415944 and WO- 35 9522552. Additional anthelmintic agents include the benzimidazoles such as albendazole, cambendazole, fenbendazole, flubendazole, mebendazole, oxfendazole, oxibendazole, parbendazole, and other members of the class. Additional anthelmintic agents include imidazothiazoles and tetrahydropyrimidines such as tetramisole, levamisole, pyrantel pamoate, oxantel or morantel. Additional anthelmintic agents include flukicides, such as triclabendazole and clorsulon and the 40 cestocides, such as praziquantel and epsiprantel.

The compounds of the invention may be used in combination with derivatives and analogues of the paraherquamide/marcfortine class of anthelmintic agents, as well as the antiparasitic oxazolines such as those disclosed in US-5478855, US- 4639771 and DE-19520936.

The compounds of the invention may be used in combination with derivatives and analogues
5 of the general class of dioxomorpholine antiparasitic agents as described in WO-9615121 and also with anthelmintic active cyclic depsipeptides such as those described in WO-9611945, WO-9319053, WO-9325543, EP-626375, EP-382173, WO-9419334, EP-382173, and EP-503538.

The compounds of the invention may be used in combination with other ectoparasiticides; for example, fipronil; pyrethroids; organophosphates; insect growth regulators such as lufenuron; ecdysone
10 agonists such as tebufenozide and the like; neonicotinoids such as imidacloprid and the like.

The compounds of the invention may be used in combination with terpene alkaloids, for example those described in WO 95/19363 or WO 04/72086, particularly the compounds disclosed therein.

Other examples of such biologically active compounds that the compounds of the invention
15 may be used in combination with include but are not restricted to the following:

Organophosphates: acephate, azamethiphos, azinphos-ethyl, azinphos- methyl, bromophos, bromophos-ethyl, cadusafos, chlorethoxyphos, chlorpyrifos, chlorfenvinphos, chlormephos, demeton, demeton-S-methyl, demeton-S-methyl sulphone, dialifos, diazinon, dichlorvos, dicrotophos, dimethoate, disulfoton, ethion, ethoprophos, etrimfos, famphur, fenamiphos, fenitrothion, fensulfothion, fenthion,
20 flupyrazofos, fonofos, formothion, fosthiazate, heptenophos, isazophos, isothioate, isoxathion, malathion, methacriphos, methamidophos, methidathion, methyl- parathion, mevinphos, monocrotophos, naled, omethoate, oxydemeton-methyl, paraoxon, parathion, parathion-methyl, phenthoate, phosalone, phosfolan, phosphocarb, phosmet, phosphamidon, phorate, phoxim, pirimiphos, pirimiphos- methyl, profenofos, propaphos, proetamphos, prothiofos, pyraclofos,
25 pyridapenthion, quinalphos, sulprophos, temephos, terbufos, tebupirimfos, tetrachlorvinphos, thimeton, triazophos, trichlorfon, vamidothion.

Carbamates: alanycarb, aldicarb, 2-sec-butylphenyl methylcarbamate, benfuracarb, carbaryl, carbofuran, carbosulfan, cloethocarb, ethiofencarb, fenoxycarb, fenthio carb, furathiocarb, HCN-801, isoprocarb, indoxacarb, methiocarb, methomyl, 5-methyl-m-cumenylbutyryl(methyl)carbamate, oxamyl,
30 pirimicarb, propoxur, thiodicarb, thiofanox, triazamate, UC-51717.

Pyrethroids: acrinathin, allethrin, alphametrin, 5-benzyl-3-furylmethyl (E) -

(1 R)-cis-2,2-dimethyl-3-(2-oxothiolan-3-ylidenemethyl)cyclopropanecarboxylate, bifenthrin, beta -cyfluthrin, cyfluthrin, a-cypermethrin, beta -cypermethrin, bioallethrin, bioallethrin((S)-cyclopentylisomer), bioresmethrin, bifenthrin, NCI-85193, cycloprothrin, cyhalothrin, cythithrin,
35 cyphenothrin, deltamethrin, empenethrin, esfenvaterate, ethofenprox, fenfluthrin, fenpropathrin, fenvalerate, flucythrinate, flumethrin, fluvalinate (D isomer), imiprothrin, cyhalothrin, lambda-cyhalothrin, permethrin, phenothrin, prallethrin, pyrethrins (natural products), resmethrin, tetramethrin, transfluthrin, theta-cypermethrin, silafluofen, t-fluvalinate, tefluthrin, tralomethrin, Zeta-cypermethrin.

Arthropod growth regulators: a) chitin synthesis inhibitors: benzoylureas: chlorfluazuron,
40 diflubenzuron, fluazuron, flucyclozuron, flufenoxuron, hexaflumuron, lufenuron, novaluron, teflubenzuron, triflumuron, buprofezin, diofenolan, hexythiazox, etoxazole, chlorfentazine; b) ecdysone

antagonists: halofenozide, methoxyfenozide, tebufenozide; c) juvenoids: pyriproxyfen, methoprene (including S-methoprene), fenoxycarb; d) lipid biosynthesis inhibitors: spiroticlofen.

Other antiparasitics: acequinocyl, amitraz, AKD-1022, ANS-118, azadirachtin, *Bacillus thuringiensis*, bensultap, bifenazate, binapacryl, bromopropylate, BTG-504, BTG-505, camphechlor, 5 cartap, chlorobenzilate, chlordimeform, chlorfenapyr, chromafenozide, clothianidine, cyromazine, diaclofen, diafenthiuron, DBI-3204, dinactin, dihydroxymethylidihydroxypyrrolidine, dinobuton, dinocap, endosulfan, ethiprole, ethofenprox, fenazaquin, flumite, MTI- 800, fenpyroximate, fluacrypyrim, flubenzimine, flubrocycytrinate, flufenzine, flufenprox, fluproxyfen, halofenprox, hydramethylnon, IKI-220, kanemite, NC-196, neem guard, nidinorterfuran, nitenpyram, SD-35651, WL-108477, pirydaryl, 10 propargite, protrifenbute, pymethroline, pyridaben, pyrimidifen, NC-1111, R-195, RH-0345, RH-2485, RYI-210, S-1283, S-1833, SI-8601, silafluofen, silomadine, spinosad, tebufenpyrad, tetradifon, tetranactin, thiocloprid, thiocyclam, thiamethoxam, tolfenpyrad, triazamate, triethoxyspinosyn, trinactin, verbutin, vertalec, YI-5301.

Biological agents: *Bacillus thuringiensis* ssp *aizawai*, *kurstaki*, *Bacillus thuringiensis* delta 15 endotoxin, baculovirus, entomopathogenic bacteria, virus and fungi.

Bactericides: chlortetracycline, oxytetracycline, streptomycin.

Other biological agents: enrofloxacin, febantel, penethamate, moloxicam, cefalexin, kanamycin, pimobendan, clenbuterol, omeprazole, tiamulin, benazepril, pyriprole, cefquinome, florfenicol, busserelin, cefovecin, tulathromycin, ceftiofur, carprofen, metaflumizone, praziquarantel, triclabendazole.

20 Another aspect of invention is related to the use of a compound of formula (I) or of a preferred individual compound as above-defined, of a composition comprising at least one compound of formula (I) or at least one preferred individual compound as above-defined, or of a fungicidal or insecticidal mixture comprising at least one compound of formula (I) or at least one preferred individual compound as above-defined, in admixture with other fungicides or insecticides as described above, for controlling 25 or preventing infestation of plants, e.g. useful plants such as crop plants, propagation material thereof, e.g. seeds, harvested crops, e.g., harvested food crops, or non-living materials by insects or by phytopathogenic microorganisms, preferably fungal organisms.

A further aspect of invention is related to a method of controlling or preventing an infestation of plants, e.g., useful plants such as crop plants, propagation material thereof, e.g. seeds, harvested crops, 30 e.g. harvested food crops, or of non-living materials by insects or by phytopathogenic or spoilage microorganisms or organisms potentially harmful to man, especially fungal organisms, which comprises the application of a compound of formula (I) or of a preferred individual compound as above-defined as active ingredient to the plants, to parts of the plants or to the locus thereof, to the propagation material thereof, or to any part of the non-living materials.

35 Controlling or preventing means reducing infestation by insects or by phytopathogenic or spoilage microorganisms or organisms potentially harmful to man, especially fungal organisms, to such a level that an improvement is demonstrated.

A preferred method of controlling or preventing an infestation of crop plants by phytopathogenic microorganisms, especially fungal organisms, or insects which comprises the application of a compound 40 of formula (I), or an agrochemical composition which contains at least one of said compounds, is foliar application. The frequency of application and the rate of application will depend on the risk of infestation

by the corresponding pathogen or insect. However, the compounds of formula (I) can also penetrate the plant through the roots via the soil (systemic action) by drenching the locus of the plant with a liquid formulation, or by applying the compounds in solid form to the soil, e.g., in granular form (soil application). In crops of water rice such granulates can be applied to the flooded rice field. The
 5 compounds of formula (I) may also be applied to seeds (coating) by impregnating the seeds or tubers either with a liquid formulation of the fungicide or coating them with a solid formulation.

A formulation, e.g. a composition containing the compound of formula (I), and, if desired, a solid or liquid adjuvant or monomers for encapsulating the compound of formula (I), may be prepared in a known manner, typically by intimately mixing and/or grinding the compound with extenders, for example
 10 solvents, solid carriers and, optionally, surface active compounds (surfactants).

Advantageous rates of application are normally from 5g to 2kg of active ingredient (a.i.) per hectare (ha), preferably from 10g to 1kg a.i./ha, most preferably from 20g to 600g a.i./ha. When used as seed drenching agent, convenient dosages are from 10mg to 1g of active substance per kg of seeds.

When the combinations of the present invention are used for treating seed, rates of 0.001 to 50 g
 15 of a compound of formula (I) per kg of seed, preferably from 0.01 to 10g per kg of seed are generally sufficient.

The following mixtures of the compounds of formula (I) with active ingredients are preferred. The abbreviation "TX" means one compound selected from the group of compounds 1.a.01 - 1.a.32 to 1.z.01 - 1.z.32 described in Table 1, and the compounds described in Table 2 (below):

20

an adjuvant selected from the group of substances consisting of petroleum oils (alternative name) (628) + TX,

an acaricide selected from the group of substances consisting of 1,1-bis(4-chlorophenyl)-2-ethoxyethanol (IUPAC name) (910) + TX, 2,4-dichlorophenyl benzenesulfonate (IUPAC/Chemical
 25 Abstracts name) (1059) + TX, 2-fluoro-*N*-methyl-*N*-1-naphthylacetamide (IUPAC name) (1295) + TX, 4-chlorophenyl phenyl sulfone (IUPAC name) (981) + TX, abamectin (1) + TX, acequinocyl (3) + TX, acetoprole [CCN] + TX, acrinathrin (9) + TX, aldicarb (16) + TX, aldoxycarb (863) + TX, alphacypermethrin (202) + TX, amidithion (870) + TX, amidoflumet [CCN] + TX, amidothioate (872) + TX, amiton (875) + TX, amiton hydrogen oxalate (875) + TX, amitraz (24) + TX, aramite (881) + TX, arsenous
 30 oxide (882) + TX, AVI 382 (compound code) + TX, AZ 60541 (compound code) + TX, azinphos-ethyl (44) + TX, azinphos-methyl (45) + TX, azobenzene (IUPAC name) (888) + TX, azocyclotin (46) + TX, azothoate (889) + TX, benomyl (62) + TX, benoxafos (alternative name) [CCN] + TX, benzoximate (71) + TX, benzyl benzoate (IUPAC name) [CCN] + TX, bifenazate (74) + TX, bifenthrin (76) + TX, binapacryl (907) + TX, brofenvalerate (alternative name) + TX, bromocyclen (918) + TX, bromophos (920) + TX,
 35 bromophos-ethyl (921) + TX, bromopropylate (94) + TX, buprofezin (99) + TX, butocarboxim (103) + TX, butoxycarboxim (104) + TX, butylpyridaben (alternative name) + TX, calcium polysulfide (IUPAC name) (111) + TX, camphechlor (941) + TX, carbanolate (943) + TX, carbaryl (115) + TX, carbofuran (118) + TX, carbophenothion (947) + TX, CGA 50'439 (development code) (125) + TX, chinomethionat (126) + TX, chlorbenside (959) + TX, chlordimeform (964) + TX, chlordimeform hydrochloride (964) +
 40 TX, chlorfenapyr (130) + TX, chlorfenethol (968) + TX, chlorfenson (970) + TX, chlorfensulfide (971) + TX, chlorfenvinphos (131) + TX, chlorobenzilate (975) + TX, chloromebuform (977) + TX,

chloromethiuron (978) + TX, chloropropylate (983) + TX, chlorpyrifos (145) + TX, chlorpyrifos-methyl (146) + TX, chlorthiophos (994) + TX, cinerin I (696) + TX, cinerin II (696) + TX, cinerins (696) + TX, clofentezine (158) + TX, closantel (alternative name) [CCN] + TX, coumaphos (174) + TX, crotamiton (alternative name) [CCN] + TX, crotoxyphos (1010) + TX, cufraneb (1013) + TX, cyanthoate (1020) + TX, cyflumetofen (CAS Reg. No.: 400882-07-7) + TX, cyhalothrin (196) + TX, cyhexatin (199) + TX, cypermethrin (201) + TX, DCPM (1032) + TX, DDT (219) + TX, demephion (1037) + TX, demephion-O (1037) + TX, demephion-S (1037) + TX, demeton (1038) + TX, demeton-methyl (224) + TX, demeton-O (1038) + TX, demeton-O-methyl (224) + TX, demeton-S (1038) + TX, demeton-S-methyl (224) + TX, demeton-S-methylsulfon (1039) + TX, diafenthion (226) + TX, dialifos (1042) + TX, diazinon (227) + TX, dichlofluanid (230) + TX, dichlorvos (236) + TX, dicliphos (alternative name) + TX, dicofol (242) + TX, dicrotophos (243) + TX, dienochlor (1071) + TX, dimefox (1081) + TX, dimethoate (262) + TX, dinactin (alternative name) (653) + TX, dinex (1089) + TX, dinex-diclexine (1089) + TX, dinobuton (269) + TX, dinocap (270) + TX, dinocap-4 [CCN] + TX, dinocap-6 [CCN] + TX, dinocton (1090) + TX, dinopenton (1092) + TX, dinosulfon (1097) + TX, dinoterbon (1098) + TX, dioxathion (1102) + TX, diphenyl sulfone (IUPAC name) (1103) + TX, disulfiram (alternative name) [CCN] + TX, disulfoton (278) + TX, DNOC (282) + TX, dofenapyn (1113) + TX, doramectin (alternative name) [CCN] + TX, endosulfan (294) + TX, endothion (1121) + TX, EPN (297) + TX, eprinomectin (alternative name) [CCN] + TX, ethion (309) + TX, ethoate-methyl (1134) + TX, etoxazole (320) + TX, etrimfos (1142) + TX, fenazaflor (1147) + TX, fenazaquin (328) + TX, fenbutatin oxide (330) + TX, fenothiocarb (337) + TX, fenpropathrin (342) + TX, fenpyrad (alternative name) + TX, fenpyroximate (345) + TX, fenson (1157) + TX, fentrifanil (1161) + TX, fenvalerate (349) + TX, fipronil (354) + TX, fluacrypyrim (360) + TX, fluazuron (1166) + TX, flubenzimine (1167) + TX, flucycloxuron (366) + TX, flucythrinate (367) + TX, fluenetil (1169) + TX, flufenoxuron (370) + TX, flumethrin (372) + TX, fluorbenside (1174) + TX, fluvalinate (1184) + TX, FMC 1137 (development code) (1185) + TX, formetanate (405) + TX, formetanate hydrochloride (405) + TX, formothion (1192) + TX, formparanate (1193) + TX, gamma-HCH (430) + TX, glyodin (1205) + TX, halfenprox (424) + TX, heptenophos (432) + TX, hexadecyl cyclopropanecarboxylate (IUPAC/Chemical Abstracts name) (1216) + TX, hexythiazox (441) + TX, iodomethane (IUPAC name) (542) + TX, isocarbophos (alternative name) (473) + TX, isopropyl O-(methoxyaminothiophosphoryl)salicylate (IUPAC name) (473) + TX, ivermectin (alternative name) [CCN] + TX, jasmolin I (696) + TX, jasmolin II (696) + TX, jodfenphos (1248) + TX, lindane (430) + TX, lufenuron (490) + TX, malathion (492) + TX, malonoben (1254) + TX, mecarbam (502) + TX, mephosfolan (1261) + TX, mesulfen (alternative name) [CCN] + TX, methacrifos (1266) + TX, methamidophos (527) + TX, methidathion (529) + TX, methiocarb (530) + TX, methomyl (531) + TX, methyl bromide (537) + TX, metolcarb (550) + TX, mevinphos (556) + TX, mexacarbate (1290) + TX, milbemectin (557) + TX, milbemycin oxime (alternative name) [CCN] + TX, mipafox (1293) + TX, monocrotophos (561) + TX, morphothion (1300) + TX, moxidectin (alternative name) [CCN] + TX, naled (567) + TX, NC-184 (compound code) + TX, NC-512 (compound code) + TX, nifluridide (1309) + TX, nikkomycins (alternative name) [CCN] + TX, nitrilacarb (1313) + TX, nitrilacarb 1:1 zinc chloride complex (1313) + TX, NNI-0101 (compound code) + TX, NNI-0250 (compound code) + TX, omethoate (594) + TX, oxamyl (602) + TX, oxydeprofos (1324) + TX, oxydisulfoton (1325) + TX, pp'-DDT (219) + TX, parathion (615) + TX, permethrin (626) + TX, petroleum oils (alternative name) (628) + TX, phenkapton (1330) + TX, phenthoate (631) + TX, phorate (636) +

