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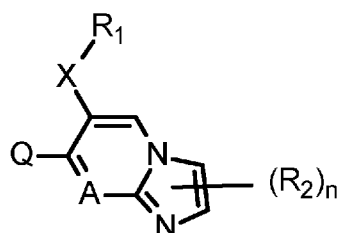
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(54) Title: PESTICIDALLY ACTIVE HETEROCYCLIC DERIVATIVES WITH SULFUR CONTAINING SUBSTITUENTS



(I)

(57) Abstract: Compounds of the formula (I), wherein the substituents are as defined in claim 1. Furthermore, the present invention relates to agrochemical compositions which comprise compounds of formula (I), to preparation of these compositions, and to the use of the compounds or compositions in agriculture or horticulture for combating, preventing or controlling animal pests, including arthropods and in particular insects, molluscs or representatives of the order Aca-



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Pesticidally active heterocyclic derivatives with sulfur containing substituents

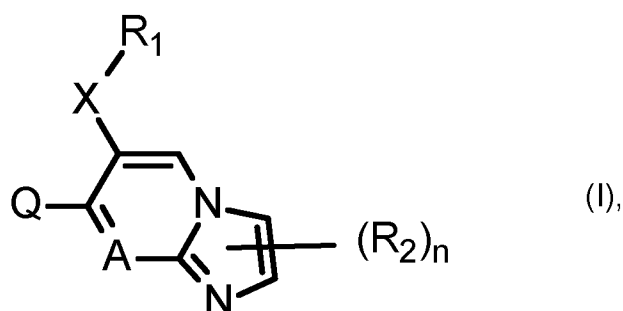
The present invention relates to pesticidally active, in particular insecticidally active heterocyclic derivatives containing sulfur substituents, to processes for their preparation, to compositions comprising those compounds, and to their use for controlling animal pests, including arthropods and in particular insects or representatives of the order *Acarina*.

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Heterocyclic compounds with pesticidal action are known and described, for example, in JP 2019/112398, WO 2017/077968, WO 2016/091731 and WO 2016/107742. There have now been found novel pesticidally active derivatives with sulfur containing bicyclic ring systems with a bridgehead nitrogen

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The present invention accordingly relates to compounds of formula I,



wherein

A is CH or N;

15 X is S, SO or SO₂;

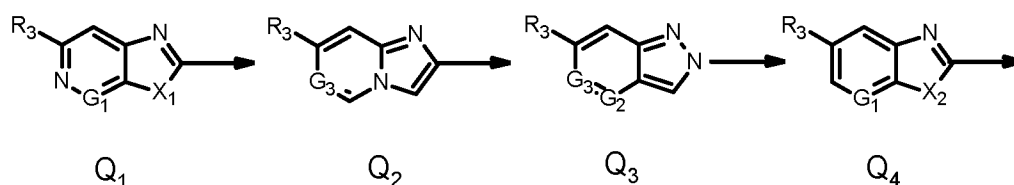
R₁ is C₁-C₄alkyl, or C₃-C₆cycloalkyl-C₁-C₄alkyl;

R₂ is C₁-C₆alkyl, C₁-C₆haloalkyl, C₃-C₆cycloalkyl, C₃-C₆cycloalkyl substituted with cyano, C₁-C₆cyanoalkyl, C₁-C₄alkoxyC₁-C₄alkyl, halogen, cyano, C₁-C₄haloalkoxy, C₁-C₄alkoxy, aminocarbonyl, C₁-C₄alkoxycarbonyl, C₁-C₄alkylsulfanyl, C₁-C₄alkylsulfinyl, and C₁-C₄alkylsulfonyl, C₁-

20 C₄haloalkylsulfanyl, C₁-C₄haloalkylsulfinyl, and C₁-C₄haloalkylsulfonyl;

n is 0, 1 or 2;

Q is a radical selected from the group consisting of formula Q₁ to Q₄



25 wherein the arrow denotes the point of attachment to the ring incorporating the radical A;
and wherein

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X₁ is O or NR₄, wherein R₄ is C₁-C₄alkyl;

X₂ is O or NR₅, wherein R₅ is C₁-C₄alkyl

R₃ is halogen, C₁-C₆haloalkyl, C₁-C₄haloalkylsulfanyl, C₁-C₄haloalkylsulfinyl, C₁-C₄haloalkylsulfonyl or C₁-C₆haloalkoxy;

5 G₁ is N or CH;

G₂ and G₃ are, independently from each other, N or CH; or

an agrochemically acceptable salt, stereoisomer, enantiomer, tautomer or N-oxide of a compound of formula I.

