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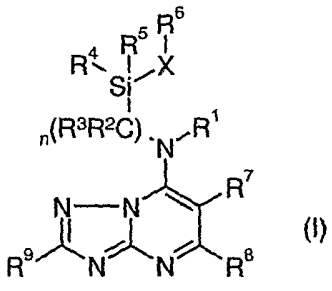
(54) Title: NOVEL TRIAZOLOPYRIMIDINE DERIVATIVES



(I)

(57) Abstract: The present invention relates to novel triazolopyrimidine derivatives of formula (I) as active ingredients which have microbiocidal activity, in particular fungicidal activity: wherein the substituents are as defined in claim 1.

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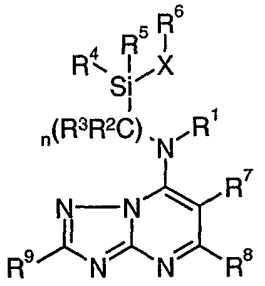
Novel triazolopyrimidine derivatives

The present invention relates to novel triazolopyrimidine derivatives as active ingredients which have microbiocidal activity, in particular fungicidal activity. The invention also relates to preparation of these active ingredients, to novel heterocyclic derivatives used as intermediates in the preparation of these active ingredients, to preparation of these novel intermediates, to agrochemical compositions which comprise at least one of the novel active ingredients, to preparation of these compositions and to use of the active ingredients or compositions in agriculture or horticulture for controlling or preventing infestation of plants or non-living materials by phytopathogenic microorganisms , preferably fungi.

The present invention provides a compound of formula (I):



(I)

wherein

R^1 is hydrogen, C_1-C_6alkyl, C_1-C_6haloalkyl, C_2-C_6alkenyl, C_2-C_6alkynyl or C(=O)C_1-C_6alkyl;

R^2 and R^3, each independently of each other and independently of n when n is 2, 3 or 4, are hydrogen, halogen, C_1-C_6alkyl, C_1-C_6haloalkyl or C_1-C_6alkyloxy, or

R^2 and R^3 are part of a C=C double bond when n is 2, 3 or 4,or

R^2 and R^3, together with the carbon atom to which they are attached, form an optionally substituted, three- to six-membered ring;

R^4 and R^5, each independently of each other, are C_1-C_6alkyl, C_1-C_6haloalkyl, C_3-C_6cycloalkyl, C_2-C_6alkenyl, C_1-C_6alkyloxy, C_1-C_6haloalkyloxy, C_3-C_6cycloalkyloxy or C_2-C_6alkynyl;

R^6 is hydrogen, C_1-C_6alkyl, C_1-C_6haloalkyl or C_3-C_6cycloalkyl;

R^7 is an optionally substituted aryl or heteroaryl;

R^8 is C_1-C_6alkyl, halogen or cyano;

R^9 is hydrogen, mercapto or C_1-C_3alkylthio;

X is oxygen or sulfur; and

n is 1, 2, 3 or 4.

In the instance where n is 2, 3 or 4, which means that 2, 3 or 4 contiguous carbon atoms respectively are present between the nitrogen atom substituted by R^1 and the silicon atom, the R^2 and R^3 substituents on those carbon atoms can be the same or different substituents each independently of each other. For example, when n is 2, the first carbon atom can be substituted by R^2 as ethyl and R^3 as bromine, and the second carbon atom can be substituted R^2 as methyl and R^3 as methyloxy.

In the above definition aryl includes aromatic hydrocarbon rings like phenyl, naphthyl, anthracenyl, phenanthrenyl and biphenyl, with phenyl being preferred.

Heteroaryl stands for aromatic ring systems comprising mono-, bi- or tricyclic systems wherein at least one oxygen, nitrogen or sulfur atom is present as a ring member. Examples are furyl, thienyl, pyrrolyl, imidazolyl, pyrazolyl, thiazolyl, isothiazolyl, oxazolyl, isoxazolyl, oxadiazolyl, thiadiazolyl, triazolyl, tetrazolyl, pyridiyl, pyridazinyl, pyrimidinyl, pyrazinyl, triazinyl, tetrazinyl, indolyl, benzothiophenyl, benzofuranyl, benzimidazolyl, indazolyl, benzotriazolyl, benzothiazolyl, benzoxazolyl, quinolinyl, isoquinolinyl, phthalazinyl, quinoxalinyl, quinazolinyl, cinnolinyl and naphthyridinyl. Each heteroaryl can be linked by a carbon atom or by a nitrogen atom to the [1,2,4]triazolo[1,5-a]pyrimidine.

The above aryl and heteroaryl groups may be optionally substituted. This means that they may carry one or more identical or different substituents. Normally not more than three substituents are present at the same time. Examples of substituents of aryl or heteroaryl groups are: halogen, alkyl, haloalkyl, cycloalkyl, cycloalkylalkyl, alkenyl, haloalkenyl, cycloalkenyl, alkynyl, haloalkynyl, alkyloxy, haloalkyloxy, cycloalkoxy, alkenyloxy, haloalkenyloxy, alkynyloxy, haloalkenyloxy, alkylthio, haloalkylthio, cycloalkylthio, alkenylthio, alkynylthio, alkylcarbonyl, haloalkylcarbonyl, cycloalkylcarbonyl, alkenylcarbonyl, alkynylcarbonyl, alkoxyalkyl, cyano, nitro, hydroxy, mercapto, amino, alkylamino, dialkylamino. Typical examples include phenyl, 2-fluorophenyl, 2-chlorophenyl, 2-trifluoromethylphenyl, 2-methylphenyl, 2,3-difluorophenyl, 2,4-difluorophenyl, 2,5-difluorophenyl, 2,6-difluorophenyl, 2,3-dichlorophenyl, 2,4-dichlorophenyl, 2,5-dichlorophenyl, 2,6-dichlorophenyl, 2-chloro-3-fluorophenyl, 2-chloro-4-fluorophenyl, 2-chloro-5-fluorophenyl, 2-chloro-6-fluorophenyl, 3-chloro-2-fluorophenyl, 4-chloro-2-fluorophenyl, 5-chloro-2-fluorophenyl, 2-fluoro-3-trifluoromethylphenyl, 2-fluoro-4-trifluoromethylphenyl, 2-fluoro-5-trifluoromethylphenyl, 2-fluoro-6-trifluoromethylphenyl, 2-chloro-3-trifluoromethylphenyl, 2-chloro-4-

trifluoromethylphenyl, 2-chloro-5-trifluoromethylphenyl, 2-chloro-6-trifluoromethylphenyl, 4-fluoro-2-trifluoromethylphenyl, 4-chloro-2-trifluoromethylphenyl, 2-fluoro-3-methylphenyl, 2-fluoro-4-methylphenyl, 2-fluoro-5-methylphenyl, 2-fluoro-6-methylphenyl, 2-chloro-3-methylphenyl, 2-chloro-4-methylphenyl, 2-chloro-5-methylphenyl, 2-chloro-6-methylphenyl, 4-fluoro-2-methylphenyl, 4-chloro-2-methylphenyl, 2,3,4-trifluorophenyl, 2,3,6-trifluorophenyl, 2,4,6-trifluorophenyl, 2,3,4-trichlorophenyl, 2,3,6-trichlorophenyl, 2,4,6-trichlorophenyl, 2,6-difluoro-4-methoxyphenyl, 2,6-difluoro-4-trifluoromethoxyphenyl, 2,6-difluoro-4-trifluoromethylphenyl, 2,6-difluoro-4-cyanophenyl, 2,6-difluoro-4-methylphenyl, 2,6-dichloro-4-methoxyphenyl, 2,6-dichloro-4-trifluoromethoxyphenyl, 2,6-dichloro-4-trifluoromethylphenyl, 2,6-dichloro-4-cyanophenyl, 2,6-dichloro-4-methylphenyl, pentafluorophenyl, 3,5-difluoropyridin-2-yl, 3,5-dichloropyridin-2-yl, 3-chloro-5-fluoropyridine-2-yl, 5-chloro-3-fluoropyridin-2-yl, 3-fluoro-5-trifluoromethylpyridin-2-yl, 3-chloro-5-trifluoromethylpyridin-2-yl, 2,4-difluoropyridin-3-yl, 2,4-dichloropyridin-3-yl, 2,4,6-trifluoropyridin-3-yl, 2,4,6-trichloropyridin-3-yl, 3,5-difluoropyridin-4-yl, 3,5-dichloropyridin-4-yl, 2,5-difluorothiophen-3-yl and 2,5-dichlorothiophen-3-yl.