TX, phosalone (637) + TX, phosfolan (1338) + TX, phosmet (638) + TX, phosphamidon (639) + TX, phoxim (642) + TX, pirimiphos-methyl (652) + TX, polychloroterpenes (traditional name) (1347) + TX, polynactins (alternative name) (653) + TX, proclonol (1350) + TX, profenofos (662) + TX, promacyl (1354) + TX, propargite (671) + TX, propetamphos (673) + TX, propoxur (678) + TX, prothidathion (1360) + TX, prothoate (1362) + TX, pyrethrin I (696) + TX, pyrethrin II (696) + TX, pyrethrins (696) + TX, pyridaben (699) + TX, pyridaphenthion (701) + TX, pyrimidifen (706) + TX, pyrimitate (1370) + TX, quinalphos (711) + TX, quintiofos (1381) + TX, R-1492 (development code) (1382) + TX, RA-17 (development code) (1383) + TX, rotenone (722) + TX, schradan (1389) + TX, sebufos (alternative name) + TX, selamectin (alternative name) [CCN] + TX, SI-0009 (compound code) + TX, sophamide (1402) + TX, spirodiclofen (738) + TX, spiromesifen (739) + TX, SSI-121 (development code) (1404) + TX, sulfiram (alternative name) [CCN] + TX, sulfluramid (750) + TX, sulfotep (753) + TX, sulfur (754) + TX, SZI-121 (development code) (757) + TX, tau-fluvalinate (398) + TX, tebufenpyrad (763) + TX, TEPP (1417) + TX, terbam (alternative name) + TX, tetrachlorvinphos (777) + TX, tetradifon (786) + TX, tetranactin (alternative name) (653) + TX, tetrasul (1425) + TX, thiafenox (alternative name) + TX, thiocarboxime (1431) + TX, thiofanox (800) + TX, thiometon (801) + TX, thioquinox (1436) + TX, thuringiensin (alternative name) [CCN] + TX, triamiphos (1441) + TX, triarathene (1443) + TX, triazophos (820) + TX, triazuron (alternative name) + TX, trichlorfon (824) + TX, trifenofos (1455) + TX, trinactin (alternative name) (653) + TX, vamidothion (847) + TX, vaniliprole [CCN] and YI-5302 (compound code) + TX,

20 an algicide selected from the group of substances consisting of bethoxazin [CCN] + TX, copper dioctanoate (IUPAC name) (170) + TX, copper sulfate (172) + TX, cybutryne [CCN] + TX, dichlone (1052) + TX, dichlorophen (232) + TX, endothal (295) + TX, fentin (347) + TX, hydrated lime [CCN] + TX, nabam (566) + TX, quinoclamine (714) + TX, quinonamid (1379) + TX, simazine (730) + TX, triphenyltin acetate (IUPAC name) (347) and triphenyltin hydroxide (IUPAC name) (347) + TX,

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

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

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

hydroxyquinoline sulfate (446) + TX, probenazole (658) + TX, streptomycin (744) + TX, streptomycin sesquisulfate (744) + TX, tecloftalam (766) + TX, and thiomersal (alternative name) [CCN] + TX,

a biological agent selected from the group of substances consisting of *Adoxophyes orana* GV (alternative name) (12) + TX, *Agrobacterium radiobacter* (alternative name) (13) + TX, *Amblyseius* spp. (alternative name) (19) + TX, *Anagrapha falcifera* NPV (alternative name) (28) + TX, *Anagrus atomus* (alternative name) (29) + TX, *Aphelinus abdominalis* (alternative name) (33) + TX, *Aphidius colemani* (alternative name) (34) + TX, *Aphidoletes aphidimyza* (alternative name) (35) + TX, *Autographa californica* NPV (alternative name) (38) + TX, *Bacillus firmus* (alternative name) (48) + TX, *Bacillus sphaericus* Neide (scientific name) (49) + TX, *Bacillus thuringiensis* Berliner (scientific name) (51) + TX, *Bacillus thuringiensis* subsp. *aizawai* (scientific name) (51) + TX, *Bacillus thuringiensis* subsp. *israelensis* (scientific name) (51) + TX, *Bacillus thuringiensis* subsp. *japonensis* (scientific name) (51) + TX, *Bacillus thuringiensis* subsp. *kurstaki* (scientific name) (51) + TX, *Bacillus thuringiensis* subsp. *tenebrionis* (scientific name) (51) + TX, *Beauveria bassiana* (alternative name) (53) + TX, *Beauveria brongniartii* (alternative name) (54) + TX, *Chrysoperla carnea* (alternative name) (151) + TX, *Cryptolaemus montrouzieri* (alternative name) (178) + TX, *Cydia pomonella* GV (alternative name) (191) + TX, *Dacnusa sibirica* (alternative name) (212) + TX, *Diglyphus isaea* (alternative name) (254) + TX, *Encarsia formosa* (scientific name) (293) + TX, *Eretmocerus eremicus* (alternative name) (300) + TX, *Helicoverpa zea* NPV (alternative name) (431) + TX, *Heterorhabditis bacteriophora* and *H. megidis* (alternative name) (433) + TX, *Hippodamia convergens* (alternative name) (442) + TX, *Leptomastix dactylopii* (alternative name) (488) + TX, *Macrolophus caliginosus* (alternative name) (491) + TX, *Mamestra brassicae* NPV (alternative name) (494) + TX, *Metaphycus helvolus* (alternative name) (522) + TX, *Metarhizium anisopliae* var. *acridum* (scientific name) (523) + TX, *Metarhizium anisopliae* var. *anisopliae* (scientific name) (523) + TX, *Neodiprion sertifer* NPV and *N. lecontei* NPV (alternative name) (575) + TX, *Orius* spp. (alternative name) (596) + TX, *Paecilomyces fumosoroseus* (alternative name) (613) + TX, *Phytoseiulus persimilis* (alternative name) (644) + TX, *Spodoptera exigua* multicapsid nuclear polyhedrosis virus (scientific name) (741) + TX, *Steinernema bibionis* (alternative name) (742) + TX, *Steinernema carpocapsae* (alternative name) (742) + TX, *Steinernema feltiae* (alternative name) (742) + TX, *Steinernema glaseri* (alternative name) (742) + TX, *Steinernema riobrave* (alternative name) (742) + TX, *Steinernema riobrave* (alternative name) (742) + TX, *Steinernema scapterisci* (alternative name) (742) + TX, *Steinernema* spp. (alternative name) (742) + TX, *Trichogramma* spp. (alternative name) (826) + TX, *Typhlodromus occidentalis* (alternative name) (844) and *Verticillium lecanii* (alternative name) (848) + TX, *bacillus subtilis* var. *amyloliquefaciens* Strain FZB24 (available from Novozymes Biologicals Inc., 5400 Corporate Circle, Salem, VA 24153, U.S.A. and known under the trade name Taegro®) + TX,

a soil sterilant selected from the group of substances consisting of iodomethane (IUPAC name) (542) and methyl bromide (537) + TX,

a chemosterilant selected from the group of substances consisting of apholate [CCN] + TX, bisazir (alternative name) [CCN] + TX, busulfan (alternative name) [CCN] + TX, diflubenzuron (250) + TX, dimatif (alternative name) [CCN] + TX, hemel [CCN] + TX, hempa [CCN] + TX, metepa [CCN] + TX, methiotepa [CCN] + TX, methyl apholate [CCN] + TX, morzid [CCN] + TX, penfluron (alternative name)

[CCN] + TX, tepa [CCN] + TX, thiohempa (alternative name) [CCN] + TX, thiotepa (alternative name) [CCN] + TX, tretamine (alternative name) [CCN] and uredepa (alternative name) [CCN] + TX,

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) + TX, (*E*)-tridec-4-en-1-yl acetate (IUPAC name) (829) + TX, (*E*)-6-methylhept-2-en-4-ol (IUPAC name) (541) + TX, (*E,Z*)-tetradeca-4,10-dien-1-yl acetate (IUPAC name) (779) + TX, (*Z*)-dodec-7-en-1-yl acetate (IUPAC name) (285) + TX, (*Z*)-hexadec-11-enal (IUPAC name) (436) + TX, (*Z*)-hexadec-11-en-1-yl acetate (IUPAC name) (437) + TX, (*Z*)-hexadec-13-en-11-yn-1-yl acetate (IUPAC name) (438) + TX, (*Z*)-icos-13-en-10-one (IUPAC name) (448) + TX, (*Z*)-tetradec-7-en-1-ol (IUPAC name) (782) + TX, (*Z*)-tetradec-9-en-1-ol (IUPAC name) (783) + TX, (*Z*)-tetradec-9-en-1-yl acetate (IUPAC name) (784) + TX, (*7E,9Z*)-dodeca-7,9-dien-1-yl acetate (IUPAC name) (283) + TX, (*9Z,11E*)-tetradeca-9,11-dien-1-yl acetate (IUPAC name) (780) + TX, (*9Z,12E*)-tetradeca-9,12-dien-1-yl acetate (IUPAC name) (781) + TX, 14-methyloctadec-1-ene (IUPAC name) (545) + TX, 4-methylnonan-5-ol with 4-methylnonan-5-one (IUPAC name) (544) + TX, alpha-multistriatin (alternative name) [CCN] + TX, brevicomin (alternative name) [CCN] + TX, codlure (alternative name) [CCN] + TX, codlemone (alternative name) (167) + TX, cuelure (alternative name) (179) + TX, disparlure (277) + TX, dodec-8-en-1-yl acetate (IUPAC name) (286) + TX, dodec-9-en-1-yl acetate (IUPAC name) (287) + TX, dodeca-8 + TX, 10-dien-1-yl acetate (IUPAC name) (284) + TX, dominicalure (alternative name) [CCN] + TX, ethyl 4-methyloctanoate (IUPAC name) (317) + TX, eugenol (alternative name) [CCN] + TX, frontalinal (alternative name) [CCN] + TX, gossyplure (alternative name) (420) + TX, grandlure (421) + TX, grandlure I (alternative name) (421) + TX, grandlure II (alternative name) (421) + TX, grandlure III (alternative name) (421) + TX, grandlure IV (alternative name) (421) + TX, hexalure [CCN] + TX, ipsdienol (alternative name) [CCN] + TX, ipsenol (alternative name) [CCN] + TX, japonilure (alternative name) (481) + TX, lineatin (alternative name) [CCN] + TX, litlure (alternative name) [CCN] + TX, looplure (alternative name) [CCN] + TX, medlure [CCN] + TX, megatomoic acid (alternative name) [CCN] + TX, methyl eugenol (alternative name) (540) + TX, muscalure (563) + TX, octadeca-2,13-dien-1-yl acetate (IUPAC name) (588) + TX, octadeca-3,13-dien-1-yl acetate (IUPAC name) (589) + TX, orfralure (alternative name) [CCN] + TX, oryctalure (alternative name) (317) + TX, ostramone (alternative name) [CCN] + TX, siglure [CCN] + TX, sordidin (alternative name) (736) + TX, sulcatol (alternative name) [CCN] + TX, tetradec-11-en-1-yl acetate (IUPAC name) (785) + TX, trimedlure (839) + TX, trimedlure A (alternative name) (839) + TX, trimedlure B₁ (alternative name) (839) + TX, trimedlure B₂ (alternative name) (839) + TX, trimedlure C (alternative name) (839) and trunc-call (alternative name) [CCN] + TX,

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

an insecticide selected from the group of substances consisting of 1-dichloro-1-nitroethane (IUPAC/Chemical Abstracts name) (1058) + TX, 1,1-dichloro-2,2-bis(4-ethylphenyl)ethane (IUPAC name) (1056), + TX, 1,2-dichloropropane (IUPAC/Chemical Abstracts name) (1062) + TX, 1,2-

dichloropropane with 1,3-dichloropropene (IUPAC name) (1063) + TX, 1-bromo-2-chloroethane (IUPAC/Chemical Abstracts name) (916) + TX, 2,2,2-trichloro-1-(3,4-dichlorophenyl)ethyl acetate (IUPAC name) (1451) + TX, 2,2-dichlorovinyl 2-ethylsulfinyethyl methyl phosphate (IUPAC name) (1066) + TX, 2-(1,3-dithiolan-2-yl)phenyl dimethylcarbamate (IUPAC/ Chemical Abstracts name) (1109)
5 + TX, 2-(2-butoxyethoxy)ethyl thiocyanate (IUPAC/Chemical Abstracts name) (935) + TX, 2-(4,5-dimethyl-1,3-dioxolan-2-yl)phenyl methylcarbamate (IUPAC/ Chemical Abstracts name) (1084) + TX, 2-(4-chloro-3,5-xilyloxy)ethanol (IUPAC name) (986) + TX, 2-chlorovinyl diethyl phosphate (IUPAC name) (984) + TX, 2-imidazolidone (IUPAC name) (1225) + TX, 2-isovalerylindan-1,3-dione (IUPAC name) (1246) + TX, 2-methyl(prop-2-ynyl)aminophenyl methylcarbamate (IUPAC name) (1284) + TX, 2-
10 thiocyanatoethyl laurate (IUPAC name) (1433) + TX, 3-bromo-1-chloroprop-1-ene (IUPAC name) (917) + TX, 3-methyl-1-phenylpyrazol-5-yl dimethylcarbamate (IUPAC name) (1283) + TX, 4-methyl(prop-2-ynyl)amino-3,5-xilyl methylcarbamate (IUPAC name) (1285) + TX, 5,5-dimethyl-3-oxocyclohex-1-enyl dimethylcarbamate (IUPAC name) (1085) + TX, abamectin (1) + TX, acephate (2) + TX, acetamiprid (4) + TX, acethion (alternative name) [CCN] + TX, acetoprole [CCN] + TX, acrinathrin (9) + TX, acrylonitrile
15 (IUPAC name) (861) + TX, alanycarb (15) + TX, aldicarb (16) + TX, aldoxycarb (863) + TX, aldrin (864) + TX, allethrin (17) + TX, allosamidin (alternative name) [CCN] + TX, allyxycarb (866) + TX, alpha-cypermethrin (202) + TX, alpha-ecdysone (alternative name) [CCN] + TX, aluminium phosphide (640) + TX, amidithion (870) + TX, amidothioate (872) + TX, aminocarb (873) + TX, amiton (875) + TX, amiton hydrogen oxalate (875) + TX, amitraz (24) + TX, anabasine (877) + TX, athidathion (883) + TX, AVI 382
20 (compound code) + TX, AZ 60541 (compound code) + TX, azadirachtin (alternative name) (41) + TX, azamethiphos (42) + TX, azinphos-ethyl (44) + TX, azinphos-methyl (45) + TX, azothoate (889) + TX, *Bacillus thuringiensis* delta endotoxins (alternative name) (52) + TX, barium hexafluorosilicate (alternative name) [CCN] + TX, barium polysulfide (IUPAC/Chemical Abstracts name) (892) + TX, barthrin [CCN] + TX, Bayer 22/190 (development code) (893) + TX, Bayer 22408 (development code)
25 (894) + TX, bendiocarb (58) + TX, benfuracarb (60) + TX, bensultap (66) + TX, beta-cyfluthrin (194) + TX, beta-cypermethrin (203) + TX, bifenthrin (76) + TX, bioallethrin (78) + TX, bioallethrin S-cyclopentenyl isomer (alternative name) (79) + TX, bioethanomethrin [CCN] + TX, biopermethrin (908) + TX, bioresmethrin (80) + TX, bis(2-chloroethyl) ether (IUPAC name) (909) + TX, bistrifluron (83) + TX, borax (86) + TX, brofenvalerate (alternative name) + TX, bromfenvinfos (914) + TX, bromocyclen (918)
30 + TX, bromo-DDT (alternative name) [CCN] + TX, bromophos (920) + TX, bromophos-ethyl (921) + TX, bufencarb (924) + TX, buprofezin (99) + TX, butacarb (926) + TX, butathiofos (927) + TX, butocarboxim (103) + TX, butonate (932) + TX, butoxycarboxim (104) + TX, butylpyridaben (alternative name) + TX, cadusafos (109) + TX, calcium arsenate [CCN] + TX, calcium cyanide (444) + TX, calcium polysulfide (IUPAC name) (111) + TX, camphechlor (941) + TX, carbanolate (943) + TX, carbaryl (115) + TX,
35 carbofuran (118) + TX, carbon disulfide (IUPAC/Chemical Abstracts name) (945) + TX, carbon tetrachloride (IUPAC name) (946) + TX, carbophenothion (947) + TX, carbosulfan (119) + TX, cartap (123) + TX, cartap hydrochloride (123) + TX, cevadine (alternative name) (725) + TX, chlorbicyclen (960) + TX, chlordane (128) + TX, chlordecone (963) + TX, chlordimeform (964) + TX, chlordimeform hydrochloride (964) + TX, chlorethoxyfos (129) + TX, chlorfenapyr (130) + TX, chlorfenvinphos (131) +
40 TX, chlorflazuron (132) + TX, chlormephos (136) + TX, chloroform [CCN] + TX, chloropicrin (141) + TX, chlorphoxim (989) + TX, chlorprazophos (990) + TX, chlorpyrifos (145) + TX, chlorpyrifos-methyl