- 10 Compounds of formula I which have at least one basic centre can form, for example, acid addition salts, for example with strong inorganic acids such as mineral acids, for example perchloric acid, sulfuric acid, nitric acid, nitrous acid, a phosphorus acid or a hydrohalic acid, with strong organic carboxylic acids, such as C₁-C₄alkanecarboxylic acids which are unsubstituted or substituted, for example by halogen, for example acetic acid, such as saturated or unsaturated dicarboxylic acids, for
- 15 example oxalic acid, malonic acid, succinic acid, maleic acid, fumaric acid or phthalic acid, such as hydroxycarboxylic acids, for example ascorbic acid, lactic acid, malic acid, tartaric acid or citric acid, or such as benzoic acid, or with organic sulfonic acids, such as C₁-C₄alkane- or arylsulfonic acids which are unsubstituted or substituted, for example by halogen, for example methane- or p-toluenesulfonic acid. Compounds of formula I which have at least one acidic group can form, for example, salts with
- 20 bases, for example mineral salts such as alkali metal or alkaline earth metal salts, for example sodium, potassium or magnesium salts, or salts with ammonia or an organic amine, such as morpholine, piperidine, pyrrolidine, a mono-, di- or tri-lower-alkylamine, for example ethyl-, diethyl-, triethyl- or dimethylpropylamine, or a mono-, di- or trihydroxy-lower-alkylamine, for example mono-, di- or triethanolamine.

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

- 30 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. Albini and S. Pietra, CRC Press, Boca Raton 1991.

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

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Where substituents are indicated as being itself further substituted, this means that they carry one or more identical or different substituents, e.g. one to four substituents. Normally not more than three such optional substituents are present at the same time. Preferably not more than two such substituents are present at the same time (i.e. the group is substituted by one or two of the

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substituents indicated). Where the additional substituent group is a larger group, such as cycloalkyl or phenyl, it is most preferred that only one such optional substituent is present. Where a group is indicated as being substituted, e.g. alkyl, this includes those groups that are part of other groups, e.g. the alkyl in alkylthio.

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The term "C₁-C_xalkyl" as used herein refers to a saturated straight-chain or branched hydrocarbon radical attached via any of the carbon atoms having 1 to x carbon atoms, for example, any one of the radicals methyl, ethyl, n-propyl, 1-methylbutyl, 2-methylbutyl, 3-methylbutyl, 2, 2-dimethylpropyl, 1-ethylpropyl, n-hexyl, n-pentyl, 1, 1-dimethylpropyl, 1, 2-dimethylpropyl, 1-methylpentyl, 2-methylpentyl, 3-methylpentyl, 4-methylpentyl, 1, 1-dimethylbutyl, 1,2-dimethylbutyl, 1, 3-dimethylbutyl, 2, 2-dimethylbutyl, 2, 3-dimethylbutyl, 3, 3-dimethylbutyl, 1-ethylbutyl, 2-ethylbutyl, 1,1, 2-trimethylpropyl, 1,2, 2-trimethylpropyl, 1-ethyl-1-methylpropyl, or 1-ethyl-2-methylpropyl.