In the above definition, R^2 and R^3 can form an optionally substituted three- to six-membered attached ring together with the carbon atom to which they are attached. Typical examples of three- to six-membered attached ring include cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, oxiranyl, aziridinyl, oxetanyl, azetidinyl, tetrahydrofuranyl, pyrrolidinyl, 1,3-dioxolanyl, 1,3-dioxanyl and 1,4-dioxanyl.

When R^2 and R^3 form an optionally substituted three- to six-membered attached ring together with the carbon atom to which they are attached; the ring is linked to the same carbon atom when n is 1, or can be linked to the same carbon atom or to another carbon atom when n is 2, 3 or 4.

The above-defined three- to six-membered attached rings may be optionally substituted: they may carry one or more identical or different substituents. Normally not more than three substituents are present at the same time. Typical examples of substituents of said attached ring include hydrogen, halogen, C_1-C_6alkyl, C_1-C_6haloalkyl, C_1-C_6cycloalkyl and cyano.

In the above definition halogen is fluorine, chlorine, bromine or iodine.

The alkyl, alkenyl or alkynyl radicals may be straight-chained or branched.

Alkyl on its own or as part of another substituent is, depending upon the number of carbon atoms mentioned, for example, methyl, ethyl, propyl, butyl, pentyl, hexyl and the isomers thereof, for example, isopropyl, isobutyl, sec-butyl, tert-butyl, isopentyl or tert-pentyl.

A haloalkyl group may contain one or more identical or different halogen atoms and for example may stand for CH_2Cl, $CHCl_2$, CCl_3, CH_2F, CHF_2, CF_3, CF_3CH_2, CH_3CF_2, CF_3CF_2, CCl_3CCl_2, etc.

Cycloalkyl on its own or as part of another substituent is, depending upon the number of carbon atoms mentioned, for example, cyclopropyl, cyclobutyl, cyclopentyl or cyclohexyl.

Alkenyl on its own or as part of another substituent is, depending upon the number of carbon atoms mentioned, for example, ethenyl, allyl, 1-propenyl, buten-2-yl, buten-3-yl, penten-1-yl, penten-3-yl, hexen-1-yl or 4-methyl-3-pentenyl.

Alkynyl on its own or as part of another substituent is, depending upon the number of carbon atoms mentioned, for example, ethynyl, propyn-1-yl, propyn-2-yl, butyn-1-yl, butyn-2-yl, 1-methyl-2-butynyl, hexyn-1-yl or 1-ethyl-2-butynyl.

The presence of one or more possible asymmetric carbon atoms in the compounds of formula I means that the compounds may occur in optically isomeric, that means enantiomeric or diastereomeric forms. As a result of the presence of a possible aliphatic C=C double bond, geometric isomerism, that means cis-trans or (*E*)-(*Z*) isomerism may also occur. 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.

In each case, the compounds of formula I according to the invention are in free form or in an agronomically usable salt form.

Preferred subgroups of compounds of formula I are those wherein

R^1 is hydrogen, C_1-C_6alkyl, C_2-C_6alkenyl, C_2-C_6alkynyl or C(=O)C_1-C_6alkyl;

R^2 and R^3, each independently of each other and independently of n when n is 2, 3 or 4, are hydrogen, halogen, C_1-C_6alkyl, C_1-C_3haloalkyl or C_1-C_6alkyloxy;
R^4 and R^5, each independently of each other, are C_1-C_6alkyl, C_1-C_6haloalkyl, C_3-C_6cycloalkyl, C_2-C_6alkenyl or C_2-C_6alkynyl;
R^6 is hydrogen, C_1-C_6alkyl, C_1-C_6haloalkyl or C_3-C_6cycloalkyl;
R^7 is an optionally substituted aryl or heteroaryl;
R^8 is C_1-C_6alkyl, halogen or cyano;
R^9 is hydrogen, mercapto or C_1-C_3alkylthio;
X is oxygen or sulfur; and
n is 1, 2, 3 or 4.

More preferred subgroups of compounds of formula I are those wherein
R^1 is hydrogen, C_2-C_6alkenyl or C_2-C_6alkynyl;
R^2 and R^3, each independently of each other and independently of n when n is 2, 3 or 4, are hydrogen, halogen, C_1-C_6alkyl or C_1-C_3haloalkyl;
R^4 and R^5, each independently of each other, are C_1-C_6alkyl, C_1-C_6haloalkyl or C_3-C_6cycloalkyl;
R^6 is hydrogen, C_1-C_6alkyl or C_1-C_6haloalkyl;
R^7 is an optionally substituted aryl;
R^8 is C_1-C_3alkyl or halogen;
R^9 is hydrogen, mercapto or methylthio;
X is oxygen or sulfur; and
n is 1, 2 or 3.

Most preferred subgroups of compounds of formula I are those wherein
R^1 is hydrogen or C_2-C_4alkynyl;
R^2 and R^3, each independently of each other and independently of n when n is 2, 3 or 4, are hydrogen, C_1-C_3alkyl or C_1-C_3haloalkyl;
R^4 and R^5, each independently of each other, are C_1-C_3alkyl or C_1-C_3haloalkyl;
R^6 is C_1-C_3alkyl or C_1-C_3haloalkyl;
R^7 is phenyl substituted at least in one *ortho*-position with halogen;
R^8 is chloro or fluoro;
R^9 is hydrogen or mercapto;
X is oxygen; and
n is 1 or 2.

Especially preferred subgroups of compounds of formula I are those wherein

R^1 is hydrogen;

R^2 and R^3, each independently of each other and independently of n when n is 2, 3 or 4, are hydrogen, methyl or trifluoromethyl;

R^4 and R^5, each independently of each other, are methyl or ethyl;

R^6 is methyl or ethyl

R^7 is 2,4,6-trifluorophenyl or 2-chloro-6-fluorophenyl;

R^8 is chloro;

R^9 is hydrogen;

X is oxygen; and

n is 1.