(146) + TX, chlorthiophos (994) + TX, chromafenozide (150) + TX, cinerin I (696) + TX, cinerin II (696) + TX, cinerins (696) + TX, cis-resmethrin (alternative name) + TX, cismethrin (80) + TX, clocythrin (alternative name) + TX, cloethocarb (999) + TX, closantel (alternative name) [CCN] + TX, clothianidin (165) + TX, copper acetoarsenite [CCN] + TX, copper arsenate [CCN] + TX, copper oleate [CCN] + TX, 5 coumaphos (174) + TX, coumithoate (1006) + TX, crotamiton (alternative name) [CCN] + TX, crotoxyphos (1010) + TX, crufomate (1011) + TX, cryolite (alternative name) (177) + TX, CS 708 (development code) (1012) + TX, cyanofenphos (1019) + TX, cyanophos (184) + TX, cyanthoate (1020) + TX, cyclethrin [CCN] + TX, cycloprothrin (188) + TX, cyfluthrin (193) + TX, cyhalothrin (196) + TX, cypermethrin (201) + TX, cyphenothrin (206) + TX, cyromazine (209) + TX, cythioate (alternative name) 10 [CCN] + TX, *d*-limonene (alternative name) [CCN] + TX, *d*-tetramethrin (alternative name) (788) + TX, DAEP (1031) + TX, dazomet (216) + TX, DDT (219) + TX, decarbofuran (1034) + TX, deltamethrin (223) + TX, demephion (1037) + TX, demephion-O (1037) + TX, demephion-S (1037) + TX, demeton (1038) + TX, demeton-methyl (224) + TX, demeton-O (1038) + TX, demeton-O-methyl (224) + TX, demeton-S (1038) + TX, demeton-S-methyl (224) + TX, demeton-S-methylsulphon (1039) + TX, diafenthiuron (226) 15 + TX, dialifos (1042) + TX, diamidafos (1044) + TX, diazinon (227) + TX, dicapthon (1050) + TX, dichlofenthion (1051) + TX, dichlorvos (236) + TX, dicliphos (alternative name) + TX, dicresyl (alternative name) [CCN] + TX, dicrotophos (243) + TX, dicyclanil (244) + TX, dieldrin (1070) + TX, diethyl 5-methylpyrazol-3-yl phosphate (IUPAC name) (1076) + TX, diflubenzuron (250) + TX, dilor (alternative name) [CCN] + TX, dimefluthrin [CCN] + TX, dimefox (1081) + TX, dimetan (1085) + TX, dimethoate 20 (262) + TX, dimethrin (1083) + TX, dimethylvinphos (265) + TX, dimetilan (1086) + TX, dinex (1089) + TX, dinex-diclexine (1089) + TX, dinoprop (1093) + TX, dinosam (1094) + TX, dinoseb (1095) + TX, dinotefuran (271) + TX, diofenolan (1099) + TX, dioxabenzofos (1100) + TX, dioxacarb (1101) + TX, dioxathion (1102) + TX, disulfoton (278) + TX, dithicrofos (1108) + TX, DNOC (282) + TX, doramectin (alternative name) [CCN] + TX, DSP (1115) + TX, ecdysterone (alternative name) [CCN] + TX, EI 1642 25 (development code) (1118) + TX, emamectin (291) + TX, emamectin benzoate (291) + TX, EMPC (1120) + TX, empenthrin (292) + TX, endosulfan (294) + TX, endothion (1121) + TX, endrin (1122) + TX, EPBP (1123) + TX, EPN (297) + TX, epofenonane (1124) + TX, eprinomectin (alternative name) [CCN] + TX, esfenvalerate (302) + TX, etaphos (alternative name) [CCN] + TX, ethiofencarb (308) + TX, ethion (309) + TX, ethiprole (310) + TX, ethoate-methyl (1134) + TX, ethoprophos (312) + TX, ethyl formate (IUPAC 30 name) [CCN] + TX, ethyl-DDD (alternative name) (1056) + TX, ethylene dibromide (316) + TX, ethylene dichloride (chemical name) (1136) + TX, ethylene oxide [CCN] + TX, etofenprox (319) + TX, etrimfos (1142) + TX, EXD (1143) + TX, famphur (323) + TX, fenamiphos (326) + TX, fenazaflor (1147) + TX, fenchlorphos (1148) + TX, fenethacarb (1149) + TX, fenfluthrin (1150) + TX, fenitrothion (335) + TX, fenobucarb (336) + TX, fenoxacrim (1153) + TX, fenoxycarb (340) + TX, fenpirithrin (1155) + TX, 35 fenpropathrin (342) + TX, fenpyrad (alternative name) + TX, fensulfothion (1158) + TX, fenthion (346) + TX, fenthion-ethyl [CCN] + TX, fenvalerate (349) + TX, fipronil (354) + TX, flonicamid (358) + TX, flubendiamide (CAS. Reg. No.: 272451-65-7) + TX, flucofuron (1168) + TX, flucycloxuron (366) + TX, flucythrinate (367) + TX, fluenetil (1169) + TX, flufenerim [CCN] + TX, flufenoxuron (370) + TX, flufenprox (1171) + TX, flumethrin (372) + TX, fluvalinate (1184) + TX, FMC 1137 (development code) (1185) + 40 TX, fonofos (1191) + TX, formetanate (405) + TX, formetanate hydrochloride (405) + TX, formothion (1192) + TX, formparanate (1193) + TX, fosmethilan (1194) + TX, fospirate (1195) + TX, fosthiazate

(408) + TX, fosthietan (1196) + TX, furathiocarb (412) + TX, furethrin (1200) + TX, gamma-cyhalothrin (197) + TX, gamma-HCH (430) + TX, guazatine (422) + TX, guazatine acetates (422) + TX, GY-81 (development code) (423) + TX, halfenprox (424) + TX, halofenozide (425) + TX, HCH (430) + TX, HEOD (1070) + TX, heptachlor (1211) + TX, heptenophos (432) + TX, heterophos [CCN] + TX, 5 hexaflumuron (439) + TX, HHDN (864) + TX, hydramethylnon (443) + TX, hydrogen cyanide (444) + TX, hydroprene (445) + TX, hyquincarb (1223) + TX, imidacloprid (458) + TX, imiprothrin (460) + TX, indoxacarb (465) + TX, iodomethane (IUPAC name) (542) + TX, IPSP (1229) + TX, isazofos (1231) + TX, isobenzan (1232) + TX, isocarbophos (alternative name) (473) + TX, isodrin (1235) + TX, isofenphos (1236) + TX, isolane (1237) + TX, isoprocab (472) + TX, isopropyl O-(methoxy-10 aminothiophosphoryl)salicylate (IUPAC name) (473) + TX, isoprothiolane (474) + TX, isothioate (1244) + TX, isoxathion (480) + TX, ivermectin (alternative name) [CCN] + TX, jasmolin I (696) + TX, jasmolin II (696) + TX, jodfenphos (1248) + TX, juvenile hormone I (alternative name) [CCN] + TX, juvenile hormone II (alternative name) [CCN] + TX, juvenile hormone III (alternative name) [CCN] + TX, kelevan (1249) + TX, kinoprene (484) + TX, lambda-cyhalothrin (198) + TX, lead arsenate [CCN] + TX, lepimectin 15 (CCN) + TX, leptophos (1250) + TX, lindane (430) + TX, lirimfos (1251) + TX, lufenuron (490) + TX, lythidathion (1253) + TX, *m*-cumenyl methylcarbamate (IUPAC name) (1014) + TX, magnesium phosphide (IUPAC name) (640) + TX, malathion (492) + TX, malonoben (1254) + TX, mazidox (1255) + TX, mecarbam (502) + TX, mecarphon (1258) + TX, menazon (1260) + TX, mephosfolan (1261) + TX, mercurous chloride (513) + TX, mesulfenfos (1263) + TX, metaflumizone (CCN) + TX, metam (519) 20 + TX, metam-potassium (alternative name) (519) + TX, metam-sodium (519) + TX, methacrifos (1266) + TX, methamidophos (527) + TX, methanesulfonyl fluoride (IUPAC/Chemical Abstracts name) (1268) + TX, methidathion (529) + TX, methiocarb (530) + TX, methocrotophos (1273) + TX, methomyl (531) + TX, methoprene (532) + TX, methoquin-butyl (1276) + TX, methothrin (alternative name) (533) + TX, methoxychlor (534) + TX, methoxyfenozide (535) + TX, methyl bromide (537) + TX, methyl 25 isothiocyanate (543) + TX, methylchloroform (alternative name) [CCN] + TX, methylene chloride [CCN] + TX, metofluthrin [CCN] + TX, metolcarb (550) + TX, metoxadiazone (1288) + TX, mevinphos (556) + TX, mexacarbate (1290) + TX, milbemectin (557) + TX, milbemycin oxime (alternative name) [CCN] + TX, mipafox (1293) + TX, mirex (1294) + TX, monocrotophos (561) + TX, morphothion (1300) + TX, moxidectin (alternative name) [CCN] + TX, naftalofos (alternative name) [CCN] + TX, naled (567) + TX, 30 naphthalene (IUPAC/Chemical Abstracts name) (1303) + TX, NC-170 (development code) (1306) + TX, NC-184 (compound code) + TX, nicotine (578) + TX, nicotine sulfate (578) + TX, nifluridide (1309) + TX, nitenpyram (579) + TX, nithiazine (1311) + TX, nitrilacarb (1313) + TX, nitrilacarb 1:1 zinc chloride complex (1313) + TX, NNI-0101 (compound code) + TX, NNI-0250 (compound code) + TX, nor nicotine (traditional name) (1319) + TX, novaluron (585) + TX, noviflumuron (586) + TX, O-5-dichloro-4- 35 iodophenyl O-ethyl ethylphosphonothioate (IUPAC name) (1057) + TX, O,O-diethyl O-4-methyl-2-oxo-2H-chromen-7-yl phosphorothioate (IUPAC name) (1074) + TX, O,O-diethyl O-6-methyl-2-propylpyrimidin-4-yl phosphorothioate (IUPAC name) (1075) + TX, O,O,O',O'-tetrapropyl dithiopyrophosphate (IUPAC name) (1424) + TX, oleic acid (IUPAC name) (593) + TX, omethoate (594) + TX, oxamyl (602) + TX, oxydemeton-methyl (609) + TX, oxydeprofos (1324) + TX, oxydisulfoton (1325) 40 + TX, pp'-DDT (219) + TX, para-dichlorobenzene [CCN] + TX, parathion (615) + TX, parathion-methyl (616) + TX, penfluron (alternative name) [CCN] + TX, pentachlorophenol (623) + TX, pentachlorophenyl

laurate (IUPAC name) (623) + TX, permethrin (626) + TX, petroleum oils (alternative name) (628) + TX, PH 60-38 (development code) (1328) + TX, phenkapton (1330) + TX, phenothrin (630) + TX, phenthoate (631) + TX, phorate (636) + TX, phosalone (637) + TX, phosfolan (1338) + TX, phosmet (638) + TX, phosnichlor (1339) + TX, phosphamidon (639) + TX, phosphine (IUPAC name) (640) + TX, phoxim (642) + TX, phoxim-methyl (1340) + TX, pirimetaphos (1344) + TX, pirimicarb (651) + TX, pirimiphos-ethyl (1345) + TX, pirimiphos-methyl (652) + TX, polychlorodicyclopentadiene isomers (IUPAC name) (1346) + TX, polychloroterpenes (traditional name) (1347) + TX, potassium arsenite [CCN] + TX, potassium thiocyanate [CCN] + TX, prallethrin (655) + TX, precocene I (alternative name) [CCN] + TX, precocene II (alternative name) [CCN] + TX, precocene III (alternative name) [CCN] + TX, primidophos (1349) + TX, profenofos (662) + TX, profluthrin [CCN] + TX, promacyl (1354) + TX, promecarb (1355) + TX, propaphos (1356) + TX, propetamphos (673) + TX, propoxur (678) + TX, prothidathion (1360) + TX, prothiofos (686) + TX, prothoate (1362) + TX, protrifenbute [CCN] + TX, pymetrozine (688) + TX, pyraclofos (689) + TX, pyrazophos (693) + TX, pyresmethrin (1367) + TX, pyrethrin I (696) + TX, pyrethrin II (696) + TX, pyrethrins (696) + TX, pyridaben (699) + TX, pyridalyl (700) + TX, pyridaphenthion (701) + TX, pyrimidifen (706) + TX, pyrimitate (1370) + TX, pyriproxyfen (708) + TX, quassia (alternative name) [CCN] + TX, quinalphos (711) + TX, quinalphos-methyl (1376) + TX, quinothion (1380) + TX, quintiofos (1381) + TX, R-1492 (development code) (1382) + TX, rafoxanide (alternative name) [CCN] + TX, resmethrin (719) + TX, rotenone (722) + TX, RU 15525 (development code) (723) + TX, RU 25475 (development code) (1386) + TX, ryania (alternative name) (1387) + TX, ryanodine (traditional name) (1387) + TX, sabadilla (alternative name) (725) + TX, schradan (1389) + TX, sebufos (alternative name) + TX, selamectin (alternative name) [CCN] + TX, SI-0009 (compound code) + TX, SI-0205 (compound code) + TX, SI-0404 (compound code) + TX, SI-0405 (compound code) + TX, silafluofen (728) + TX, SN 72129 (development code) (1397) + TX, sodium arsenite [CCN] + TX, sodium cyanide (444) + TX, sodium fluoride (IUPAC/Chemical Abstracts name) (1399) + TX, sodium hexafluorosilicate (1400) + TX, sodium pentachlorophenoxide (623) + TX, sodium selenate (IUPAC name) (1401) + TX, sodium thiocyanate [CCN] + TX, sophamide (1402) + TX, spinosad (737) + TX, spiromesifen (739) + TX, spirotetrmat (CCN) + TX, sulcofuron (746) + TX, sulcofuron-sodium (746) + TX, sulfluramid (750) + TX, sulfotep (753) + TX, sulfuryl fluoride (756) + TX, sulprofos (1408) + TX, tar oils (alternative name) (758) + TX, tau-fluvalinate (398) + TX, tazimcarb (1412) + TX, TDE (1414) + TX, tebufenozide (762) + TX, tebufenpyrad (763) + TX, tebupirimfos (764) + TX, teflubenzuron (768) + TX, tefluthrin (769) + TX, temephos (770) + TX, TEPP (1417) + TX, terallethrin (1418) + TX, terbam (alternative name) + TX, terbufos (773) + TX, tetrachloroethane [CCN] + TX, tetrachlorvinphos (777) + TX, tetramethrin (787) + TX, theta-cypermethrin (204) + TX, thiacloprid (791) + TX, thiafenox (alternative name) + TX, thiamethoxam (792) + TX, thicrofos (1428) + TX, thiocarboxime (1431) + TX, thiocyclam (798) + TX, thiocyclam hydrogen oxalate (798) + TX, thiodicarb (799) + TX, thiofanox (800) + TX, thiometon (801) + TX, thionazin (1434) + TX, thiosultap (803) + TX, thiosultap-sodium (803) + TX, thuringiensin (alternative name) [CCN] + TX, tolfenpyrad (809) + TX, tralomethrin (812) + TX, transluthrin (813) + TX, transpermethrin (1440) + TX, triamiphos (1441) + TX, triazamate (818) + TX, triazophos (820) + TX, triazuron (alternative name) + TX, trichlorfon (824) + TX, trichlormetaphos-3 (alternative name) [CCN] + TX, trichloronat (1452) + TX, trifenofos (1455) + TX, triflumuron (835) + TX, trimethacarb (840) + TX, triprene (1459) + TX, vamidothion (847) + TX, vaniliprole [CCN] + TX,

veratridine (alternative name) (725) + TX, veratrine (alternative name) (725) + TX, XMC (853) + TX, xylylcarb (854) + TX, YI-5302 (compound code) + TX, zeta-cypermethrin (205) + TX, zetamethrin (alternative name) + TX, zinc phosphide (640) + TX, zolaprofos (1469) and ZXI 8901 (development code) (858) + TX, cyantraniliprole [736994-63-19 + TX, chlorantraniliprole [500008-45-7] + TX, 5 cyenopyrafen [560121-52-0] + TX, cyflumetofen [400882-07-7] + TX, pyrifluquinazon [337458-27-2] + TX, spinetoram [187166-40-1 + 187166-15-0] + TX, spirotetramat [203313-25-1] + TX, sulfoxaflor [946578-00-3] + TX, flufiprole [704886-18-0] + TX, meperfluthrin [915288-13-0] + TX, tetramethylfluthrin [84937-88-2] + TX, triflumezopyrim (disclosed in WO 2012/092115) + TX,