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The term "C₁-C_xhaloalkyl" as used herein refers to a straight-chain or branched saturated alkyl radical attached via any of the carbon atoms having 1 to x carbon atoms (as mentioned above), where some or all of the hydrogen atoms in these radicals may be replaced by fluorine, chlorine, bromine and/or iodine, i.e., for example, any one of chloromethyl, dichloromethyl, trichloromethyl, fluoromethyl, difluoromethyl, trifluoromethyl, chlorofluoromethyl, dichlorofluoromethyl, chlorodifluoromethyl, 2-fluoroethyl, 2-chloroethyl, 2-bromoethyl, 2-iodoethyl, 2, 2-difluoroethyl, 2,2, 2-trifluoroethyl, 2-chloro-2-fluoroethyl, 2-chloro-2, 2-difluoroethyl, 2, 2-dichloro-2-fluoroethyl, 2,2, 2-trichloroethyl, pentafluoroethyl, 2-fluoropropyl, 3-fluoropropyl, 2,2-difluoropropyl, 2, 3-difluoropropyl, 2-chloropropyl, 3-chloropropyl, 2, 3-dichloropropyl, 2-bromopropyl, 3-bromopropyl, 3,3, 3-trifluoropropyl, 3,3, 3-trichloropropyl, 2,2, 3,3, 3-pentafluoropropyl, heptafluoropropyl, 1-(fluoromethyl)-2-fluoroethyl, 1-(chloromethyl)-2-chloroethyl, 1-(bromomethyl)-2-bromoethyl, 4-fluorobutyl, 4-chlorobutyl, 4-bromobutyl or nonafluorobutyl. According a term "C₁-C₂-fluoroalkyl" would refer to a C₁-C₂-alkyl radical which carries 1,2, 3,4, or 5 fluorine atoms, for example, any one of difluoromethyl, trifluoromethyl, 1-fluoroethyl, 2-fluoroethyl, 2, 2-difluoroethyl, 2,2, 2-trifluoroethyl, 1,1, 2, 2-tetrafluoroethyl or pentafluoroethyl.

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The term "C₁-C_xalkoxy" as used herein refers to a straight-chain or branched saturated alkyl radical having 1 to x carbon atoms (as mentioned above) which is attached via an oxygen atom, i.e., for example, any one of methoxy, ethoxy, n-propoxy, 1-methylethoxy, n-butoxy, 1-methylpropoxy, 2-methylpropoxy or 1, 1-dimethylethoxy.

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The term "C₁-C_xhaloalkoxy" as used herein refers to a C₁-C_xalkoxy radical as mentioned above which is partially or fully substituted by fluorine, chlorine, bromine and/or iodine, i.e., for example, any one of chloromethoxy, dichloromethoxy, trichloromethoxy, fluoromethoxy, difluoromethoxy, trifluoromethoxy, chlorofluoromethoxy, dichlorofluoromethoxy, chlorodifluoromethoxy, 2-fluoroethoxy, 2-chloroethoxy, 2-bromoethoxy, 2-iodoethoxy, 2, 2-difluoroethoxy, 2,2, 2-trifluoroethoxy, 2-chloro-2-fluoroethoxy, 2-

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chloro-2, 2-difluoroethoxy, 2, 2-dichloro-2-fluoroethoxy, 2,2, 2-trichloroethoxy, pentafluoroethoxy, 2-fluoropropoxy, 3-fluoropropoxy, 2, 2-difluoropropoxy, 2, 3-difluoropropoxy, 2-chloropropoxy, 3-chloropropoxy, 2, 3-dichloropropoxy, 2-bromopropoxy, 3-bromopropoxy, 3,3, 3-trifluoropropoxy, 3,3, 3-trichloropropoxy, 2,2, 3,3, 3-pentafluoropropoxy, heptafluoropropoxy, 1-(fluoromethyl)-2-fluoroethoxy, 1-(chloromethyl)-2-chloroethoxy, 1-(bromomethyl)-2-bromoethoxy, 4-fluorobutoxy, 4-chlorobutoxy, or 4-bromobutoxy.

The term "C₁-C_xalkylsulfanyl" as used herein refers to a straight chain or branched saturated alkyl radical having 1 to n carbon atoms (as mentioned above) which is attached via a sulfur atom, i.e., for example, any one of methylthio, ethylthio, n-propylthio, 1-methylethylthio, butylthio, 1-methylpropylthio, 2-methylpropylthio or 1, 1-dimethylethylthio.

The term "C₁-C_xalkylsulfinyl" as used herein refers to a straight chain or branched saturated alkyl radical having 1 to x carbon atoms (as mentioned above) which is attached via the sulfur atom of the sulfinyl group, i.e., for example, any one of methylsulfinyl, ethylsulfinyl, n-propylsulfinyl, 1-methylethylsulfinyl, n-butylsulfinyl, 1-methylpropylsulfinyl, 2-methylpropylsulfinyl, 1, 1-dimethylethylsulfinyl, n-pentylsulfinyl, 1-methylbutylsulfinyl, 2-methylbutylsulfinyl, 3-methylbutylsulfinyl, 1, 1-dimethylpropylsulfinyl, 1, 2-dimethylpropylsulfinyl, 2,2-dimethylpropylsulfinyl or 1-ethylpropylsulfinyl.