Preferred individual compounds are:

[5-chloro-6-(2,4,6-trifluoro-phenyl)-[1,2,4]triazolo[1,5-a]pyrimidin-7-yl]-[(methoxy-dimethyl-silanyl)-methyl]-amine (Compound No.I.e.081),

[5-chloro-6-(2-chloro-6-fluoro-phenyl)-[1,2,4]triazolo[1,5-a]pyrimidin-7-yl]-[(methoxy-dimethyl-silanyl)-methyl]-amine (Compound No.I.e.031),

[5-chloro-6-(2,4,6-trifluoro-phenyl)-[1,2,4]triazolo[1,5-a]pyrimidin-7-yl]-[1-(methoxy-dimethyl-silanyl)-ethyl]-amine (Compound No.I.g.081),

[5-chloro-6-(2-chloro-6-fluoro-phenyl)-[1,2,4]triazolo[1,5-a]pyrimidin-7-yl]-[1-(methoxy-dimethyl-silanyl)-ethyl]-amine (Compound No.I.g.031),

[5-chloro-6-(2,4,6-trifluoro-phenyl)-[1,2,4]triazolo[1,5-a]pyrimidin-7-yl]-[2,2,2-trifluoro-1-(methoxy-dimethyl-silanyl)-ethyl]-amine (Compound No.I.h.081),

[5-chloro-6-(2-chloro-6-fluoro-phenyl)-[1,2,4]triazolo[1,5-a]pyrimidin-7-yl]-[2,2,2-trifluoro-1-(methoxy-dimethyl-silanyl)-ethyl]-amine (Compound No.I.h.031),

[5-chloro-6-(2,4,6-trifluoro-phenyl)-[1,2,4]triazolo[1,5-a]pyrimidin-7-yl]-[2-(methoxy-dimethyl-silanyl)-ethyl]-amine (Compound No.I.s.081),

[5-chloro-6-(2-chloro-6-fluoro-phenyl)-[1,2,4]triazolo[1,5-a]pyrimidin-7-yl]-[2-(methoxy-dimethyl-silanyl)-ethyl]-amine (Compound No.I.s.031),

[5-chloro-6-(2,4,6-trifluoro-phenyl)-[1,2,4]triazolo[1,5-a]pyrimidin-7-yl]-[2-(methoxy-dimethyl-silanyl)-1-methyl-ethyl]-amine (Compound No.I.u.081),

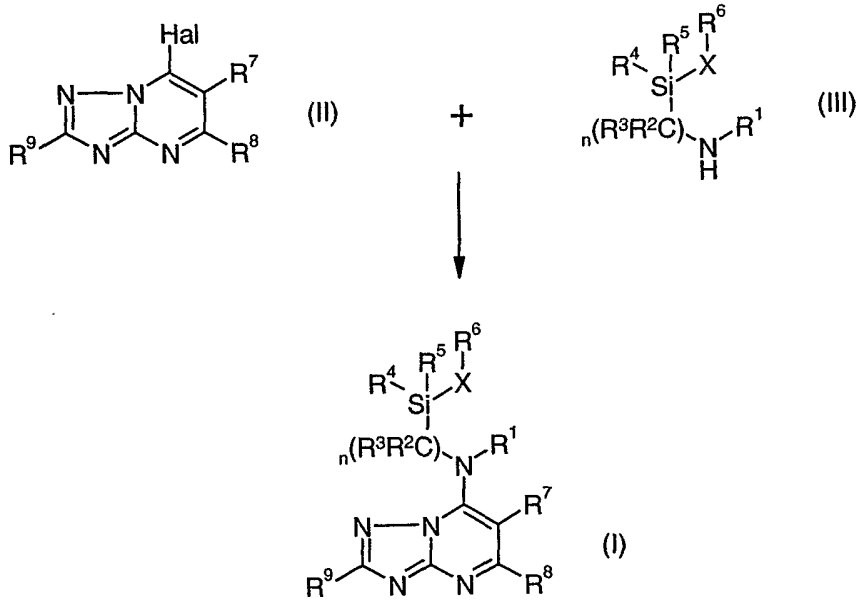
[5-chloro-6-(2-chloro-6-fluoro-phenyl)-[1,2,4]triazolo[1,5-a]pyrimidin-7-yl]-[2-(methoxy-dimethyl-silanyl)-1-methyl-ethyl]-amine (Compound No.I.u.031),

[5-chloro-6-(2,4,6-trifluoro-phenyl)-[1,2,4]triazolo[1,5-a]pyrimidin-7-yl]-{2,2,2-trifluoro-1-[(methoxy-dimethyl-silanyl)-methyl]-ethyl}-amine (Compound No.I.v.081),

[5-chloro-6-(2-chloro-6-fluoro-phenyl)-[1,2,4]triazolo[1,5-a]pyrimidin-7-yl]-{2,2,2-trifluoro-1-[(methoxy-dimethyl-silanyl)-methyl]-ethyl}-amine (Compound No.I.v.031).

Certain triazolo[1,5-a]pyrimidine derivatives with trialkylsilyl-containing amines in position 7 have been proposed for controlling plant-destructive fungi, for example in WO 98/46607, US 6117876 and US 6297251. However, the action of those preparations is not satisfactory in all aspects of agricultural needs. Surprisingly, with the compounds of formula I, new kinds of fungicides having a high level of biological actitivity have now been found.

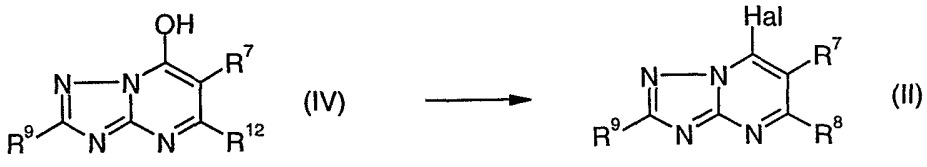
The compounds of formula I can be obtained by coupling of a compound of formula II, wherein R^7, R^8 and R^9 are as defined for formula I and Hal is halogen, preferably fluorine, chlorine or bromine, with a compound of formula III, wherein R^1, R^2, R^3, R^4, R^5, R^6, X and n are as defined for formula I.



The reaction (II + III → I) can be carried out in a manner known per se for the transformation of amines with heterocyclic halides, e.g. 4-halopyrimidines or 7-halotriazolo[1,5-a]pyrimidines. Preferably the reaction is carried out in solution. Preferred are either organic solvents like N,N-dimethylformamide, N,N-dimethylacetamide, acetonitrile, dioxane, N-methylpyrrolidon, methanol, ethanol or dimethylsulfoxide, or organic solvents, like toluene or xylene in mixture with water and a phase transfer catalyst. The reaction is advantageously carried out in the presence of a base. In general all types of organic or inorganic bases may be used, for instance triethylamine, diisopropylethylamine, pyridine, 4-dimethylaminopyridine, sodium hydroxide, potassium hydroxide, sodium methoxide, sodium ethoxide, sodium carbonate or potassium carbonate. Reaction temperatures are between 0 °C

and +100 °C, preferably between +10 °C and +50 °C. The reaction of trialkylsilyl-containing amines with compounds of formula II is already described in WO 98/46607, US 6117876 and US 6297251.

The compounds of formula II, wherein R^7, R^8 and R^9 are as defined for formula I and Hal is halogen, preferably fluorine, chlorine or bromine, can be obtained by halogenation of a compound of formula IV, wherein R^7 and R^9 are as defined for formula I and R^{12} is hydroxy, C_1-C_6alkyl or cyano.

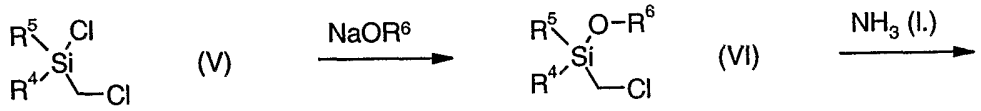


(IV) (II)

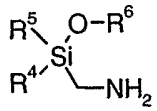
The preparation of compounds of formula II is already described in WO 2002/038565, US 6297251 and US 6117876.

The compounds of formula III, wherein R^1, R^2, R^3, R^4, R^5, R^6, X and n are as defined for formula I, can be obtained by known methods for the synthesis of oxysilyl-containing amines.

For instance, the synthesis of C-(oxysilanyl)methylamines of formula (IIIa) can be achieved from chloro-chloromethylsilanes of formula (V), following a route described in J. Organomet. Chem. 1980, 190, 247 – 256, WO 2003/068845 and WO 2004/067605.



(V) (VI)



(IIIa)

Surprisingly, it has now been found that the novel compounds of formula I have, for practical purposes, a very advantageous spectrum of activities for protecting plants against diseases that are caused by fungi as well as by bacteria and viruses.