a molluscicide selected from the group of substances consisting of bis(tributyltin) oxide (IUPAC name) (913) + TX, bromoacetamide [CCN] + TX, calcium arsenate [CCN] + TX, cloethocarb (999) + TX, copper acetoarsenite [CCN] + TX, copper sulfate (172) + TX, fentin (347) + TX, ferric phosphate (IUPAC name) (352) + TX, metaldehyde (518) + TX, methiocarb (530) + TX, niclosamide (576) + TX, niclosamide-olamine (576) + TX, pentachlorophenol (623) + TX, sodium pentachlorophenoxide (623) + TX, tazimcarb (1412) + TX, thiodicarb (799) + TX, tributyltin oxide (913) + TX, trifenmorph (1454) + TX, 15 trimethacarb (840) + TX, triphenyltin acetate (IUPAC name) (347) and triphenyltin hydroxide (IUPAC name) (347) + TX, pyriprole [394730-71-3] + TX,

a nematicide selected from the group of substances consisting of AKD-3088 (compound code) + TX, 1,2-dibromo-3-chloropropane (IUPAC/Chemical Abstracts name) (1045) + TX, 1,2-dichloropropane (IUPAC/ Chemical Abstracts name) (1062) + TX, 1,2-dichloropropane with 1,3-dichloropropene (IUPAC name) (1063) + TX, 1,3-dichloropropene (233) + TX, 3,4-dichlorotetrahydrothiophene 1,1-dioxide (IUPAC/Chemical Abstracts name) (1065) + TX, 3-(4-chlorophenyl)-5-methylrhodanine (IUPAC name) (980) + TX, 5-methyl-6-thioxo-1,3,5-thiadiazinan-3-ylacetic acid (IUPAC name) (1286) + TX, 6-isopentenylaminopurine (alternative name) (210) + TX, abamectin (1) + TX, acetoprole [CCN] + TX, alanycarb (15) + TX, aldicarb (16) + TX, aldoxycarb (863) 25 + TX, AZ 60541 (compound code) + TX, benclotiaz [CCN] + TX, benomyl (62) + TX, butylpyridaben (alternative name) + TX, cadusafos (109) + TX, carbofuran (118) + TX, carbon disulfide (945) + TX, carbosulfan (119) + TX, chloropicrin (141) + TX, chlorpyrifos (145) + TX, cloethocarb (999) + TX, cytokinins (alternative name) (210) + TX, dazomet (216) + TX, DBCP (1045) + TX, DCIP (218) + TX, diamidafos (1044) + TX, dichlofenthion (1051) + TX, dicliphos (alternative name) + TX, dimethoate (262) 30 + TX, doramectin (alternative name) [CCN] + TX, emamectin (291) + TX, emamectin benzoate (291) + TX, eprinomectin (alternative name) [CCN] + TX, ethoprophos (312) + TX, ethylene dibromide (316) + TX, fenamiphos (326) + TX, fenpyrad (alternative name) + TX, fensulfothion (1158) + TX, fosthiazate (408) + TX, fosthietan (1196) + TX, furfural (alternative name) [CCN] + TX, GY-81 (development code) (423) + TX, heterophos [CCN] + TX, iodomethane (IUPAC name) (542) + TX, isamidofos (1230) + TX, 35 isazofos (1231) + TX, ivermectin (alternative name) [CCN] + TX, kinetin (alternative name) (210) + TX, mecarphon (1258) + TX, metam (519) + TX, metam-potassium (alternative name) (519) + TX, metam-sodium (519) + TX, methyl bromide (537) + TX, methyl isothiocyanate (543) + TX, milbemycin oxime (alternative name) [CCN] + TX, moxidectin (alternative name) [CCN] + TX, *Myrothecium verrucaria* composition (alternative name) (565) + TX, NC-184 (compound code) + TX, oxamyl (602) + TX, phorate 40 (636) + TX, phosphamidon (639) + TX, phosphocarb [CCN] + TX, sebufos (alternative name) + TX, selamectin (alternative name) [CCN] + TX, spinosad (737) + TX, terbam (alternative name) + TX,

terbufos (773) + TX, tetrachlorothiophene (IUPAC/ Chemical Abstracts name) (1422) + TX, thiafenox (alternative name) + TX, thionazin (1434) + TX, triazophos (820) + TX, triazuron (alternative name) + TX, xylenols [CCN] + TX, YI-5302 (compound code) and zeatin (alternative name) (210) + TX, fluensulfone [318290-98-1] + TX,

5 a nitrification inhibitor selected from the group of substances consisting of potassium ethylxanthate [CCN] and nitrapyrin (580) + TX,

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

10 a rodenticide selected from the group of substances consisting of 2-isovalerylindan-1,3-dione (IUPAC name) (1246) + TX, 4-(quinoxalin-2-ylamino)benzenesulfonamide (IUPAC name) (748) + TX, alpha-chlorohydrin [CCN] + TX, aluminium phosphide (640) + TX, antu (880) + TX, arsenous oxide (882) + TX, barium carbonate (891) + TX, bithiosemi (912) + TX, brodifacoum (89) + TX, bromadiolone (91) + TX, bromethalin (92) + TX, calcium cyanide (444) + TX, chloralose (127) + TX, chlorophacinone (140) + TX, cholecalciferol (alternative name) (850) + TX, coumachlor (1004) + TX, coumafuryl (1005) + TX, coumatetralyl (175) + TX, crimidine (1009) + TX, difenacoum (246) + TX, difethialone (249) + TX, diphacinone (273) + TX, ergocalciferol (301) + TX, flocoumafen (357) + TX, fluoroacetamide (379) + TX, flupropradine (1183) + TX, flupropradine hydrochloride (1183) + TX, gamma-HCH (430) + TX, HCH (430) + TX, hydrogen cyanide (444) + TX, iodomethane (IUPAC name) (542) + TX, lindane (430) + TX, 20 magnesium phosphide (IUPAC name) (640) + TX, methyl bromide (537) + TX, norbormide (1318) + TX, phosacetim (1336) + TX, phosphine (IUPAC name) (640) + TX, phosphorus [CCN] + TX, pindone (1341) + TX, potassium arsenite [CCN] + TX, pyrinuron (1371) + TX, scilliroside (1390) + TX, sodium arsenite [CCN] + TX, sodium cyanide (444) + TX, sodium fluoroacetate (735) + TX, strychnine (745) + TX, thallium sulfate [CCN] + TX, warfarin (851) and zinc phosphide (640) + TX,

25 a synergist selected from the group of substances consisting of 2-(2-butoxyethoxy)ethyl piperonylate (IUPAC name) (934) + TX, 5-(1,3-benzodioxol-5-yl)-3-hexylcyclohex-2-enone (IUPAC name) (903) + TX, farnesol with nerolidol (alternative name) (324) + TX, MB-599 (development code) (498) + TX, MGK 264 (development code) (296) + TX, piperonyl butoxide (649) + TX, piprotal (1343) + TX, propyl isomer (1358) + TX, S421 (development code) (724) + TX, sesamex (1393) + TX, sesasmolin 30 (1394) and sulfoxide (1406) + TX,

an animal repellent selected from the group of substances consisting of anthraquinone (32) + TX, chloralose (127) + TX, copper naphthenate [CCN] + TX, copper oxychloride (171) + TX, diazinon (227) + TX, dicyclopentadiene (chemical name) (1069) + TX, guazatine (422) + TX, guazatine acetates (422) + TX, methiocarb (530) + TX, pyridin-4-amine (IUPAC name) (23) + TX, thiram (804) + TX, 35 trimethacarb (840) + TX, zinc naphthenate [CCN] and ziram (856) + TX,

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

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

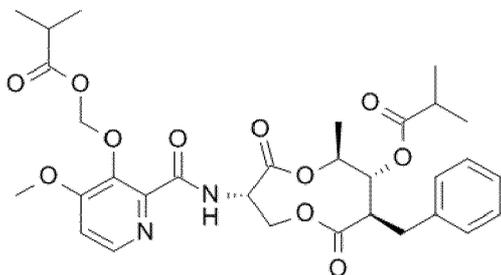
40 and biologically active compounds selected from the group consisting of ametoctradin [865318-97-4] + TX, amisulbrom [348635-87-0] + TX, azaconazole [60207-31-0] + TX, benzovindiflupyr

[1072957-71-1] + TX, bitertanol [70585-36-3] + TX, bixafen [581809-46-3] + TX, bromuconazole [116255-48-2] + TX, coumoxystrobin [850881-70-8] + TX, cyproconazole [94361-06-5] + TX, difenoconazole [119446-68-3] + TX, diniconazole [83657-24-3] + TX, enoxastrobin [238410-11-2] + TX, epoxiconazole [106325-08-0] + TX, fenbuconazole [114369-43-6] + TX, fenpyrazamine [473798-59-3] + TX, fluquinconazole [136426-54-5] + TX, flusilazole [85509-19-9] + TX, flutriafol [76674-21-0] + TX, fluxapyroxad [907204-31-3] + TX, fluopyram [658066-35-4] + TX, fenaminstrobin [366815-39-6] + TX, isofetamid [875915-78-9] + TX, hexaconazole [79983-71-4] + TX, imazalil [35554-44-0] + TX, imibenconazole [86598-92-7] + TX, ipconazole [125225-28-7] + TX, ipfentrifluconazole [1417782-08-1] + TX, isotianil [224049-04-1] + TX, mandestrobin [173662-97-0] (can be prepared according to the procedures described in WO 2010/093059) + TX, mefentrifluconazole [1417782-03-6] + TX, metconazole [125116-23-6] + TX, myclobutanil [88671-89-0] + TX, paclobutrazol [76738-62-0] + TX, pefurazoate [101903-30-4] + TX, penflufen [494793-67-8] + TX, penconazole [66246-88-6] + TX, prothioconazole [178928-70-6] + TX, pyrifenox [88283-41-4] + TX, prochloraz [67747-09-5] + TX, propiconazole [60207-90-1] + TX, simeconazole [149508-90-7] + TX, tebuconazole [107534-96-3] + TX, tetraconazole [112281-77-3] + TX, triadimefon [43121-43-3] + TX, triadimenol [55219-65-3] + TX, triflumizole [99387-89-0] + TX, triticonazole [131983-72-7] + TX, ancymidol [12771-68-5] + TX, fenarimol [60168-88-9] + TX, nuarimol [63284-71-9] + TX, bupirimate [41483-43-6] + TX, dimethirimol [5221-53-4] + TX, ethirimol [23947-60-6] + TX, dodemorph [1593-77-7] + TX, fenpropidin [67306-00-7] + TX, fenpropimorph [67564-91-4] + TX, spiroxamine [118134-30-8] + TX, tridemorph [81412-43-3] + TX, cyprodinil [121552-61-2] + TX, mepanipyrim [110235-47-7] + TX, pyrimethanil [53112-28-0] + TX, fenpiclonil [74738-17-3] + TX, fludioxonil [131341-86-1] + TX, fluindapyr [1383809-87-7] + TX, benalaxyl [71626-11-4] + TX, furalaxyl [57646-30-7] + TX, metalaxyl [57837-19-1] + TX, R-metalaxyl [70630-17-0] + TX, ofurace [58810-48-3] + TX, oxadixyl [77732-09-3] + TX, benomyl [17804-35-2] + TX, carbendazim [10605-21-7] + TX, debacarb [62732-91-6] + TX, fuberidazole [3878-19-1] + TX, thiabendazole [148-79-8] + TX, chlozolate [84332-86-5] + TX, dichlozoline [24201-58-9] + TX, iprodione [36734-19-7] + TX, myclozoline [54864-61-8] + TX, procymidone [32809-16-8] + TX, vinclozoline [50471-44-8] + TX, boscalid [188425-85-6] + TX, carboxin [5234-68-4] + TX, fenfuram [24691-80-3] + TX, flutolanil [66332-96-5] + TX, flutianil [958647-10-4] + TX, mepronil [55814-41-0] + TX, oxycarboxin [5259-88-1] + TX, penthiopyrad [183675-82-3] + TX, thifluzamide [130000-40-7] + TX, guazatine [108173-90-6] + TX, dodine [2439-10-3] [112-65-2] (free base) + TX, iminoctadine [13516-27-3] + TX, azoxystrobin [131860-33-8] + TX, dimoxystrobin [149961-52-4] + TX, enestroburin {Proc. BCPC, Int. Congr., Glasgow, 2003, 1, 93} + TX, fluoxastrobin [361377-29-9] + TX, kresoxim-methyl [143390-89-0] + TX, metominostrobin [133408-50-1] + TX, trifloxystrobin [141517-21-7] + TX, orysastrobin [248593-16-0] + TX, picoxystrobin [117428-22-5] + TX, pyraclostrobin [175013-18-0] + TX, pyraoxystrobin [862588-11-2] + TX, ferbam [14484-64-1] + TX, mancozeb [8018-01-7] + TX, maneb [12427-38-2] + TX, metiram [9006-42-2] + TX, propineb [12071-83-9] + TX, thiram [137-26-8] + TX, zineb [12122-67-7] + TX, ziram [137-30-4] + TX, captan [2425-06-1] + TX, captan [133-06-2] + TX, dichlofluanid [1085-98-9] + TX, fluoroimide [41205-21-4] + TX, folpet [133-07-3] + TX, tolylfluanid [731-27-1] + TX, bordeaux mixture [8011-63-0] + TX, copperhydroxid [20427-59-2] + TX, copperoxychlorid [1332-40-7] + TX, coppersulfat [7758-98-7] + TX, copperoxid [1317-39-1] + TX, mancopper [53988-93-5] + TX, oxine-copper [10380-28-6] + TX, dinocap [131-72-6] + TX, nitrothal-isopropyl [10552-74-6] + TX, edifenphos [17109-49-8] + TX, iprobenphos

[26087-47-8] + TX, isoprothiolane [50512-35-1] + TX, phosdiphen [36519-00-3] + TX, pyrazophos [13457-18-6] + TX, tolclofos-methyl [57018-04-9] + TX, acibenzolar-S-methyl [135158-54-2] + TX, anilazine [101-05-3] + TX, benthiavalicarb [413615-35-7] + TX, blasticidin-S [2079-00-7] + TX, chinomethionat [2439-01-2] + TX, chloroneb [2675-77-6] + TX, chlorothalonil [1897-45-6] + TX, 5 cyflufenamid [180409-60-3] + TX, cymoxanil [57966-95-7] + TX, dichlone [117-80-6] + TX, diclocymet [139920-32-4] + TX, diclomezine [62865-36-5] + TX, dicloran [99-30-9] + TX, diethofencarb [87130-20-9] + TX, dimethomorph [110488-70-5] + TX, SYP-LI90 (Flumorph) [211867-47-9] + TX, dithianon [3347-22-6] + TX, ethaboxam [162650-77-3] + TX, etridiazole [2593-15-9] + TX, famoxadone [131807-57-3] + TX, fenamidone [161326-34-7] + TX, fenoxanil [115852-48-7] + TX, fentin [668-34-8] + TX, ferimzone 10 [89269-64-7] + TX, fluazinam [79622-59-6] + TX, fluopicolide [239110-15-7] + TX, flusulfamide [106917-52-6] + TX, fenhexamid [126833-17-8] + TX, fosetyl-aluminium [39148-24-8] + TX, hymexazol [10004-44-1] + TX, iprovalicarb [140923-17-7] + TX, IKF-916 (Cyazofamid) [120116-88-3] + TX, kasugamycin [6980-18-3] + TX, methasulfocarb [66952-49-6] + TX, metrafenone [220899-03-6] + TX, pencycuron [66063-05-6] + TX, phthalide [27355-22-2] + TX, picarbutrazox [500207-04-5] + TX, polyoxins [11113-15 80-7] + TX, probenazole [27605-76-1] + TX, propamocarb [25606-41-1] + TX, proquinazid [189278-12-4] + TX, pydiflumetofen [1228284-64-7] + TX, pyrametostrobin [915410-70-7] + TX, pyroquilon [57369-32-1] + TX, pyriofenone [688046-61-9] + TX, pyribencarb [799247-52-2] + TX, pyrisoxazole [847749-37-5] + TX, quinoxyfen [124495-18-7] + TX, quintozene [82-68-8] + TX, sulfur [7704-34-9] + TX, Timorex Gold™ (plant extract containing tea tree oil from the Stockton Group) + TX, tebufloquin [376645-78-2] + TX, tiadinil [223580-51-6] + TX, triazoxide [72459-58-6] + TX, tolprocarb [911499-62-2] + TX, triclopyricarb [902760-40-1] + TX, tricyclazole [41814-78-2] + TX, triforine [26644-46-2] + TX, validamycin [37248-47-8] + TX, valifenalate [283159-90-0] + TX, zoxamide (RH7281) [156052-68-5] + TX, mandipropamid [374726-62-2] + TX, isopyrazam [881685-58-1] + TX, phenamacril + TX, sedaxane [874967-67-6] + TX, trinexapac-ethyl [95266-40-3] + TX, 3-difluoromethyl-1-methyl-1H-pyrazole-4-25 carboxylic acid (9-dichloromethylene-1,2,3,4-tetrahydro-1,4-methano-naphthalen-5-yl)-amide (disclosed in WO 2007/048556) + TX, 3-difluoromethyl-1-methyl-1H-pyrazole-4-carboxylic acid (3',4',5'-trifluorobiphenyl-2-yl)-amide (disclosed in WO 2006/087343) + TX, [(3S,4R,4aR,6S,6aS,12R,12aS,12bS)-3-[(cyclopropylcarbonyl)oxy]-1,3,4,4a,5,6,6a,12,12a,12b-decahydro-6,12-dihydroxy-4,6a,12b-trimethyl-11-oxo-9-(3-pyridinyl)-2H,11Hnaphtho[2,1-b]pyrano[3,4-e]pyran-4-yl)methyl-cyclopropanecarboxylate 30 [915972-17-7] + TX and 1,3,5-trimethyl-N-(2-methyl-1-oxopropyl)-N-[3-(2-methylpropyl)-4-[2,2,2-trifluoro-1-methoxy-1-(trifluoromethyl)ethyl]phenyl]-1H-pyrazole-4-carboxamide [926914-55-8] + TX, or a biologically active compound selected from the group consisting of N-[(5-chloro-2-isopropylphenyl)methyl]-N-cyclopropyl-3-(difluoromethyl)-5-fluoro-1-methyl-pyrazole-4-carboxamide (can be prepared according to the procedures described in WO 2010/130767) + TX, 2,6-Dimethyl-1H,5H-35 [1,4]dithiino[2,3-c:5,6-c']dipyrrole-1,3,5,7(2H,6H)-tetrone (can be prepared according to the procedures described in WO 2011/138281) + TX, 6-ethyl-5,7-dioxo-pyrrolo[4,5][1,4]dithiino[1,2-c]isothiazole-3-carbonitrile + TX, 4-(2-bromo-4-fluoro-phenyl)-N-(2-chloro-6-fluoro-phenyl)-2,5-dimethyl-pyrazol-3-amine (can be prepared according to the procedures described in WO 2012/031061) + TX, 3-(difluoromethyl)-N-(7-fluoro-1,1,3-trimethyl-indan-4-yl)-1-methyl-pyrazole-4-carboxamide (can be prepared according to the procedures described in WO 2012/084812) + TX, CAS 850881-30-0 + TX, 3-(3,4-dichloro-1,2-thiazol-5-ylmethoxy)-1,2-benzothiazole 1,1-dioxide (can be prepared according to the