The term "C₁-C_xalkylsulfonyl" as used herein refers to a straight chain or branched saturated alkyl radical having 1 to x carbon atoms (as mentioned above) which is attached via the sulfur atom of the sulfonyl group, i.e., for example, any one of methylsulfonyl, ethylsulfonyl, n-propylsulfonyl, isopropylsulfonyl, n-butylsulfonyl, 1-methylpropylsulfonyl, 2-methylpropylsulfonyl or t-butylsulfonyl.

The term "C₁-C_xhaloalkylsulfanyl" as used herein refers to a C₁-C_xalkylthio radical as mentioned above which is partially or fully substituted by fluorine, chlorine, bromine and/or iodine, i.e., for example, any one of fluoromethylthio, difluoromethylthio, trifluoromethylthio, chlorodifluoromethylthio, bromodifluoromethylthio, 2-fluoroethylthio, 2-chloroethylthio, 2-bromoethylthio, 2-iodoethylthio, 2, 2-difluoroethylthio, 2,2,2-trifluoroethylthio, 2,2, 2-trichloroethylthio, 2-chloro-2-fluoroethylthio, 2-chloro-2,2-difluoroethylthio, 2, 2-dichloro-2-fluoroethylthio, pentafluoroethylthio, 2-fluoropropylthio, 3-fluoropropylthio, 2-chloropropylthio, 3-chloropropylthio, 2-bromopropylthio, 3-bromopropylthio, 2,2-difluoropropylthio, 2,3-difluoropropylthio, 2, 3-dichloropropylthio, 3,3, 3-trifluoropropylthio, 3,3, 3-trichloropropylthio, 2,2, 3,3, 3-pentafluoropropylthio, heptafluoropropylthio, 1-(fluoromethyl)-2-fluoroethylthio, 1-(chloromethyl)-2-chloroethylthio, 1-(bromomethyl)-2-bromoethylthio, 4-fluorobutylthio, 4-chlorobutylthio, or 4-bromobutylthio.

The term "C₁-C_xhaloalkylsulfinyl" and "C₁-C_nhaloalkylsulfonyl" refers to the groups above but with the sulfur in oxidation state 1 or 2 respectively.

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The term "C₁-C_xalkoxycarbonyl" as used herein refers to a straight chain or branched alkoxy radical having 1 to x carbon atoms (as mentioned above) which is attached via the carbon atom of the carbonyl group, i.e., for , any one of methoxycarbonyl, ethoxycarbonyl, n-propoxycarbonyl, 1-methylethoxycarbonyl, n-butoxycarbonyl, 1-methylpropoxycarbonyl, 2-methylpropoxycarbonyl or 1, 1-dimethylethoxycarbonyl.

The term "C₁-C_xcyanoalkyl" as used herein refers to a straight chain or branched saturated alkyl radicals having 1 to x carbon atoms (as mentioned above) which is substituted by a cyano group, for example cyanomethylene, cyanoethylene, 1,1-dimethylcyanomethyl, cyanomethyl, cyanoethyl, and 1-dimethylcyanomethyl.

The term "C₃-C₆cycloalkyl" as used herein (including as a prefix before C₁-C₄alkyl) refers to 3-6 membered cycloalkyl groups such as cyclopropane, cyclobutane, cyclopentane and cyclohexane.

Halogen is generally fluorine, chlorine, bromine or iodine. This also applies, correspondingly, to halogen in combination with other meanings, such as haloalkyl

Embodiments according to the invention are provided as set out below.

Embodiment 1 provides compounds of formula I, or an agrochemically acceptable salt, stereoisomer, enantiomer, tautomer or N-oxide thereof, as defined above.