The compounds of formula I can be used in the agricultural sector and related fields of use as active ingredients for controlling plant pests or on non-living materials for control of spoilage microorganisms or organisms potentially harmfull 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 are 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.

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 (for example 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, for example, can be dressed before being sown. 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, for example, 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 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 are, for example, effective against the phytopathogenic fungi of the following classes: Fungi imperfecti (e.g. *Botrytis* spp., *Alternaria* spp.) and Basidiomycetes (e.g. *Rhizoctonia* spp., *Hemileia* spp., *Puccinia* spp., *Phakopsora* spp.). Additionally, they are also effective against Ascomycetes

(e.g. *Venturia* spp., *Blumeria* spp., *Podosphaera leucotricha, Monilinia* spp., *Fusarium* spp., *Uncinula* spp., *Mycosphaerella* spp.*Pyrenophora* spp., *Rhynchosporium secalis, Magnaporthe* spp., *Colletotrichum* spp.) and Oomycetes (e.g. *Phytophthora* spp., *Pythium* spp., *Plasmopara* spp.). Outstanding activity has been observed against powdery mildews (e.g. *Uncinula necator*), rusts (e.g. *Puccinia* spp.) and leaf spots (e.g. *Septoria tritici*). Furthermore, the novel compounds of formula I are effective against phytopathogenic bacteria and viruses (e.g. against *Xanthomonas* spp, *Pseudomonas* spp, *Erwinia amylovora* as well as against the tobacco mosaic virus).

Within the scope of present invention, target crops to be protected typically comprise the following species of plants: cereal (wheat, barley, rye, oat, rice, maize, sorghum and related species); beet (sugar beet and fodder beet); pomes, drupes and soft fruit (apples, pears, plums, peaches, almonds, cherries, strawberries, raspberries and blackberries); leguminous plants (beans, lentils, peas, soybeans); oil plants (rape, mustard, poppy, olives, sunflowers, coconut, castor oil plants, cocoa beans, groundnuts); cucumber plants (pumpkins, cucumbers, melons); fibre plants (cotton, flax, hemp, jute); citrus fruit (oranges, lemons, grapefruit, mandarins); vegetables (spinach, lettuce, asparagus, cabbages, carrots, onions, tomatoes, potatoes, paprika); lauraceae (avocado, cinnamomum, camphor) or plants such as tobacco, nuts, coffee, eggplants, sugar cane, tea, pepper, vines, hops, bananas and natural rubber plants, as well as turf and ornamentals.

The target crops in accordance with the invention include conventional as well as genetically enhanced or engineered varieties such as, for example, insect resistant (e.g. Bt. And VIP varieties) as well as disease resistant, herbicide tolerant (e.g. glyphosate- and glufosinate-resistant maize varieties commercially available under the trade names RoundupReady® and LibertyLink®) and nematode tolerant varieties. By way of example, suitable genetically enhanced or engineered crop varieties include the Stoneville 5599BR cotton and Stoneville 4892BR cotton varieties.

The compounds of formula I are used in unmodified form or, preferably, together with the adjuvants conventionally employed in the art of formulation. To this end they are 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 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 as well as insecticides, fungicides, bactericides, nematicides, 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 are normally used in the form of fungicidal compositions for controlling and protecting against phytopathogenic microorganisms, comprising as active ingredient at least one compound of formula I, in free form or in agrochemically usable salt form, and at least one of the above-mentioned adjuvants.

The compounds of formula I can be mixed with other fungicides, resulting in some cases in unexpected synergistic activities. Mixing components which are particularly preferred are:

Azoles, such as azaconazole, BAY 14120, bitertanol, bromuconazole, cyproconazole, difenoconazole, diniconazole, epoxiconazole, fenbuconazole, fluquinconazole, flusilazole, flutriafol, hexaconazole, imazalil, imibenconazole, ipconazole, metconazole, myclobutanil, pefurazoate, penconazole, prothioconazole, pyrifenox, prochloraz, propiconazole, simeconazole, tebuconazole, tetraconazole, triadimefon, triadimenol, triflumizole, triticonazole;

Pyrimidinyl carbinole, such as ancymidol, fenarimol, nuarimol;

2-amino-pyrimidines, such as bupirimate, dimethirimol, ethirimol;

Morpholines, such as dodemorph, fenpropidine, fenpropimorph, spiroxamine, tridemorph;

Anilinopyrimidines, such as cyprodinil, mepanipyrim, pyrimethanil;

Pyrroles, such as fenpiclonil, fludioxonil;

Phenylamides, such as benalaxyl, furalaxyl, metalaxyl, R-metalaxyl, ofurace, oxadixyl;

Benzimidazoles, such as benomyl, carbendazim, debacarb, fuberidazole, thiabendazole;

Dicarboximides, such as chlozolinate, dichlozoline, iprodione, myclozoline, procymidone, vinclozoline;

Carboxamides, such as boscalid, carboxin, fenfuram, flutolanil, mepronil, oxycarboxin, penthiopyrad, thifluzamide; guanidines, such as guazatine, dodine, iminoctadine;

Strobilurines, such as azoxystrobin, dimoxystrobin (SSF 129), enestroburin, fluoxastrobin, kresoxim-methyl, metominostrobin, trifloxystrobin, orysastrobin, picoxystrobin, pyraclostrobin;

Dithiocarbamates, such as ferbam, mancozeb, maneb, metiram, propineb, thiram, zineb, ziram;

N-halomethylthiotetrahydrophthalimides, such as captafol, captan, dichlofluanid, fluoromides, folpet, tolyfluanid;

Cu-compounds, such as Bordeaux mixture, copper hydroxide, copper oxychloride, copper sulfate, cuprous oxide, mancopper, oxine-copper;

Nitrophenol-derivatives, such as dinocap, nitrothal-isopropyl;

Organo-p-derivatives, such as edifenphos, iprobenphos, isoprothiolane, phosdiphen, pyrazophos, tolclofos-methyl; and

Various others, such as acibenzolar-S-methyl, anilazine, benthiavalicarb, blasticidin-S, chinomethionate, chloroneb, chlorothalonil, cyflufenamid, cymoxanil, dichlone, diclocymet, diclomezine, dicloran, diethofencarb, dimethomorph, SYP-LI90 (proposed name: flumorph), dithianon, ethaboxam, etridiazole, famoxadone, fenamidone, fenoxanil, fentin, ferimzone, fluazinam, fluopicolide, flusulfamide, fenhexamid, fosetyl-aluminium, hymexazol, iprovalicarb, IKF-916 (cyazofamid), kasugamycin, methasulfocarb, metrafenone, nicobifen, pencycuron, phthalide, polyoxins, probenazole, propamocarb, proquinazid, pyroquilon, quinoxyfen, quintozene, sulfur, tiadinil, triazoxide, tricyclazole, triforine, validamycin, zoxamide (RH7281).

A method of controlling and preventing an infestation of crop plants or non-living materials by phytopathogenic or spoilage microorganisms or organisms potentially harmful to man, especially fungal organisms, which comprises the application of a compound of formula I as active ingredient to the plants, to parts of the plants or to the locus thereof, or to any part of the non-living materials.

A preferred method of controlling and preventing an infestation of crop plants by phytopathogenic microorganisms, especially fungal organisms, which comprises the application of a compound 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. 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 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 [that is, 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, is prepared in a known manner, typically by intimately mixing and/or grinding the compound with extenders, for example solvents, solid carriers and, optionally, surface active compounds (surfactants).