procedures described in WO 2007/129454) + TX, 2-[2-[(2,5-dimethylphenoxy)methyl]phenyl]-2-methoxy-N-methyl-acetamide + TX, 3-(4,4-difluoro-3,4-dihydro-3,3-dimethylisoquinolin-1-yl)quinolone (can be prepared according to the procedures described in WO 2005/070917) + TX, 2-[2-fluoro-6-[(8-fluoro-2-methyl-3-quinolyl)oxy]phenyl]propan-2-ol (can be prepared according to the procedures
5 described in WO 2011/081174) + TX, 2-[2-[(7,8-difluoro-2-methyl-3-quinolyl)oxy]-6-fluoro-phenyl]propan-2-ol (can be prepared according to the procedures described in WO 2011/081174) + TX, oxathiapiprolin + TX [1003318-67-9], tert-butyl N-[6-[[[(1-methyltetrazol-5-yl)-phenyl-methylene]amino]oxymethyl]-2-pyridyl]carbamate + TX, N-[2-(3,4-difluorophenyl)phenyl]-3-(trifluoromethyl)pyrazine-2-carboxamide (can be prepared according to the procedures described in WO
10 2007/ 072999) + TX, 3-(difluoromethyl)-1-methyl-N-[(3R)-1,1,3-trimethylindan-4-yl]pyrazole-4-carboxamide (can be prepared according to the procedures described in WO 2014/013842) + TX, 2,2,2-trifluoroethyl N-[2-methyl-1-[(4-methylbenzoyl)amino]methyl]propyl]carbamate + TX, (2RS)-2-[4-(4-chlorophenoxy)- α,α,α -trifluoro-*o*-tolyl]-1-(1H-1,2,4-triazol-1-yl)propan-2-ol + TX, (2RS)-2-[4-(4-chlorophenoxy)- α,α,α -trifluoro-*o*-tolyl]-3-methyl-1-(1H-1,2,4-triazol-1-yl)butan-2-ol + TX,
15 (difluoromethyl)-N-[(3R)-3-ethyl-1,1-dimethyl-indan-4-yl]pyridine-3-carboxamide + TX, 2-(difluoromethyl)-N-[3-ethyl-1,1-dimethyl-indan-4-yl]pyridine-3-carboxamide + TX, N'-(2,5-dimethyl-4-phenoxy-phenyl)-N-ethyl-N-methyl-formamidine + TX, N'-[4-(4,5-dichlorothiazol-2-yl)oxy-2,5-dimethyl-phenyl]-N-ethyl-N-methyl-formamidine (can be prepared according to the procedures described in WO 2007/031513) + TX, [2-[3-[2-[1-[2-[3,5-bis(difluoromethyl)pyrazol-1-yl]acetyl]-4-piperidyl]thiazol-4-yl]-
20 4,5-dihydroisoxazol-5-yl]-3-chloro-phenyl] methanesulfonate (can be prepared according to the procedures described in WO 2012/025557) + TX, but-3-ynyl N-[6-[[[(Z)-[(1-methyltetrazol-5-yl)-phenyl-methylene]amino]oxymethyl]-2-pyridyl]carbamate (can be prepared according to the procedures described in WO 2010/000841) + TX, 2-[[3-(2-chlorophenyl)-2-(2,4-difluorophenyl)oxiran-2-yl]methyl]-4H-1,2,4-triazole-3-thione (can be prepared according to the procedures described in WO 2010/146031)
25 + TX, methyl N-[[5-[4-(2,4-dimethylphenyl)triazol-2-yl]-2-methyl-phenyl]methyl]carbamate + TX, 3-chloro-6-methyl-5-phenyl-4-(2,4,6-trifluorophenyl)pyridazine (can be prepared according to the procedures described in WO 2005/121104) + TX, 2-[2-chloro-4-(4-chlorophenoxy)phenyl]-1-(1,2,4-triazol-1-yl)propan-2-ol (can be prepared according to the procedures described in WO 2013/024082) + TX, 3-chloro-4-(2,6-difluorophenyl)-6-methyl-5-phenyl-pyridazine (can be prepared according to the
30 procedures described in WO 2012/020774) + TX, 4-(2,6-difluorophenyl)-6-methyl-5-phenyl-pyridazine-3-carbonitrile (can be prepared according to the procedures described in WO 2012/020774) + TX, (*R*)-3-(difluoromethyl)-1-methyl-N-[1,1,3-trimethylindan-4-yl]pyrazole-4-carboxamide (can be prepared according to the procedures described in WO 2011/162397) + TX, 3-(difluoromethyl)-N-(7-fluoro-1,1,3-trimethyl-indan-4-yl)-1-methyl-pyrazole-4-carboxamide (can be prepared according to the procedures
35 described in WO 2012/084812) + TX, 1-[2-[[1-(4-chlorophenyl)pyrazol-3-yl]oxymethyl]-3-methyl-phenyl]-4-methyl-tetrazol-5-one (can be prepared according to the procedures described in WO 2013/162072) + TX, 1-methyl-4-[3-methyl-2-[[2-methyl-4-(3,4,5-trimethylpyrazol-1-yl)phenoxy]methyl]phenyl]tetrazol-5-one (can be prepared according to the procedures described in
WO 2014/051165) + TX, (*Z*,*2E*)-5-[1-(4-chlorophenyl)pyrazol-3-yl]oxy-2-methoxyimino-N,3-dimethyl-
40 pent-3-enamide + TX, (4-phenoxyphenyl)methyl 2-amino-6-methyl-pyridine-3-carboxylate + TX, N-(5-chloro-2-isopropylbenzyl)-N-cyclopropyl-3-(difluoromethyl)-5-fluoro-1-methylpyrazole-4-carboxamide

[1255734-28-1] (can be prepared according to the procedures described in WO 2010/130767) + TX, 3-(difluoromethyl)-N-[(R)-2,3-dihydro-1,1,3-trimethyl-1H-inden-4-yl]-1-methylpyrazole-4-carboxamide [1352994-67-2] + TX, N'-(2,5-dimethyl-4-phenoxy-phenyl)-N-ethyl-N-methyl-formamidine + TX, N'-[4-(4,5-dichloro-thiazol-2-yloxy)-2,5-dimethyl-phenyl]-N-ethyl-N-methyl-formamidine + TX, N'-(2,5-dimethyl-4-phenoxy-phenyl)-N-ethyl-N-methyl-formamidine + TX, N'-[4-(4,5-dichloro-thiazol-2-yloxy)-2,5-dimethyl-phenyl]-N-ethyl-N-methyl-formamidine + TX,



(fenpicoxamid [517875-34-2]) + TX (as described in WO 2003/035617), (1S)-2,2-bis(4-fluorophenyl)-1-methylethyl N-[[3-(acetyloxy)-4-methoxy-2-pyridyl]carbonyl]-L-alaninate [1961312-55-9] (florylpicoxamid - as described in WO 2016/122802) + TX, 2-(difluoromethyl)-N-(1,1,3-trimethylindan-4-yl)pyridine-3-carboxamide + TX, 2-(difluoromethyl)-N-(3-ethyl-1,1-dimethyl-indan-4-yl)pyridine-3-carboxamide + TX, 2-(difluoromethyl)-N-(1,1-dimethyl-3-propyl-indan-4-yl)pyridine-3-carboxamide + TX, 2-(difluoromethyl)-N-(3-isobutyl-1,1-dimethyl-indan-4-yl)pyridine-3-carboxamide + TX, 2-(difluoromethyl)-N-[(3R)-1,1,3-trimethylindan-4-yl]pyridine-3-carboxamide + TX, 2-(difluoromethyl)-N-[(3R)-3-ethyl-1,1-dimethyl-indan-4-yl]pyridine-3-carboxamide + TX, and 2-(difluoromethyl)-N-[(3R)-1,1-dimethyl-3-propyl-indan-4-yl]pyridine-3-carboxamide + TX, wherein each of these carboxamide compounds can be prepared according to the procedures described in WO 2014/095675 and/or WO 2016/139189.

The references in brackets behind the active ingredients, e.g. [3878-19-1] refer to the Chemical Abstracts Registry number. 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 active ingredient mixture of the compounds of formula (I) selected from a compound 1.a.01 - 1.a.32 to 1.z.01 - 1.z.32 described in Table 1, and the compounds described in Table 2 (below), and an active ingredient as described above are preferably in a mixing ratio of from 100:1 to 1:6000, especially from 50:1 to 1:50, more especially in a ratio of from 20:1 to 1:20, even more especially from 10:1 to 1:10, very especially from 5:1 and 1:5, special preference being given to a ratio of from 2:1 to 1:2, and a ratio of from 4:1 to 2:1 being likewise preferred, above all in a ratio of 1:1, or 5:1, or 5:2, or 5:3, or 5:4, or 4:1, or 4:2, or 4:3, or 3:1, or 3:2, or 2:1, or 1:5, or 2:5, or 3:5, or 4:5, or 1:4, or 2:4, or 3:4, or 1:3, or 2:3, or 1:2, or 1:600, or 1:300, or 1:150, or 1:35, or 2:35, or 4:35, or 1:75, or 2:75, or 4:75, or 1:6000, or 1:3000, or 1:1500, or 1:350, or 2:350, or 4:350, or 1:750, or 2:750, or 4:750. Those mixing ratios are by weight.

The mixtures as described above can be used in a method for controlling pests, which comprises applying a composition comprising a mixture as described above to the pests or their environment, with the exception of a method for treatment of the human or animal body by surgery or therapy and diagnostic methods practised on the human or animal body.

The mixtures comprising a compound of formula (I) selected from one of compounds 1.a.01 - 1.a.32 to 1.z.01 - 1.z.32 described in Table 1, and the compounds described in Table 2 (below), 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) selected from a compound 1.a.01 - 1.a.32 to 1.z.01 - 1.z.32 described in Table 1, and the compounds described in Table 2 (below), and the active ingredient(s) as described above, is not essential for working the present invention.

In a preferred composition there is provided a mixture of components (A) and (B), wherein component (A) is a compound of Formula (I) as described above, and component (B) is selected from benzovindiflupyr, isopyrazam, pydiflumetofen, azoxystrobin, sedaxane, difenoconazole, prothioconazole, chlorothalonil, fenpropidin, acibenzolar-S-methyl, cyproconazole, cyprodinil, fenpropimorph, propiconazole, hexaconazole, penconazole, pyrifenoxy, fludioxonil, pyroquilon, tricyclazole, fluazinam, mandipropamid, mefentrifluconazole, metalaxyl, metalaxyl-M, oxadixyl, florylpicoxamid, metyltetraprole, oxathiapiprolin, paclobutrazol, sulfur, thiabendazole, *Aspergillus Flavus* NRRL 21882 (Afla-Guard®) and *Bacillus subtilis* var. *amyloliquefaciens* Strain FZB24 (Taegro®).

Preferably, component (A) is a compound of Formula (I) as described above, and component (B) is selected from benzovindiflupyr, pydiflumetofen, isopyrazam, sedaxane, difenoconazole, cyproconazole, propiconazole, azoxystrobin, metalaxyl-M, cyprodinil, chlorothalonil, oxathiapiprolin, mandipropamid, tricyclazole, fluazinam, fludioxonil, prothioconazole, mefentrifluconazole, florylpicoxamid, and metyltetraprole.

More specifically, component (A) is a compound selected from the group of compounds 1.a.01 - 1.a.32 to 1.z.01 - 1.z.32 described in Table 1 (below) and component (B) is selected from

benzovindiflupyr, pydiflumetofen, isopyrazam, sedaxane, difenoconazole, cyproconazole, propiconazole, azoxystrobin, metalaxyl-M, cyprodinil, chlorothalonil, oxathiapiprolin, mandipropamid, tricyclazole, fluazinam, fludioxinil, prothioconazole, mefentrifluconazole, florylpicoxamid, and metyltetraprole. Preferably, component (A) is a compound selected from the group of described in Table 5 2 (below), i.e. a compound of Formula I.a.19, I.c.19, I.k.19, I.m.19, I.n.19, I.o.19 or I.r.19, and component (B) is selected from benzovindiflupyr, pydiflumetofen, isopyrazam, sedaxane, difenoconazole, cyproconazole, propiconazole, azoxystrobin, metalaxyl-M, cyprodinil, chlorothalonil, oxathiapiprolin, mandipropamid, tricyclazole, fluazinam, fludioxinil, prothioconazole, mefentrifluconazole, florylpicoxamid, and metyltetraprole.

10

Component (B) in combination with component (A) may enhance the effectiveness of the latter against fungi, and vice versa. Additionally, the fungicidal compositions may be effective against a wider spectrum of fungal pathogens that can be combated with the individual active ingredients when used solely. Generally, the weight ratio of component (A) to component (B) may be from 1000:1 to 1:1000, or 15 100:1 to 1:100, or 50:1 to 1:50, or 20:1 to 1:40, or 20:1 to 1:20, or 15:1 to 1:30, or 12:1 to 1:25, or 10:1 to 1:20, or 5:1 to 1:15, or 3:1 to 1:10, or 2:1 to 1:5. Otherwise, the weight ratio of component (A) to component (B) may be from 2:1 to 1:2, or 4:1 to 2:1, or 1:1, or 5:1, or 5:2, or 5:3, or 5:4, or 4:1, or 4:2, or 4:3, or 3:1, or 3:2, or 2:1, or 1:5, or 2:5, or 3:5, or 4:5, or 1:4, or 2:4, or 3:4, or 1:3, or 2:3, or 1:2, or 1:600, or 1:300, or 1:150, or 1:35, or 2:35, or 4:35, or 1:75, or 2:75, or 4:75, or 1:6000, or 1:3000, or 20 1:1500, or 1:350, or 2:350, or 4:350, or 1:750, or 2:750, or 4:750. Those mixing ratios are understood to include, on the one hand, ratios by weight and also, on other hand, molar ratios. Synergistic action between the active ingredients may be observed.

In a preferred composition, an active ingredient mixture of components (A) and (B) as described 25 above may comprise a further active ingredient component (C) selected from one of benzovindiflupyr, isopyrazam, pydiflumetofen, azoxystrobin, sedaxane, difenoconazole, prothioconazole, chlorothalonil, fenpropidin, acibenzolar-S-methyl, cyproconazole, cyprodinil, fenpropimorph, propiconazole, hexaconazole, penconazole, pyrifenoxy, fludioxonil, pyroquilon, tricyclazole, fluazinam, mandipropamid, mefentrifluconazole, metalaxyl, metalaxyl-M, oxadixyl, florylpicoxamid, metyltetraprole, oxathiapiprolin, 30 paclobutrazol, sulfur, thiabendazole, *Aspergillus Flavus* NRRL 21882 (Afla-Guard®) and *Bacillus subtilis* var. *amyloliquefaciens* Strain FZB24 (Taegro®), wherein components (B) and (C) are not the same active ingredient.

The compositions may contain the active ingredient compounds of components (A), (B) and (C) 35 at weight ratios selected from 20:1:1, 1:20:1, 1:1:20, 10:1:1, 1:10:1, 1:1:10, 5:1:1, 1:5:1, 1:1:5, 2:1:1, 1:2:1, 1:1:2 or 1:1:1. Synergistic action between the active ingredients may be observed.