The agrochemical formulations will usually contain from 0.1 to 99% by weight, preferably from 0.1 to 95% by weight, of the compound of formula I, 99.9 to 1% by weight, preferably 99.8 to 5% by weight, of a solid or liquid adjuvant, and from 0 to 25% by weight, preferably from 0.1 to 25% by weight, of a surfactant.

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.

Whereas it is preferred to formulate commercial products as concentrates, the end user will normally use dilute formulations.

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

Table 1: individual compounds of formula I according to the invention

Compound No.	R^7	R^8	R^9
001	2-fluorophenyl	Cl	H
002	2-fluorophenyl	F	H
003	2-chlorophenyl	Cl	H
004	2-chlorophenyl	F	H
005	2-trifluoromethylphenyl	Cl	H
006	2-trifluoromethylphenyl	F	H
007	2-methylphenyl	Cl	H
008	2-methylphenyl	F	H
009	2,3-difluorophenyl	Cl	H
010	2,3-difluorophenyl	F	H
011	2,4-difluorophenyl	Cl	H
012	2,4-difluorophenyl	F	H
013	2,5-difluorophenyl	Cl	H
014	2,5-difluorophenyl	F	H
015	2,6-difluorophenyl	Cl	H
016	2,6-difluorophenyl	F	H
017	2,3-dichlorophenyl	Cl	H
018	2,3-dichlorophenyl	F	H
019	2,4-dichlorophenyl	Cl	H
020	2,4-dichlorophenyl	F	H
021	2,5-dichlorophenyl	Cl	H
022	2,5-dichlorophenyl	F	H
023	2,6-dichlorophenyl	Cl	H
024	2,6-dichlorophenyl	F	H
025	2-chloro-3-fluorophenyl	Cl	H
026	2-chloro-3-fluorophenyl	F	H
027	2-chloro-4-fluorophenyl	Cl	H

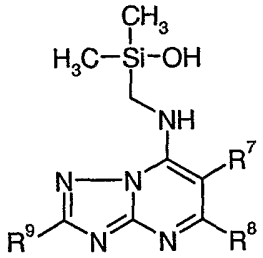
Compound No.	R^7	R^8	R^9
028	2-chloro-4-fluorophenyl	F	H
029	2-chloro-5-fluorophenyl	Cl	H
030	2-chloro-5-fluorophenyl	F	H
031	2-chloro-6-fluorophenyl	Cl	H
032	2-chloro-6-fluorophenyl	Cl	SH
033	2-chloro-6-fluorophenyl	F	H
034	2-chloro-6-fluorophenyl	CH_3	H
035	3-chloro-2-fluorophenyl	Cl	H
036	3-chloro-2-fluorophenyl	F	H
037	4-chloro-2-fluorophenyl	Cl	H
038	4-chloro-2-fluorophenyl	F	H
039	5-chloro-2-fluorophenyl	Cl	H
040	5-chloro-2-fluorophenyl	F	H
041	2-fluoro-3-trifluoromethylphenyl	Cl	H
042	2-fluoro-3-trifluoromethylphenyl	F	H
043	2-fluoro-4-trifluoromethylphenyl	Cl	H
044	2-fluoro-4-trifluoromethylphenyl	F	H
045	2-fluoro-5-trifluoromethylphenyl	Cl	H
046	2-fluoro-5-trifluoromethylphenyl	F	H
047	2-fluoro-6-trifluoromethylphenyl	Cl	H
048	2-fluoro-6-trifluoromethylphenyl	F	H
049	2-chloro-3-trifluoromethylphenyl	Cl	H
050	2-chloro-3-trifluoromethylphenyl	F	H
051	2-chloro-4-trifluoromethylphenyl	Cl	H
052	2-chloro-4-trifluoromethylphenyl	F	H
053	2-chloro-5-trifluoromethylphenyl	Cl	H
054	2-chloro-5-trifluoromethylphenyl	F	H
055	2-chloro-6-trifluoromethylphenyl	Cl	H
056	2-chloro-6-trifluoromethylphenyl	F	H
057	4-fluoro-2-trifluoromethylphenyl	Cl	H
058	4-fluoro-2-trifluoromethylphenyl	F	H
059	4-chloro-2-trifluoromethylphenyl	Cl	H
060	4-chloro-2-trifluoromethylphenyl	F	H

Compound No.	R^7	R^8	R^9
061	2-fluoro-3-methylphenyl	Cl	H
062	2-fluoro-3-methylphenyl	F	H
063	2-fluoro-4-methylphenyl	Cl	H
064	2-fluoro-4-methylphenyl	F	H
065	2-fluoro-5-methylphenyl	Cl	H
066	2-fluoro-5-methylphenyl	F	H
067	2-fluoro-6-methylphenyl	Cl	H
068	2-fluoro-6-methylphenyl	F	H
069	2-chloro-3-methylphenyl	Cl	H
070	2-chloro-3-methylphenyl	F	H
071	2-chloro-4-methylphenyl	Cl	H
072	2-chloro-4-methylphenyl	F	H
073	2-chloro-5-methylphenyl	Cl	H
074	2-chloro-5-methylphenyl	F	H
075	2-chloro-6-methylphenyl	Cl	H
076	2-chloro-6-methylphenyl	F	H
077	4-fluoro-2-methylphenyl	Cl	H
078	4-fluoro-2-methylphenyl	F	H
079	4-chloro-2-methylphenyl	Cl	H
080	4-chloro-2-methylphenyl	F	H
081	2,4,6-trifluorophenyl	Cl	H
082	2,4,6-trifluorophenyl	Cl	SH
083	2,4,6-trifluorophenyl	F	H
084	2,4,6-trifluorophenyl	CH_3	H
085	2,3,6-trifluorophenyl	Cl	H
086	2,3,6-trifluorophenyl	F	H
087	2,3,4-trifluorophenyl	Cl	H
088	2,3,4-trifluorophenyl	F	H
089	2,4,6-trichlorophenyl	Cl	H
090	2,4,6-trichlorophenyl	F	H
091	2,3,6-trichlorophenyl	Cl	H
092	2,3,6-trichlorophenyl	F	H
093	2,3,4-trichlorophenyl	Cl	H

Compound No.	R^7	R^8	R^9
094	2,3,4-trichlorophenyl	F	H
095	2,6-difluoro-4-methoxyphenyl	Cl	H
096	2,6-difluoro-4-methoxyphenyl	F	H
097	2,6-difluoro-4-trifluoromethoxyphenyl	Cl	H
098	2,6-difluoro-4-trifluoromethoxyphenyl	F	H
099	2,6-difluoro-4-trifluoromethylphenyl	Cl	H
100	2,6-difluoro-4-trifluoromethylphenyl	F	H
101	2,6-difluoro-4-cyanoyphenyl	Cl	H
102	2,6-difluoro-4-cyanophenyl	F	H
103	2,6-difluoro-4-methylphenyl	Cl	H
104	2,6-difluoro-4-methylphenyl	F	H
105	2,6-dichloro-4-methoxyphenyl	Cl	H
106	2,6-dichloro-4-methoxyphenyl	F	H
107	2,6-dichloro-4-trifluoromethoxyphenyl	Cl	H
108	2,6-dichloro-4-trifluoromethoxyphenyl	F	H
109	2,6-dichloro-4-trifluoromethylphenyl	Cl	H
110	2,6-dichloro-4-trifluoromethylphenyl	F	H
111	2,6-dichloro-4-cyanophenyl	Cl	H
112	2,6-dichloro-4-cyanophenyl	F	H
113	2,6-dichloro-4-methylphenyl	Cl	H
114	2,6-dichloro-4-methylphenyl	F	H
115	pentafluorophenyl	Cl	H
116	pentafluorophenyl	F	H
117	3,5-difluoropyridin-2-yl	Cl	H
118	3,5-difluoropyridin-2-yl	F	H
119	3,5-dichloropyridin-2-yl	Cl	H
120	3,5-dichloropyridin-2-yl	F	H
121	3-chloro-5-fluoropyridin-2-yl	Cl	H
122	3-chloro-5-fluoropyridin-2-yl	F	H
123	5-chloro-3-fluoropyridin-2-yl	Cl	H
124	5-chloro-3-fluoropyridin-2-yl	F	H
125	3-fluoro-5-trifluoromethylpyridin-2-yl	Cl	H
126	3-fluoro-5-trifluoromethylpyridin-2-yl	F	H

Compound No.	R^7	R^8	R^9
127	3-chloro-5-trifluoromethylpyridin-2-yl	Cl	H
128	3-chloro-5-trifluoromethylpyridin-2-yl	F	H
129	2,4-difluoropyridin-3-yl	Cl	H
130	2,4-difluoropyridin-3-yl	F	H
131	2,4-dichloropyridin-3-yl	Cl	H
132	2,4-dichloropyridin-3-yl	F	H
133	2,4,6-trifluoropyridin-3-yl	Cl	H
134	2,4,6-trifluoropyridin-3-yl	F	H
135	2,4,6-trichloropyridin-3-yl	Cl	H
136	2,4,6-trichloropyridin-3-yl	F	H
137	3,5-difluoropyridin-4-yl	Cl	H
138	3,5-difluoropyridin-4-yl	F	H
139	3,5-dichloropyridin-4-yl	Cl	H
140	3,5-dichloropyridin-4-yl	F	H
141	2,5-difluorothiophen-3-yl	Cl	H
142	2,5-difluorothiophen-3-yl	F	H
143	2,5-dichlorothiophen-3-yl	Cl	H
144	2,5-dichlorothiophen-3-yl	F	H

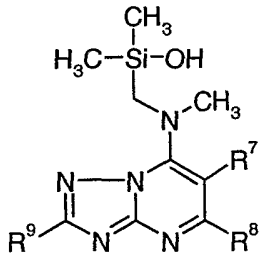
Table 1 provides 144 compounds of formula (I.a):



(I.a)

wherein R^7, R^8 and R^9 are as defined in Table 1.

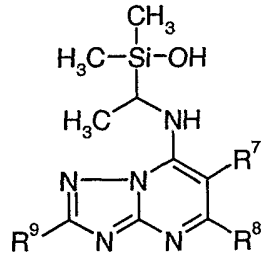
Table 1 provides 144 compounds of formula (I.b):



(I.b)

wherein R^7, R^8 and R^9 are as defined in Table 1.

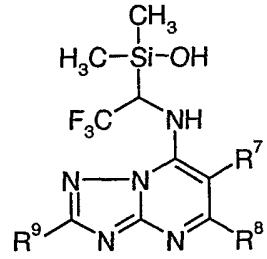
Table 1 provides 144 compounds of formula (I.c):



(I.c)

wherein R^7, R^8 and R^9 are as defined in Table 1.

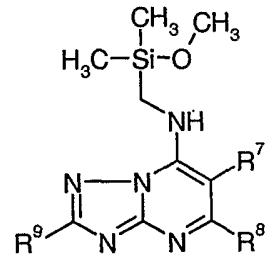
Table 1 provides 144 compounds of formula (I.d):



(I.d)

wherein R^7, R^8 and R^9 are as defined in Table 1.

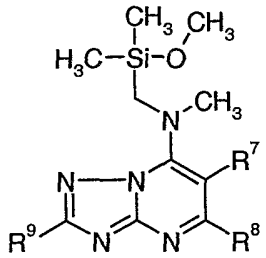
Table 1 provides 144 compounds of formula (I.e):



(I.e)

wherein R^7, R^8 and R^9 are as defined in Table 1.

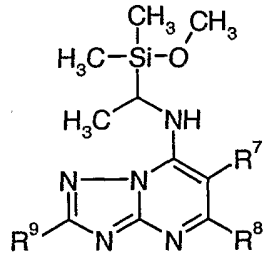
Table 1 provides 144 compounds of formula (I.f):



(I.f)

wherein R^7, R^8 and R^9 are as defined in Table 1.

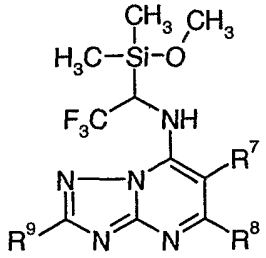
Table 1 provides 144 compounds of formula (I.g):



(I.g)

wherein R^7, R^8 and R^9 are as defined in Table 1.

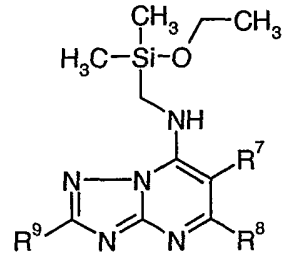
Table 1 provides 144 compounds of formula (I.h):



(I.h)

wherein R^7, R^8 and R^9 are as defined in Table 1.

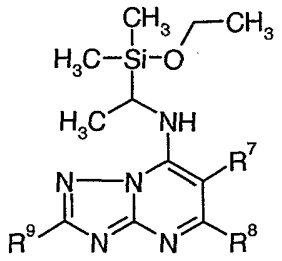
Table 1 provides 144 compounds of formula (I.i):



(I.i)

wherein R^7, R^8 and R^9 are as defined in Table 1.

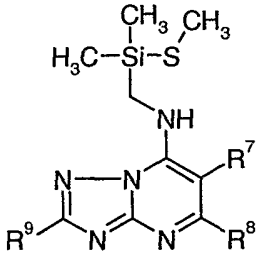
Table 1 provides 144 compounds of formula (I.k):



(I.k)

wherein R^7, R^8 and R^9 are as defined in Table 1.

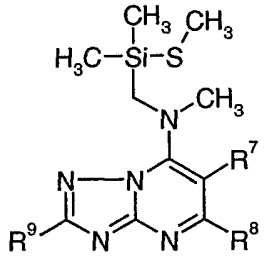
Table 1 provides 144 compounds of formula (I.l):



(I.l)

wherein R^7, R^8 and R^9 are as defined in Table 1.

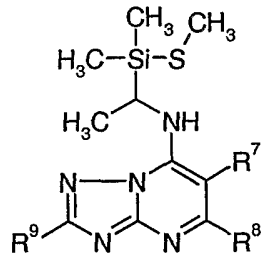
Table 1 provides 144 compounds of formula (I.m):



(I.m)

wherein R^7, R^8 and R^9 are as defined in Table 1.

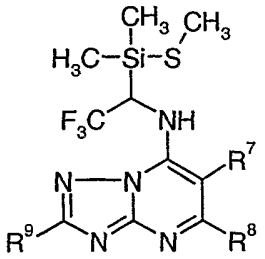
Table 1 provides 144 compounds of formula (I.n):



(I.n)

wherein R^7, R^8 and R^9 are as defined in Table 1.

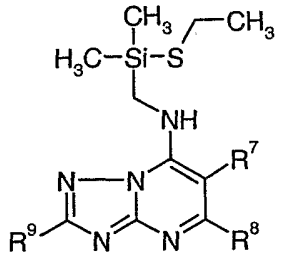
Table 1 provides 144 compounds of formula (I.o):



(I.o)

wherein R^7, R^8 and R^9 are as defined in Table 1.

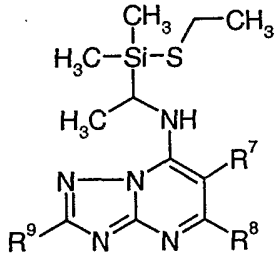
Table 1 provides 144 compounds of formula (I.p):



(I.p)

wherein R^7, R^8 and R^9 are as defined in Table 1.