The compositions of the invention may be employed in any conventional form, for example in the form of a twin pack, a powder for dry seed treatment (DS), an emulsion for seed treatment (ES), a 40 flowable concentrate for seed treatment (FS), a solution for seed treatment (LS), a water dispersible powder for seed treatment (WS), a capsule suspension for seed treatment (CF), a gel for seed treatment

(GF), an emulsion concentrate (EC), a suspension concentrate (SC), a suspo-emulsion (SE), a capsule suspension (CS), a water dispersible granule (WG), an emulsifiable granule (EG), an emulsion, water in oil (EO), an emulsion, oil in water (EW), a micro-emulsion (ME), an oil dispersion (OD), an oil miscible flowable (OF), an oil miscible liquid (OL), a soluble concentrate (SL), an ultra-low volume suspension (SU), an ultra-low volume liquid (UL), a technical concentrate (TK), a dispersible concentrate (DC), a wettable powder (WP) or any technically feasible formulation in combination with agriculturally acceptable adjuvants.

Such compositions may be produced in conventional manner, e.g., by mixing the active ingredients with appropriate formulation inert (diluent, solvent, filler and optionally other formulating ingredients such as surfactants, biocides, anti-freeze, stickers, thickeners and compounds that provide adjuvancy effects). Also conventional slow release formulations may be employed where long lasting efficacy is intended. Particularly formulations to be applied in spraying forms, such as water dispersible concentrates (e.g. EC, SC, DC, OD, SE, EW, EO and the like), wettable powders and granules, may contain surfactants such as wetting and dispersing agents and other compounds that provide adjuvancy effects, e.g. the condensation product of formaldehyde with naphthalene sulphonate, an alkylarylsulphonate, a lignin sulphonate, a fatty alkyl sulphate, and ethoxylated alkylphenol and an ethoxylated fatty alcohol.

A seed dressing formulation is applied in a manner known per se to the seeds employing the combination of the invention and a diluent in suitable seed dressing formulation form, e.g., as an aqueous suspension or in a dry powder form having good adherence to the seeds. Such seed dressing formulations are known in the art. Seed dressing formulations may contain the single active ingredients or the combination of active ingredients in encapsulated form, e.g. as slow release capsules or microcapsules.

In general, the formulations include from 0.01 to 90% by weight of active agent, from 0 to 20% agriculturally acceptable surfactant and 10 to 99.99% solid or liquid formulation inert and adjuvant(s), the active agent consisting of at least the compound of formula (I) together with component (B) and (C), and optionally other active agents, particularly microbiocides or conservatives or the like. Concentrated forms of compositions generally contain in between about 2 and 80%, preferably between about 5 and 70% by weight of active agent. Application forms of formulation may for example contain from 0.01 to 20% by weight, preferably from 0.01 to 5% by weight of active agent. Whereas commercial products will preferably be formulated as concentrates, the end user will normally employ diluted formulations.

Examples

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The Examples which follow serve to illustrate the invention.

The compounds of the invention can be distinguished from known compounds by virtue of greater efficacy at low application rates, which can be verified by the person skilled in the art using the experimental procedures outlined in the Examples, using lower application rates if necessary, for example 50 ppm, 12.5 ppm, 6 ppm, 3 ppm, 1.5 ppm, 0.8 ppm or 0.2 ppm.

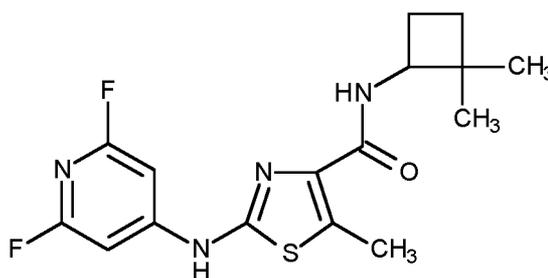
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Compounds of formula (I) may possess any number of benefits including, *inter alia*, advantageous levels of biological activity for protecting plants against diseases that are caused by fungi or superior properties for use as agrochemical active ingredients (for example, greater biological activity, an advantageous spectrum of activity, an increased safety profile (including improved crop tolerance), improved physico-chemical properties, or increased biodegradability).

List of Abbreviations

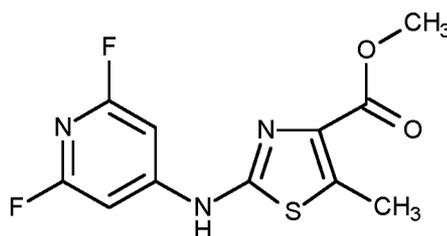
	°C	= degrees Celsius
10	CDCl ₃	= chloroform-d
	d	= doublet
	HATU	= 1-[Bis(dimethylamino)methylene]-1 <i>H</i> -1,2,3-triazolo[4,5- <i>b</i>]pyridinium 3-oxid hexafluorophosphate
	m	= multiplet
15	MHz	= mega hertz
	mp	= melting point
	ppm	= parts per million
	q	= quartet
	s	= singlet
20	t	= triplet

Example 1: This example illustrates the preparation of 2-[(2,6-difluoro-4-pyridyl)amino]-N-(2,2-dimethylcyclobutyl)-5-methyl-thiazole-4-carboxamide (Compound 1.r.19):



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a) Preparation of methyl 2-[(2,6-difluoro-4-pyridyl)amino]-5-methyl-thiazole-4-carboxylate

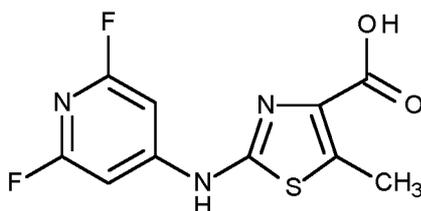


Xantphos (1.2 g, 2.0 mmol), tris(dibenzylideneacetone)dipalladium (0.9 g, 1.0 mmol), cesium carbonate (6.4 g, 19.7 mmol), and 4-amino-2,6-difluoropyridine (1.3 g, 9.9 mmol) were added successively to a mixture of methyl 2-bromo-5-methylthiazole-4-carboxylate (2.45 g, 9.9 mmol) in

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dioxane (350 mL). The mixture was flushed with argon for 20 mins, then heated to reflux for 4 h. The reaction mixture was cooled to room temperature and filtrated through Celite. The filtrate was concentrated under reduced pressure and the remainder was purified by chromatography on silica gel, using ethyl acetate and cyclohexane as eluents, to deliver methyl 2-[(2,6-difluoro-4-pyridyl)amino]-5-methyl-thiazole-4-carboxylate (1.0 g, 3.5 mmol). ¹H-NMR (400 MHz, CDCl₃): δ = 2.73 (s, 3H), 3.91 (s, 3H), 6.76 (s, 1H), 7.25 (s, 1H), 8.29 (bs, 1H).

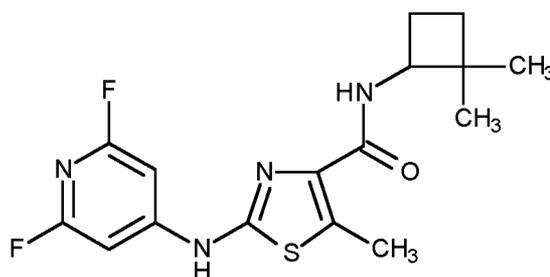
b) Preparation of 2-[(2,6-difluoro-4-pyridyl)amino]-5-methyl-thiazole-4-carboxylic acid



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Lithium hydroxide monohydrate (0.6 g, 25 mmol) was added to a solution of methyl 2-[(2,6-difluoro-4-pyridyl)amino]-5-methyl-thiazole-4-carboxylate (1.8 g, 6.3 mmol) in a mixture of tetrahydrofuran (12 mL) and water (12 mL). The reaction mixture was stirred for 16 h at room temperature, followed by the removal of solvents under reduced pressure. The residue was diluted with water, then 2N hydrochloric acid was slowly added until a pH of 3-4 was reached. The resulting precipitate was filtered, washed with cold water and dried in the vacuum oven to deliver 2-[(2,6-difluoro-4-pyridyl)amino]-5-methyl-thiazole-4-carboxylic acid (0.9 g, 5.7 mmol). ¹H-NMR (400 MHz, d₆-DMSO): δ = 2.63 (s, 3H), 7.28 (s, 2H), 11.33 (bs, 1H), 12.91 (bs, 1H).

20 c) Preparation of 2-[(2,6-difluoro-4-pyridyl)amino]-N-(2,2-dimethylcyclobutyl)-5-methyl-thiazole-4-carboxamide (Compound 1.r.19)



N,N-Diisopropylethylamine (0.37 ml, 2.12 mmol), (2,2-dimethylcyclobutyl)ammonium chloride (0.14 g, 1.01 mmol) and HATU (0.39 g, 1.01 mmol) were added to a solution of 2-[(2,6-difluoro-4-pyridyl)amino]-5-methyl-thiazole-4-carboxylic acid (0.25 g, 0.92 mmol) in N,N-dimethylformamide (9.2 mL), and the reaction mixture stirred for 40 minutes at room temperature. Saturated aqueous sodium bicarbonate solution was added followed by water, and the solution was extracted twice with ethyl acetate. The phases were separated, the organic layer was washed once with brine, dried over sodium sulfate, filtrated and evaporated under reduced pressure. The residue was purified by chromatography on silica gel, using ethyl acetate and cyclohexane as eluents, to deliver 2-[(2,6-difluoro-4-pyridyl)amino]-N-(2,2-dimethylcyclobutyl)-5-methyl-thiazole-4-carboxamide (0.28 g, 0.79 mmol). ¹H-NMR (400 MHz,

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CDCl₃): d = 1.17 (s, 3H), 1.20 (s, 3H), 1.50 – 1.75 (m, 2H), 1.86 – 1.92 (m, 1H), 2.29 – 2.36 (m, 1H), 2.79 (s, 3H), 4.25 – 4.31 (m, 1H), 6.87 (s, 2H), 7.32 (d, 1H), 7.67 (s, 1H).

Table 1 below illustrates examples of individual compounds of formula (I) according to the invention.

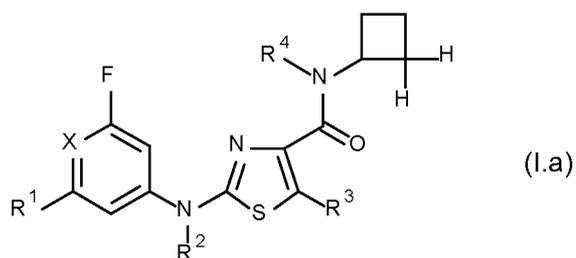
Table 1: Individual compounds of formula (I) according to the invention

Compound No.	X	R ¹	R ²	R ³	R ⁴
01	CH	F	H	Cl	H
02	CH	F	H	Cl	OCH ₃
03	CH	F	H	CH ₃	H
04	CH	F	H	CH ₃	OCH ₃
05	CH	F	OCH ₃	Cl	H
06	CH	F	OCH ₃	Cl	OCH ₃
07	CH	F	OCH ₃	CH ₃	H
08	CH	F	OCH ₃	CH ₃	OCH ₃
09	CH	Cl	H	Cl	H
10	CH	Cl	H	Cl	OCH ₃
11	CH	Cl	H	CH ₃	H
12	CH	Cl	H	CH ₃	OCH ₃
13	CH	Cl	OCH ₃	Cl	H
14	CH	Cl	OCH ₃	Cl	OCH ₃
15	CH	Cl	OCH ₃	CH ₃	H
16	CH	Cl	OCH ₃	CH ₃	OCH ₃
17	N	F	H	Cl	H
18	N	F	H	Cl	OCH ₃
19	N	F	H	CH ₃	H
20	N	F	H	CH ₃	OCH ₃
21	N	F	OCH ₃	Cl	H
22	N	F	OCH ₃	Cl	OCH ₃
23	N	F	OCH ₃	CH ₃	H
24	N	F	OCH ₃	CH ₃	OCH ₃
25	N	Cl	H	Cl	H
26	N	Cl	H	Cl	OCH ₃
27	N	Cl	H	CH ₃	H
28	N	Cl	H	CH ₃	OCH ₃
29	N	Cl	OCH ₃	Cl	H
30	N	Cl	OCH ₃	Cl	OCH ₃

31	N	Cl	OCH ₃	CH ₃	H
32	N	Cl	OCH ₃	CH ₃	OCH ₃

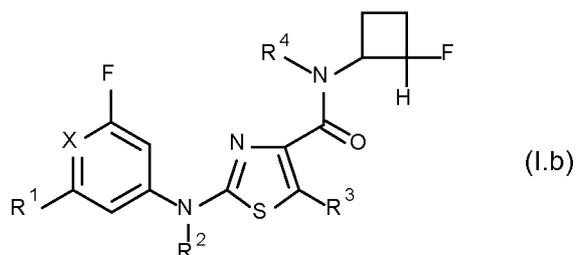
where

a) 32 compounds of formula (I.a):



5 wherein R¹, R², R³, R⁴ and X are as defined in Table 1.

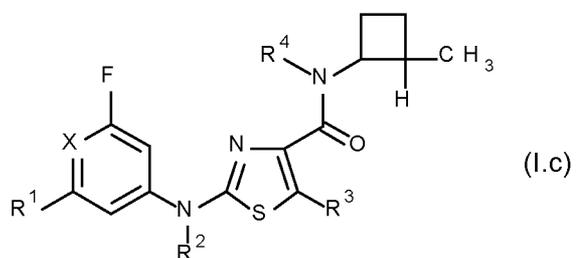
b) 32 compounds of formula (I.b):



wherein R¹, R², R³, R⁴ and X are as defined in Table 1.

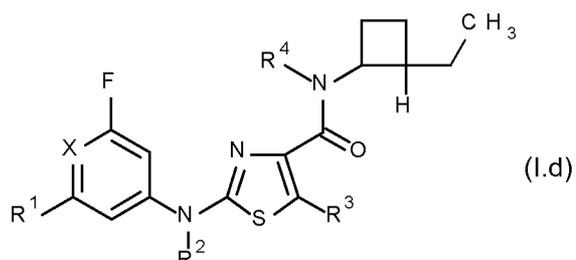
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c) 32 compounds of formula (I.c):



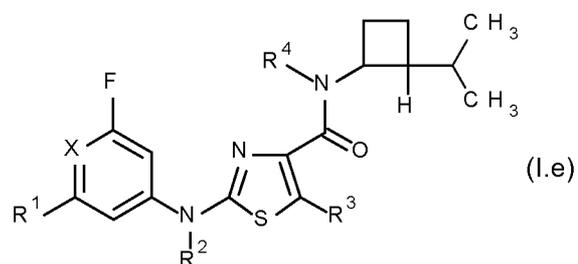
wherein R¹, R², R³, R⁴ and X are as defined in Table 1.

15 d) 32 compounds of formula (I.d):



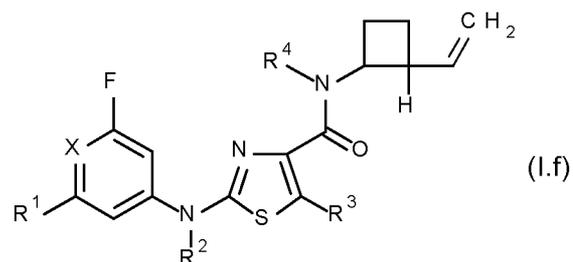
wherein R¹, R², R³, R⁴ and X are as defined in Table 1.

e) 32 compounds of formula (I.e):



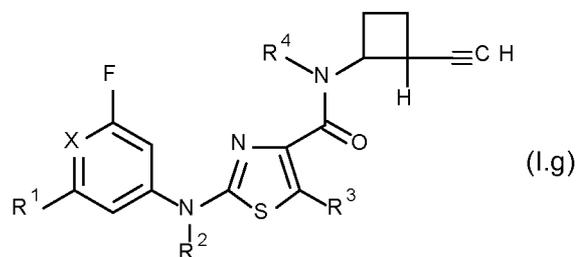
wherein R¹, R², R³, R⁴ and X are as defined in Table 1.

5 f) 32 compounds of formula (I.f):



wherein R¹, R², R³, R⁴ and X are as defined in Table 1.

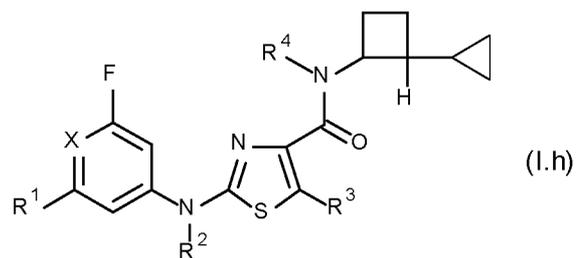
g) 32 compounds of formula (I.g):



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wherein R¹, R², R³, R⁴ and X are as defined in Table 1.

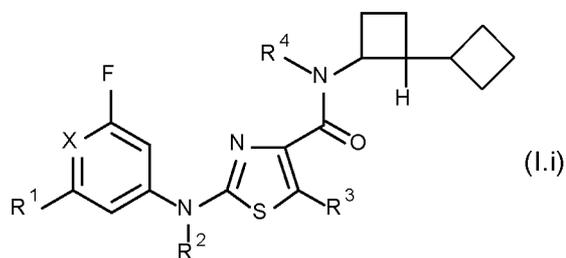
h) 32 compounds of formula (I.h):



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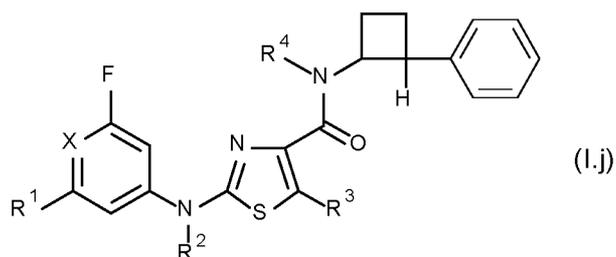
wherein R¹, R², R³, R⁴ and X are as defined in Table 1.

i) 32 compounds of formula (I.i):



wherein R^1 , R^2 , R^3 , R^4 and X are as defined in Table 1.

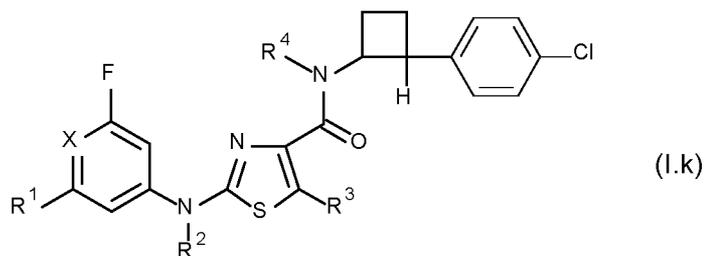
j) 32 compounds of formula (I.j):



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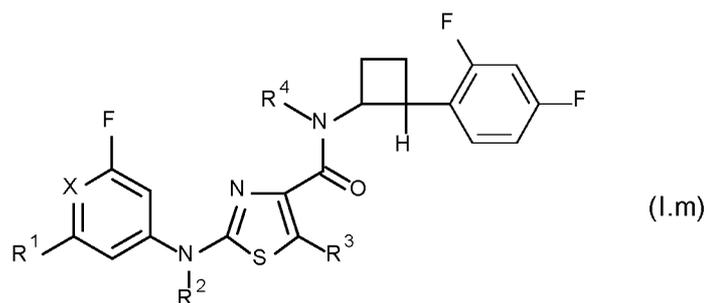
wherein R^1 , R^2 , R^3 , R^4 and X are as defined in Table 1.

k) 32 compounds of formula (I.k):



10 wherein R^1 , R^2 , R^3 , R^4 and X are as defined in Table 1.

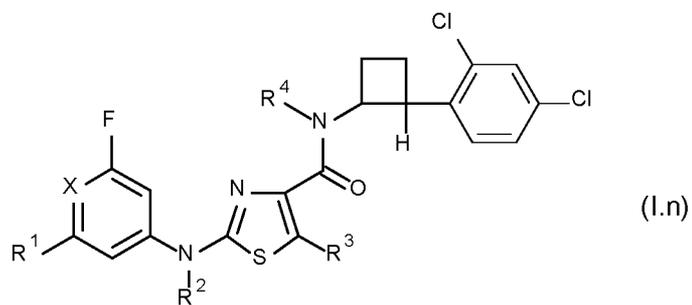
m) 32 compounds of formula (I.m):



wherein R^1 , R^2 , R^3 , R^4 and X are as defined in Table 1.

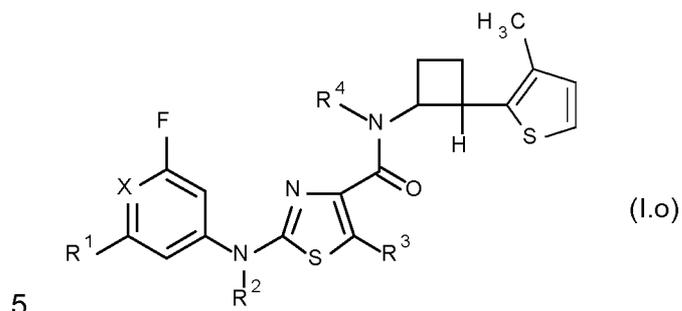
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n) 32 compounds of formula (I.n):



wherein R¹, R², R³, R⁴ and X are as defined in Table 1.

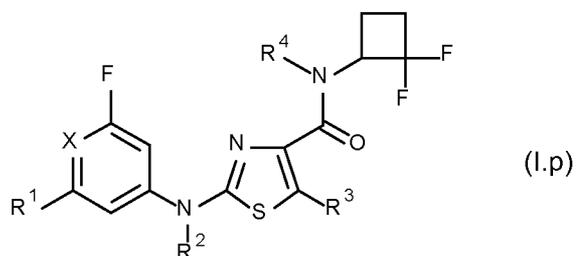
o) 32 compounds of formula (I.o):



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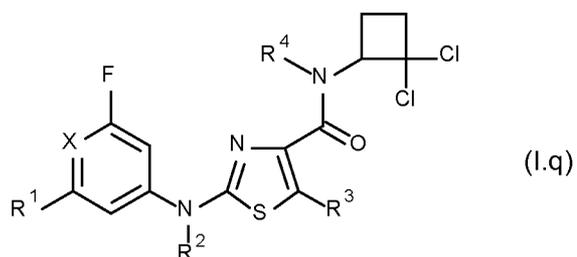
wherein R¹, R², R³, R⁴ and X are as defined in Table 1.

p) 32 compounds of formula (I.p):



10 wherein R¹, R², R³, R⁴ and X are as defined in Table 1.

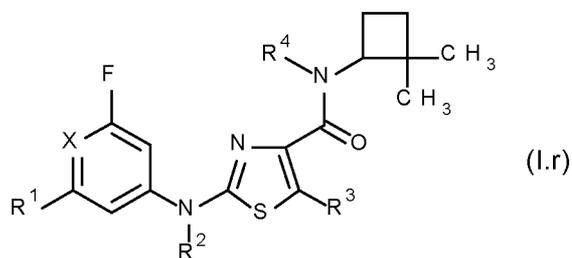
q) 32 compounds of formula (I.q):



wherein R¹, R², R³, R⁴ and X are as defined in Table 1.

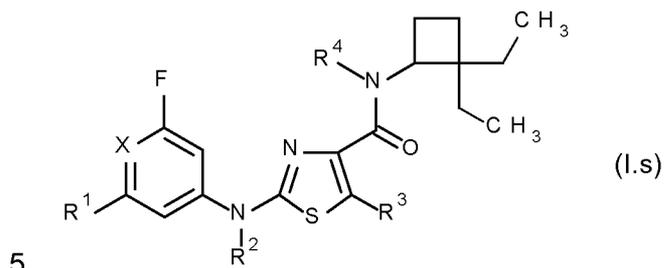
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r) 32 compounds of formula (I.r):



wherein R^1 , R^2 , R^3 , R^4 and X are as defined in Table 1.

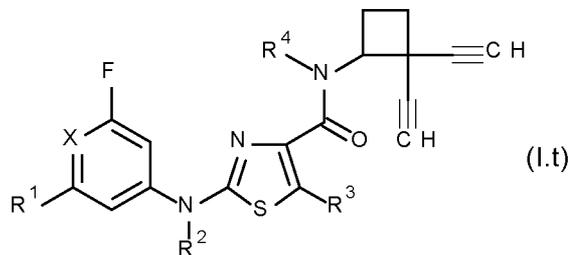
s) 32 compounds of formula (I.s):



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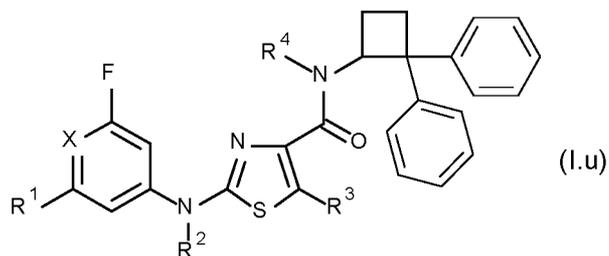
wherein R^1 , R^2 , R^3 , R^4 and X are as defined in Table 1.

t) 32 compounds of formula (I.t):



10 wherein R^1 , R^2 , R^3 , R^4 and X are as defined in Table 1.

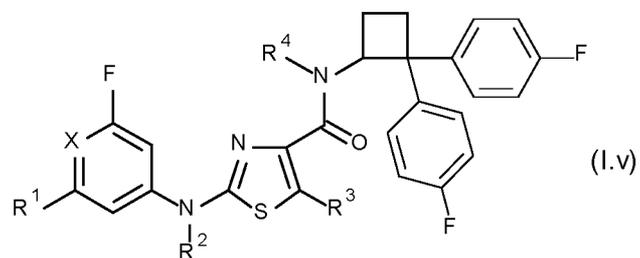
u) 32 compounds of formula (I.u):



wherein R^1 , R^2 , R^3 , R^4 and X are as defined in Table 1.

15

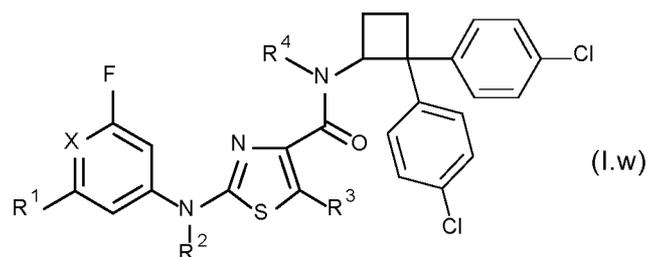
v) 32 compounds of formula (I.v):



(I.v)

wherein R¹, R², R³, R⁴ and X are as defined in Table 1.

w) 32 compounds of formula (I.w):

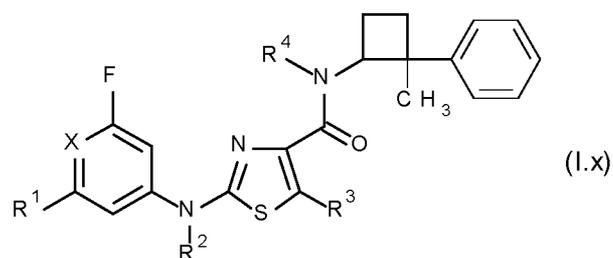


(I.w)

5

wherein R¹, R², R³, R⁴ and X are as defined in Table 1.

x) 32 compounds of formula (I.x):

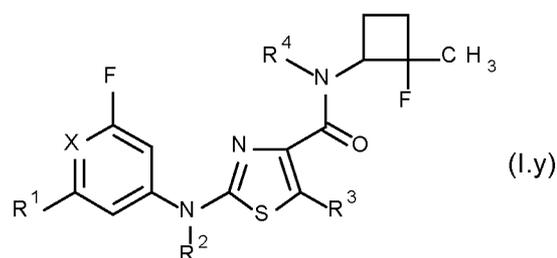


(I.x)

10

wherein R¹, R², R³, R⁴ and X are as defined in Table 1.

y) 32 compounds of formula (I.y):

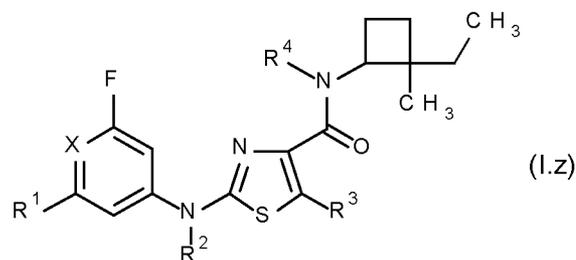


(I.y)

15

wherein R¹, R², R³, R⁴ and X are as defined in Table 1.

z) 32 compounds of formula (I.z):

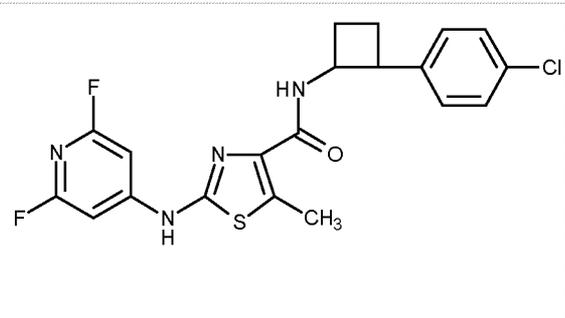
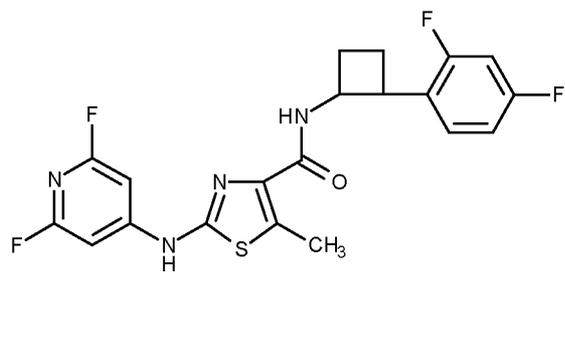
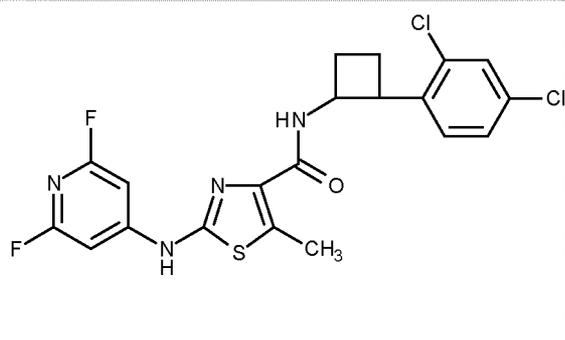
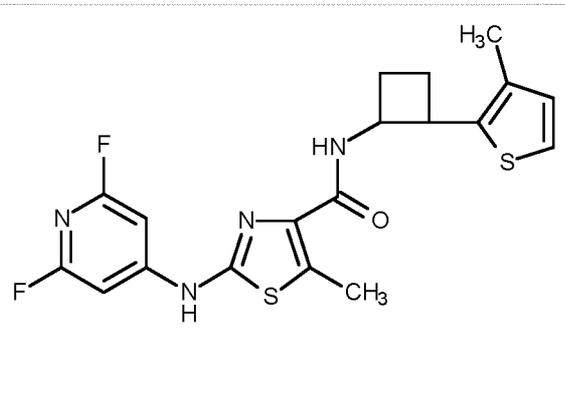
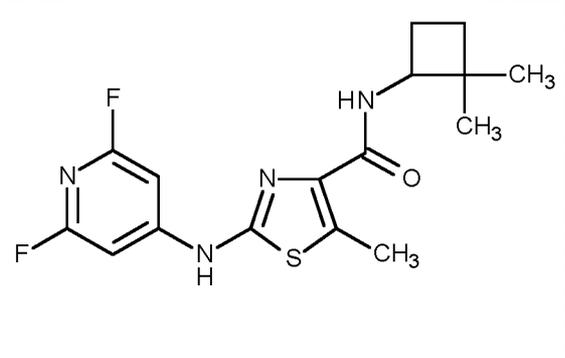


wherein R¹, R², R³, R⁴ and X are as defined in Table 1.

- 5 Throughout this description, temperatures are given in degrees Celsius (°C) and “m.p.” means melting point. LC/MS means Liquid Chromatography Mass Spectrometry and the description of the apparatus and the method is: (ACQUITY UPLC from Waters, Phenomenex Gemini C18, 3 μm particle size, 110 Angström, 30 x 3 mm column, 1.7mL/min., 60 °C, H₂O + 0.05% HCOOH (95%) / CH₃CN/MeOH 4:1 + 0.04% HCOOH (5%) – 2 min. – CH₃CN/MeOH 4:1 + 0.04% HCOOH (5%) - 0.8 min., ACQUITY
- 10 SQD Mass Spectrometer from Waters, ionization method: electrospray (ESI), Polarity: positive ions, Capillary (kV) 3.00, Cone (V) 20.00, Extractor (V) 3.00, Source Temperature (°C) 150, Desolvation Temperature (°C) 400, Cone Gas Flow (L/Hr) 60, Desolvation Gas Flow (L/Hr) 700).

Table 2: Melting point and LC/MS data (R_t = Retention time) for selected compounds of Table 1.