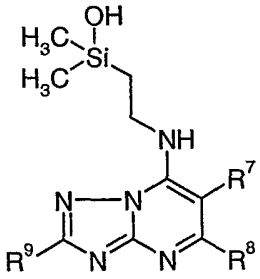
Table 1 provides 144 compounds of formula (I.q):



(I.q)

wherein R^7, R^8 and R^9 are as defined in Table 1.

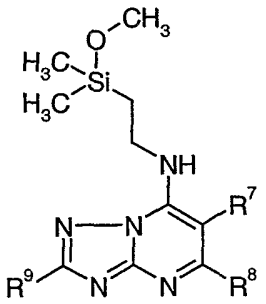
Table 1 provides 144 compounds of formula (I.r):



(I.r)

wherein R^7, R^8 and R^9 are as defined in Table 1.

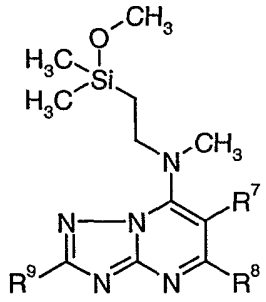
Table 1 provides 144 compounds of formula (I.s):



(I.s)

wherein R^7, R^8 and R^9 are as defined in Table 1.

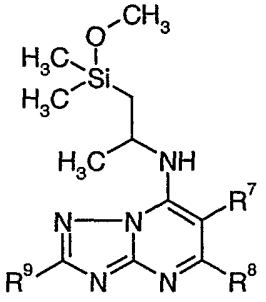
Table 1 provides 144 compounds of formula (I.t):



(I.t)

wherein R^7, R^8 and R^9 are as defined in Table 1.

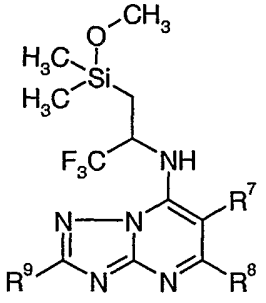
Table 1 provides 144 compounds of formula (I.u):



(I.u)

wherein R^7, R^8 and R^9 are as defined in Table 1.

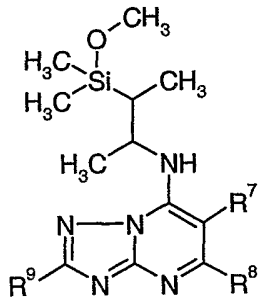
Table 1 provides 144 compounds of formula (I.v):



(I.v)

wherein R^7, R^8 and R^9 are as defined in Table 1.

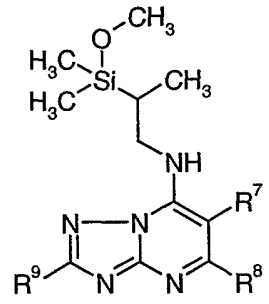
Table 1 provides 144 compounds of formula (I.w):



(I.w)

wherein R^7, R^8 and R^9 are as defined in Table 1.

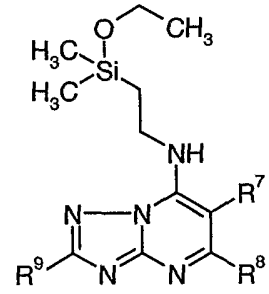
Table 1 provides 144 compounds of formula (I.x):



(I.x)

wherein R^7, R^8 and R^9 are as defined in Table 1.

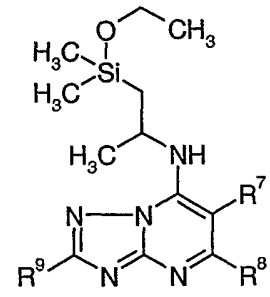
Table 1 provides 144 compounds of formula (I.y):



(I.y)

wherein R^7, R^8 and R^9 are as defined in Table 1.

Table 1 provides 144 compounds of formula (I.z):



(I.z)

wherein R^7, R^8 and R^9 are as defined in Table 1.

Biological examples

Alternaria solani / tomato / preventive (Action against Alternaria on tomato)

4 weeks old tomato plants cv. Roter Gnom are treated with the formulated test compound in a spray chamber. Two days after application tomato plants are inoculated by spraying a spore suspension on the test plants. After an incubation period of 4 days at 22/18° C and 95% r. h. in a greenhouse the disease incidence is assessed.

Compounds of formula I at 200 ppm inhibit fungal infestation in this test to a least 80 %, while under the same conditions untreated control plants are infected by the phytopathogenic fungi to over 80 %.

Botrytis cinerea / tomato / preventive (Action against Botrytis on tomato)

4 weeks old tomato plants cv. Roter Gnom are treated with the formulated test compound in a spray chamber. Two days after application tomato plants are inoculated by spraying a spore suspension on the test plants. After an incubation period of 3 days at 20° C and 95% r. h. in a greenhouse the disease incidence is assessed.

Compounds of formula I at 200 ppm inhibit fungal infestation in this test to a least 80 %, while under the same conditions untreated control plants are infected by the phytopathogenic fungi to over 80 %.

Puccinia recondita / wheat / preventive (Action against brown rust on wheat)

1 week old wheat plants cv. Arina are treated with the formulated test compound in a spray chamber. One day after application wheat plants are inoculated by spraying a spore suspension (1 x 105 uredospores/ml) on the test plants. After an incubation period of 1 day at 20o C and 95% r. h. plants are kept for 10 days 20° C / 18° C (day/night) and 60% r.h. in a greenhouse. The disease incidence is assessed 11 days after inoculation.

Compounds of formula I at 200 ppm inhibit fungal infestation in this test to a least 80 %, while under the same conditions untreated control plants are infected by the phytopathogenic fungi to over 80 %.

Magnaporthe grisea (Pyricularia oryzae) / rice / preventive (Action against rice blast)
3 weeks old rice plants cv. Koshihikari are treated with the formulated test compound in a spray chamber. Two days after application rice plants are inoculated by spraying a spore suspension (1 x 10^5 conidia/ml) on the test plants. After an incubation period of 6 days at 25° C and 95% r. h. the disease incidence is assessed.

Compounds of formula I at 200 ppm inhibit fungal infestation in this test to a least 80 %, while under the same conditions untreated control plants are infected by the phytopathogenic fungi to over 80 %.

Pyrenophora teres (Helminthosporium teres) / barley / preventive (Action against net blotch on barley)
1-week-old barley plants cv. Regina are treated with the formulated test compound in a spray chamber. Two days after application barley plants are inoculated by spraying a spore suspension (2.6 x 10^4 conidia/ml) on the test plants. After an incubation period of 4 days at 20° C and 95% r. h. the disease incidence is assessed.

Compounds of formula I at 200 ppm inhibit fungal infestation in this test to a least 80 %, while under the same conditions untreated control plants are infected by the phytopathogenic fungi to over 80 %.

Septoria tritici / wheat / preventive (Action against Septoria leaf spot on wheat)
2 weeks old wheat plants cv. Riband are treated with the formulated test compound in a spray chamber. One day after application wheat plants are inoculated by spraying a spore suspension (10^6 conidia/ml) on the test plants. After an incubation period of 1 day at 22°C/21 °C and 95% r. h. plants are kept at 22°C/21°C and 70% r.h. in a greenhouse. The disease incidence is assessed 16 - 18 days after inoculation.

Compounds of formula I at 200 ppm inhibit fungal infestation in this test to a least 80 %, while under the same conditions untreated control plants are infected by the phytopathogenic fungi to over 80 %.