No.	Compound Name	Structure	Mp (°C)	LC/MS
I.a.19	N-cyclobutyl-2-[(2,6-difluoro-4-pyridyl)amino]-5-methylthiazole-4-carboxamide			R _t = 0.97 min; MS: m/z = 325 (M+1)
I.c.19	2-[(2,6-difluoro-4-pyridyl)amino]-5-methyl-N-(2-methylcyclobutyl)thiazole-4-carboxamide			R _t = 1.61 min; MS: m/z = 339 (M+1)

I.k.19	N-[2-(4-chlorophenyl)cyclobutyl]-2-[(2,6-difluoro-4-pyridyl)amino]-5-methyl-thiazole-4-carboxamide		$R_t = 1.79$ min; MS: $m/z = 435$ (M+1)
I.m.19	N-[2-(2,4-difluorophenyl)cyclobutyl]-2-[(2,6-difluoro-4-pyridyl)amino]-5-methyl-thiazole-4-carboxamide		$R_t = 1.73$ min; MS: $m/z = 437$ (M+1)
I.n.19	N-[2-(2,4-dichlorophenyl)cyclobutyl]-2-[(2,6-difluoro-4-pyridyl)amino]-5-methyl-thiazole-4-carboxamide		$R_t = 1.90$ min; MS: $m/z = 469$ (M+1)
I.o.19	2-[(2,6-difluoro-4-pyridyl)amino]-5-methyl-N-[2-(3-methyl-2-thienyl)cyclobutyl]thiazole-4-carboxamide		$R_t = 1.80$ min; MS: $m/z = 421$ (M+1)
I.r.19	2-[(2,6-difluoro-4-pyridyl)amino]-N-(2,2-dimethylcyclobutyl)-5-methyl-thiazole-4-carboxamide		$R_t = 1.09$ min; MS: $m/z = 353$ (M+1)

<u>Wettable powders</u>	a)	b)	c)
active ingredient [compound of formula (I)]	25 %	50 %	75 %
sodium lignosulfonate	5 %	5 %	-
sodium lauryl sulfate	3 %	-	5 %
sodium diisobutyl-naphthalenesulfonate	-	6 %	10 %
phenol polyethylene glycol ether (7-8 mol of ethylene oxide)	-	2 %	-
highly dispersed silicic acid	5 %	10 %	10 %
Kaolin	62 %	27 %	-

The active ingredient is thoroughly mixed with the adjuvants and the mixture is thoroughly ground in a suitable mill, affording wettable powders that can be diluted with water to give suspensions of the desired concentration.

<u>Powders for dry seed treatment</u>	a)	b)	c)
active ingredient [compound of formula (I)]	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.

10

<u>Emulsifiable concentrate</u>	
active ingredient [compound of formula (I)]	10 %
octylphenol polyethylene glycol ether (4-5 mol of ethylene oxide)	3 %
calcium dodecylbenzenesulfonate	3 %
castor oil polyglycol ether (35 mol of ethylene oxide)	4 %
Cyclohexanone	30 %
xylene mixture	50 %

Emulsions of any required dilution, which can be used in plant protection, can be obtained from this concentrate by dilution with water.

<u>Dusts</u>	a)	b)	c)
Active ingredient [compound of formula (I)]	5 %	6 %	4 %
talcum	95 %	-	-
Kaolin	-	94 %	-
mineral filler	-	-	96 %

Ready-for-use dusts are obtained by mixing the active ingredient with the carrier and grinding the mixture in a suitable mill. Such powders can also be used for dry dressings for seed.

Extruder granules

Active ingredient [compound of formula (I)]	15 %
sodium lignosulfonate	2 %
carboxymethylcellulose	1 %
Kaolin	82 %

5

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

Coated granules

Active ingredient [compound of formula (I)]	8 %
polyethylene glycol (mol. wt. 200)	3 %
Kaolin	89 %

10 The finely ground active ingredient is uniformly applied, in a mixer, to the kaolin moistened with polyethylene glycol. Non-dusty coated granules are obtained in this manner.

Suspension concentrate

active ingredient [compound of formula (I)]	40 %
propylene glycol	10 %
nonylphenol polyethylene glycol ether (15 mol of ethylene oxide)	6 %
Sodium lignosulfonate	10 %
carboxymethylcellulose	1 %
silicone oil (in the form of a 75 % emulsion in water)	1 %
Water	32 %

15 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 can be treated and protected against infestation by microorganisms, by spraying, pouring or immersion.

20 Flowable concentrate for seed treatment

active ingredient [compound of formula (I)]	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 can be treated and protected against infestation by microorganisms, by spraying, pouring or immersion.

Slow Release Capsule Suspension

28 parts of a combination of the compound of formula (I) are mixed with 2 parts of an aromatic solvent and 7 parts of toluene diisocyanate/polymethylene-polyphenylisocyanate-mixture (8:1). This mixture is emulsified in a mixture of 1.2 parts of polyvinyl alcohol, 0.05 parts of a defoamer and 51.6 parts of water until the desired particle size is achieved. To this emulsion a mixture of 2.8 parts 1,6-diaminohexane in 5.3 parts of water is added. The mixture is agitated until the polymerization reaction is completed.

The obtained capsule suspension is stabilized by adding 0.25 parts of a thickener and 3 parts of a dispersing agent. The capsule suspension formulation contains 28% of the active ingredients. The medium capsule diameter is 8-15 microns.

The resulting formulation is applied to seeds as an aqueous suspension in an apparatus suitable for that purpose.

20 Biological examples

Blumeria graminis f. sp. *tritici* (*Erysiphe graminis* f. sp. *tritici*) / wheat / leaf disc preventative (Powdery mildew on wheat)

25 Wheat leaf segments cv. Kanzler are placed on agar in a multiwell plate (24-well format) and sprayed with the test compound formulated with DMSO and Tween20 and diluted in water. The leaf disks are inoculated by shaking powdery mildew infected plants above the test plates 1 day after application. The inoculated leaf disks are incubated at 20°C and 60% rh under a light regime of 24 h darkness followed by 12 h light / 12 h darkness in a climate chamber and the activity of a compound is assessed as percent disease control compared to untreated when an appropriate level of disease damage appears on untreated check leaf segments (6 - 8 days after application).

Compounds I.a.19, I.c.19 and I.r.19 at 200 ppm in the formulation give at least 80% disease control in this test when compared to untreated control leaf disks under the same conditions, which show extensive disease development.

5 *Botryotinia fuckeliana (Botrytis cinerea) / liquid culture (Gray mould)*

Conidia of the fungus from cryogenic storage are directly mixed into nutrient broth (Vogels broth). After placing a (DMSO) solution of test compound into a microtiter plate (96-well format), the nutrient broth containing the fungal spores is added. The test plates are incubated at 24°C and the inhibition of growth is determined photometrically 3-4 days after application.

Compounds I.c.19 and I.r.19 at 200 ppm in the formulation give at least 80% disease control in this test when compared to untreated control leaf disks under the same conditions, which show extensive mycelial growth.

15 *Glomerella lagenarium (Colletotrichum lagenarium) / liquid culture (Anthracnose)*

Conidia of the fungus from cryogenic storage are directly mixed into nutrient broth (PDB potato dextrose broth). After placing a (DMSO) solution of test compound into a microtiter plate (96-well format), the nutrient broth containing the fungal spores is added. The test plates are incubated at 24°C and the inhibition of growth is measured photometrically 3 to 4 days after application.

Compounds I.a.19, I.c.19, I.o.19 and I.r.19 at 200 ppm in the formulation give at least 80% disease control in this test when compared to untreated control leaf disks under the same conditions, which show extensive disease development.

25 *Magnaporthe grisea (Pyricularia oryzae) / rice / leaf disc preventative (Rice Blast)*

Rice leaf segments cv. Ballila are placed on agar in a multiwell plate (24-well format) and sprayed with the test compound formulated with DMSO and Tween20 and diluted in water. The leaf segments are inoculated with a spore suspension of the fungus 2 days after application. The inoculated leaf segments are incubated at 22 °C and 80% rh under a light regime of 24 h darkness followed by 12 h light / 12 h darkness in a climate cabinet and the activity of a compound is assessed as percent disease control compared to untreated when an appropriate level of disease damage appears in untreated check leaf segments (5 to 7 days after application).

Compounds I.a.19, I.c.19 and I.r.19 at 200 ppm in the formulation give at least 80% disease control in this test when compared to untreated control leaf disks under the same conditions, which show extensive disease development

Monographella nivalis (Microdochium nivale) / liquid culture (foot rot cereals)

Conidia of the fungus from cryogenic storage are directly mixed into nutrient broth (PDB potato dextrose broth). After placing a (DMSO) solution of test compound into a microtiter plate (96-well format),

the nutrient broth containing the fungal spores is added. The test plates are incubated at 24°C and the inhibition of growth is determined photometrically 4-5 days after application.

Compounds I.a.19, I.m.19, I.o.19 and I.r.19 at 200 ppm in the formulation give at least 80% disease control in this test when compared to untreated control leaf disks under the same conditions, 5 which show extensive mycelial growth.

Mycosphaerella arachidis (*Cercospora arachidicola*) / liquid culture (early leaf spot)

Conidia of the fungus from cryogenic storage are directly mixed into nutrient broth (PDB potato 10 dextrose broth). After placing a (DMSO) solution of test compound into a microtiter plate (96-well format), the nutrient broth containing the fungal spores is added. The test plates are incubated at 24 °C and the inhibition of growth is determined photometrically 4-5 days after application.

Compound I.r.19 at 200 ppm in the formulation give at least 80% disease control in this test when compared to untreated control leaf disks under the same conditions, which show extensive 15 mycelial growth.

Mycosphaerella graminicola (*Septoria tritici*) / liquid culture (Septoria blotch)

Conidia of the fungus from cryogenic storage are directly mixed into nutrient broth (PDB potato 20 dextrose broth). After placing a (DMSO) solution of test compound into a microtiter plate (96-well format), the nutrient broth containing the fungal spores is added. The test plates are incubated at 24°C and the inhibition of growth is determined photometrically 4 to 5 days after application.

Compounds I.a.19, I.c.19, I.k.19, I.o.19 and I.r.19 at 200 ppm in the formulation give at least 80% disease control in this test when compared to untreated control leaf disks under the same 25 conditions, which show extensive mycelial growth.

Phaeosphaeria nodorum (*Septoria nodorum*) / wheat / leaf disc preventative (Glume blotch)

Wheat leaf segments cv. Kanzler are placed on agar in a multiwell plate (24-well format) and sprayed with the formulated test compound diluted in water. The leaf disks are inoculated with a spore 30 suspension of the fungus 2 days after application. The inoculated test leaf disks are incubated at 20°C and 75% rh under a light regime of 12 h light / 12 h darkness in a climate cabinet and the activity of a compound is assessed as percent disease control compared to untreated when an appropriate level of disease damage appears in untreated check leaf disks (5 – 7 days after application).

Compound I.r.19 at 200 ppm in the formulation give at least 80% disease control in this test 35 when compared to untreated control leaf disks under the same conditions, which show extensive disease development.

Puccinia recondita f. sp. *tritici* / wheat / leaf disc preventative (Brown rust)

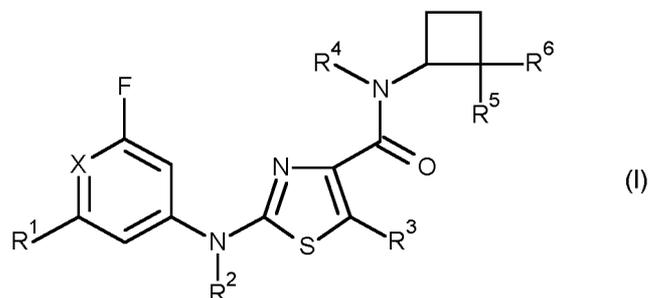
40 Wheat leaf segments cv. Kanzler are placed on agar in multiwell plates (24-well format) and sprayed with the formulated test compound diluted in water. The leaf disks are inoculated with a spore

suspension of the fungus 1 day after application. The inoculated leaf segments are incubated at 19°C and 75% rh under a light regime of 12 h light / 12 h darkness in a climate cabinet and the activity of a compound is assessed as percent disease control compared to untreated when an appropriate level of disease damage appears in untreated check leaf segments (7 – 9 days after application).

- 5 Compounds I.a.19, I.c.19 and I.r.19 at 200 ppm in the formulation give at least 80% disease control in this test when compared to untreated control leaf disks under the same conditions, which show extensive disease development.

Claims:

1. A compound of formula (I):



5 wherein,

R¹ is halogen, cyano, C₁-C₄alkyl, C₁-C₄alkoxy, or C₁-C₄haloalkyl;

R² is hydrogen, C₁-C₄alkyl, C₁-C₄alkoxy, C₁-C₄haloalkyl, or C₃-C₄cycloalkyl;

10

R³ is halogen, C₁-C₄alkyl, C₁-C₄alkoxy, C₁-C₄haloalkyl, or C₃-C₄cycloalkyl;

R⁴ is hydrogen, C₁-C₄alkyl, C₁-C₄alkoxy, C₁-C₄haloalkyl, or C₃-C₄cycloalkyl;

15

R⁵ is hydrogen, halogen, C₁-C₆alkyl, C₂-C₆alkenyl, C₂-C₆alkynyl, C₁-C₄haloalkyl, C₂-C₆haloalkenyl, C₂-C₆haloalkynyl, hydroxyC₁-C₄alkyl, cyanoC₁-C₄alkyl, C₃-C₆cycloalkyl, phenyl or heteroaryl, wherein the heteroaryl moiety is a 5- or 6-membered aromatic monocyclic ring comprising 1, 2, 3 or 4 heteroatoms individually selected from nitrogen, oxygen and sulfur, and wherein the, C₃-C₆cycloalkyl, phenyl and heteroaryl moieties are each optionally substituted with 1 to 3 groups

20 represented by R⁷;

R⁶ is hydrogen, halogen, C₁-C₆alkyl, C₂-C₆alkenyl, C₂-C₆alkynyl, C₁-C₄haloalkyl, C₂-C₆haloalkenyl, C₂-C₆haloalkynyl, hydroxyC₁-C₄alkyl, cyanoC₁-C₄alkyl, C₃-C₆cycloalkyl, phenyl or heteroaryl, wherein the heteroaryl moiety is a 5- or 6-membered aromatic monocyclic ring comprising 1,

25

2, 3 or 4 heteroatoms individually selected from nitrogen, oxygen and sulfur, and wherein the C₃-C₆cycloalkyl, phenyl and heteroaryl moieties are each optionally substituted with 1 to 3 groups represented by R⁷;

R⁷ is halogen, cyano, hydroxyl, C₁-C₃alkyl, C₁-C₃alkoxy, or C₃-C₄cycloalkyl;

30

X is C-H or N;

or a salt or an N-oxide thereof.

2. The compound according to claim 1, wherein R¹ is chloro, fluoro, bromo, methyl, ethyl or isopropyl.
3. The compound according to claim 1 or claim 2, wherein R² is hydrogen, methyl, ethyl, methoxy
5 or ethoxy.
4. The compound according to any one of claims 1 to 3, wherein R³ is halogen or C₁-C₃alkyl.
5. The compound according to any one of claims 1 to 4, wherein R⁴ is hydrogen, methyl, ethyl,
10 methoxy or ethoxy.
6. The compound according to any one of claims 1 to 5, wherein R⁵ is hydrogen, halogen, C₁-C₆alkyl, C₂-C₆alkynyl, C₃-C₄cycloalkyl, or phenyl, wherein the C₃-C₄cycloalkyl and phenyl moieties are each optionally substituted with 1 to 3 groups represented by R⁷.
15
7. The compound according to any one of claims 1 to 6, wherein R⁶ is hydrogen, halogen, C₁-C₆alkyl, C₂-C₆alkenyl, C₂-C₆alkynyl, C₃-C₆cycloalkyl, or phenyl, wherein the heteroaryl moiety is a 5- or 6-membered aromatic monocyclic ring comprising 1, 2, or 3 heteroatoms individually selected from nitrogen, oxygen and sulfur, and wherein the C₃-C₆cycloalkyl, phenyl and heteroaryl moieties are
20 optionally substituted with 1 to 3 groups represented by R⁷.
8. The compound according to any one of claims 1 to 7, wherein R⁷ is halogen, C₁-C₃alkyl, or C₁-C₃alkoxy.
- 25 9. The compound according to any one of claims 1 to 8, wherein when R⁵ is hydrogen or C₁-C₃alkyl, R⁶ is C₁-C₃alkyl, phenyl, or thienyl, wherein the phenyl and thienyl moieties are optionally substituted with 1 or 2 groups selected from R⁷.
10. The compound according to any one of claims 1 to 9, wherein X is N.
30
11. The compound according to any one of claims 1 to 8, or claim 10, wherein the compound of formula (I) is 2-[(2,6-difluoro-4-pyridyl)amino]-5-methyl-N-(2-methylcyclobutyl)thiazole-4-carboxamide (1.c.19), 2-[(2,6-difluoro-4-pyridyl)amino]-N-(2-ethylcyclobutyl)-5-methyl-thiazole-4-carboxamide (1.d.19), N-(2,2-difluorocyclobutyl)-2-[(2,6-difluoro-4-pyridyl)amino]-5-methyl-thiazole-4-carboxamide (1.p.19), 2-[(2,6-difluoro-4-pyridyl)amino]-N-(2,2-dimethylcyclobutyl)-5-methyl-thiazole-4-carboxamide (1.r.19), or N-(2,2-diethylcyclobutyl)-2-[(2,6-difluoro-4-pyridyl)amino]-5-methyl-thiazole-4-carboxamide (1.s.19).
35
12. An agrochemical composition comprising a fungicidally effective amount of a compound of
40 formula (I) according to any one of claims 1 to 11.

13. The composition according to claim 12, further comprising at least one additional active ingredient and/or an agrochemically-acceptable diluent or carrier.

14. A method of controlling or preventing infestation of useful plants by phytopathogenic
5 microorganisms, wherein a fungicidally effective amount of a compound of formula (I) according to any of claims 1 to 11, or a composition comprising this compound as active ingredient, is applied to the plants, to parts thereof or the locus thereof.

15. Use of a compound of formula (I) according to any one of claims 1 to 11 as a fungicide.