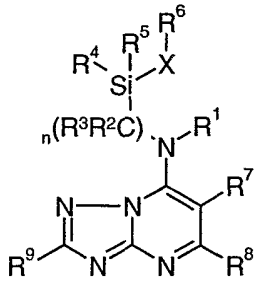
Uncinula necator / grape / preventive (Action against powdery mildew on grape)
5 weeks old grape seedlings cv. Gutedel are treated with the formulated test compound in a spray chamber. One day after application grape plants are inoculated by shaking plants infected with grape powdery mildew above the test plants. After an

incubation period of 7 days at 24/22° C and 70% r. h. under a light regime of 14/10 h (light/dark) the disease incidence is assessed.

Compounds of formula I at 200 ppm inhibit fungal infestation in this test to a least 80 %, while under the same conditions untreated control plants are infected by the phytopathogenic fungi to over 80 %.

What is claimed is:

1. A compound of formula I



(I)

wherein

R^1 is hydrogen, C_1-C_6alkyl, C_1-C_6haloalkyl, C_2-C_6alkenyl, C_2-C_6alkynyl or C(=O)C_1-C_6alkyl;

R^2 and R^3, each independently of each other and independently of n when n is 2, 3 or 4, are hydrogen, halogen, C_1-C_6alkyl, C_1-C_6haloalkyl or C_1-C_6alkyloxy, or

R^2 and R^3 are part of a C=C double bond when n is 2, 3 or 4, or

R^2 and R^3, together with the carbon atom to which they are attached, form an optionally substituted, three- to six-membered ring;

R^4 and R^5, each independently of each other, are C_1-C_6alkyl, C_1-C_6haloalkyl, C_3-C_6cycloalkyl, C_2-C_6alkenyl, C_1-C_6alkyloxy, C_1-C_6haloalkyloxy, C_3-C_6cycloalkyloxy or C_2-C_6alkynyl;

R^6 is hydrogen, C_1-C_6alkyl, C_1-C_6haloalkyl or C_3-C_6cycloalkyl;

R^7 is an optionally substituted aryl or heteroaryl;

R^8 is C_1-C_6alkyl, halogen or cyano;

R^9 is hydrogen, mercapto or C_1-C_3alkylthio;

X is oxygen or sulfur; and

n is 1, 2, 3 or 4.

2. A compound of formula I according to claim 1 in free form.

3. A compound of formula I according to claim 1 in an agrochemically usable salt form.

4. A compound of formula I according to any one of claims 1 to 3 wherein

R^1 is hydrogen, C_1-C_6alkyl, C_2-C_6alkenyl, C_2-C_6alkynyl or C(=O)C_1-C_6alkyl;

R^2 and R^3, each independently of each other and independently of n when n is 2, 3 or 4, are hydrogen, halogen, C_1-C_6alkyl, C_1-C_3haloalkyl or C_1-C_6alkyloxy;

R^4 and R^5, each independently of each other, are C_1-C_6alkyl, C_1-C_6haloalkyl, C_3-C_6cycloalkyl, C_2-C_6alkenyl or C_2-C_6alkynyl;

R^6 is hydrogen, C_1-C_6alkyl, C_1-C_6haloalkyl or C_3-C_6cycloalkyl;
R^7 is an optionally substituted aryl or heteroaryl;
R^8 is C_1-C_6alkyl, halogen or cyano;
R^9 is hydrogen, mercapto or C_1-C_3alkylthio;
X is oxygen or sulfur; and
n is 1, 2, 3 or 4.

5. A compound of formula I according to any one of claims 1 to 4, wherein
R^1 is hydrogen, C_2-C_6alkenyl or C_2-C_6alkynyl;
R^2 and R^3, each independently of each other and independently of n when n is 2, 3 or 4, are hydrogen, halogen, C_1-C_6alkyl or C_1-C_3haloalkyl;
R^4 and R^5, each independently of each other, are C_1-C_6alkyl, C_1-C_6haloalkyl or C_3-C_6cycloalkyl;
R^6 is hydrogen, C_1-C_6alkyl or C_1-C_6haloalkyl;
R^7 is an optionally substituted aryl;
R^8 is C_1-C_3alkyl or halogen;
R^9 is hydrogen, mercapto or methylthio;
X is oxygen or sulfur; and
n is 1, 2 or 3.

6. A compound of formula I according to any one of claims 1 to 5, wherein
R^1 is hydrogen or C_2-C_4alkynyl;
R^2 and R^3, each independently of each other and independently of n when n is 2, 3 or 4, are hydrogen, C_1-C_3alkyl or C_1-C_3haloalkyl;
R^4 and R^5, each independently of each other, are C_1-C_3alkyl or C_1-C_3haloalkyl;
R^6 is C_1-C_3alkyl or C_1-C_3haloalkyl;
R^7 is phenyl substituted at least in one *ortho*-position with halogen;
R^8 is chloro or fluoro;
R^9 is hydrogen or mercapto;
X is oxygen; and
n is 1 or 2.

7. A compound of formula I according to any one of claims 1 to 6, wherein
R^1 is hydrogen;
R^2 and R^3, each independently of each other and independently of n when n is 2, 3 or 4, are hydrogen, methyl or trifluoromethyl;
R^4 and R^5, each independently of each other, are methyl or ethyl;

R^6 is methyl or ethyl;

R^7 is 2,4,6-trifluorophenyl or 2-chloro-6-fluorophenyl;

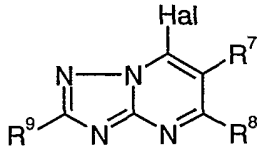
R^8 is chloro;

R^9 is hydrogen;

X is oxygen; and

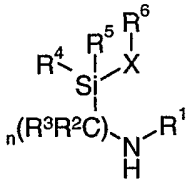
n is 1.

8. A process for the preparation of a compound of formula I defined in claim 1, which comprises reacting a compound of formula II,



(II)

wherein R^7, R^8 and R^9 are as defined for formula I and Hal is halogen, preferably fluorine, chlorine or bromine, with a compound of formula III,



(III)

wherein R^1, R^2, R^3, R^4, R^5, R^6 and n are as defined for formula I.

9. A fungicidal composition for controlling and protecting against phytopathogenic microorganisms, comprising as active ingredient at least one compound of formula I defined in claim 1, in free form or in agrochemically usable salt form, and at least one adjuvant.

10. A composition according to claim 9, which comprises at least one additional fungicidally active compound, prefarably selected from the group consisting of azoles, pyrimidinyl carbinoles, 2-amino-pyrimidines, morpholines, anilinopyrimidines, pyrroles, phenylamides, benzimidazoles, dicarboximides, carboxamides, strobilurines, dithiocarbamates, N-halomethylthiotetrahydrophthalimides, copper-compounds, nitrophenols, organo-phosphor-derivatives.

11. The use of a compound of formula I defined in claim 1 for controlling or preventing infestation of plants or non-living materials by phytopathogenic microorganisms.

12. A method of controlling and preventing an infestation of crop plants or non-living materials by phytopathogenic or spoilage microorganisms or organisms potentially harmful to man, which comprises the application of a compound of formula I defined in claim 1 as active ingredient to the plant, to parts of the plants or to the locus thereof, or to any part of the non-living materials.

13. A method according to claim 12, wherein the phytopathogenic microorganisms are fungal organisms.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2005/013710

A. CLASSIFICATION OF SUBJECT MATTER
INV. C07D487/04 C07F7/18 A01N43/90

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C07D C07F A01N

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, BEILSTEIN Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 297 251 B1 (PEES KLAUS-JUERGEN ET AL) 2 October 2001 (2001-10-02) column 5, line 45 - line 47 column 6, line 14 - line 41 column 20; claims 9,10 column 16, line 26 - line 48; claim 1	1-13

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

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

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

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 April 2006	04/05/2006

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Jeanjean, F

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Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2005/013710

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6297251 B1	02-10-2001	NONE	