Embodiment 2 provides compounds, or an agrochemically acceptable salt, stereoisomer, enantiomer, tautomer or N-oxide thereof, according to embodiment 1 wherein:

A is CH or N;

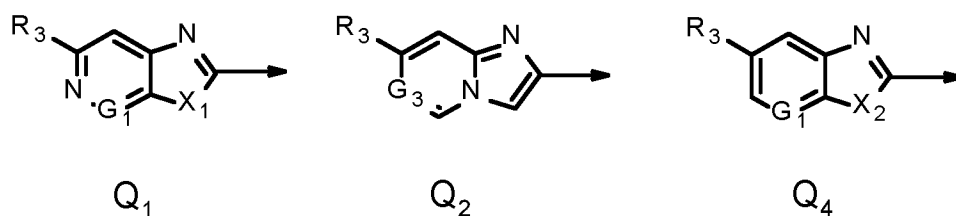
X is S, SO or SO₂;

R₁ is C₁-C₃alkyl or C₃-C₆cycloalkyl-C₁-C₂alkyl;

R₂ is C₁-C₄alkyl, C₁-C₄haloalkyl, C₃-C₄cycloalkyl, C₃-C₄cycloalkyl substituted with cyano, C₁-C₂cyanoalkyl, C₁-C₃alkoxyC₁-C₂alkyl, fluoro, chloro, bromo, cyano, C₁-C₃haloalkoxy, C₁-C₄alkoxy, aminocarbonyl, C₁-C₂alkoxycarbonyl, C₁-C₂alkylsulfanyl, C₁-C₂alkylsulfinyl, C₁-C₂alkylsulfonyl, C₁-C₂haloalkylsulfanyl, C₁-C₂haloalkylsulfinyl or C₁-C₂haloalkylsulfonyl;

n is 0 or 1; and

Q is a radical selected from the group consisting of formula Q₁ , Q₂ or Q₄



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wherein the arrow denotes the point of attachment to the ring incorporating the radical A;
and wherein

X₁ is NR₄, wherein R₄ is C₁-C₂alkyl;

X₂ is O or NR₅, wherein R₅ is C₁-C₂alkyl

- 5 R₃ is fluoro, chloro, bromo, C₁-C₂haloalkyl, C₁-C₂haloalkylsulfanyl, C₁-C₂haloalkylsulfinyl, C₁-C₂haloalkylsulfonyl or C₁-C₂haloalkoxy;

G₁ is N or CH; and

G₃ is N or CH.

- 10 Embodiment 3 provides compounds, or an agrochemically acceptable salt, stereoisomer, enantiomer, tautomer or N-oxide thereof, according to embodiment 1 wherein:

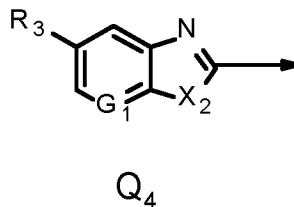
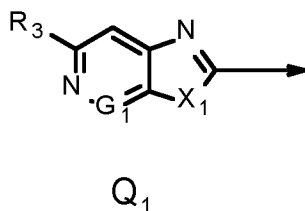
A is CH or N;

X is S, SO or SO₂;

R₁ is ethyl, propyl, isopropyl or cyclopropylmethyl;

- 15 R₂ is C₁-C₃alkyl, C₁-C₂haloalkyl, cyclopropyl, cyclopropyl substituted with cyano, cyanomethyl, methoxymethyl, ethoxymethyl, methoxyethyl, ethoxyethyl, fluoro, chloro, bromo, cyano, C₁-C₂haloalkoxy, C₁-C₃alkoxy, aminocarbonyl, methoxycarbonyl, C₁-C₂alkylsulfanyl, C₁-C₂alkylsulfinyl, C₁-C₂alkylsulfonyl, C₁-C₂haloalkylsulfanyl, C₁-C₂haloalkylsulfinyl or C₁-C₂haloalkylsulfonyl;
n is 0 or 1; and

- 20 Q is a radical selected from the group consisting of formula Q₁ or Q₄



wherein the arrow denotes the point of attachment to the ring incorporating the radical A;
and wherein

- 25 X₁ is NCH₃;

X₂ is NCH₃;

R₃ is bromo, trifluoromethyl, pentafluoroethyl, 1,1-difluoroethyl, difluoromethyl, difluorochloromethyl, trifluoromethylsulfanyl, trifluoromethylsulfinyl, trifluoromethylsulfonyl, difluoromethylsulfanyl, difluoromethylsulfinyl, difluoromethylsulfonyl, difluoromethoxy, difluorobromomethoxy or

- 30 trifluoromethoxy; and

G₁ is N or CH.

Embodiment 4 provides compounds, or an agrochemically acceptable salt, stereoisomer, enantiomer, tautomer or N-oxide thereof, according to embodiments 1, 2, or 3 with the proviso that when Q is Q₄

- 35 and X₂ is NR₅, then G₁ is CH.

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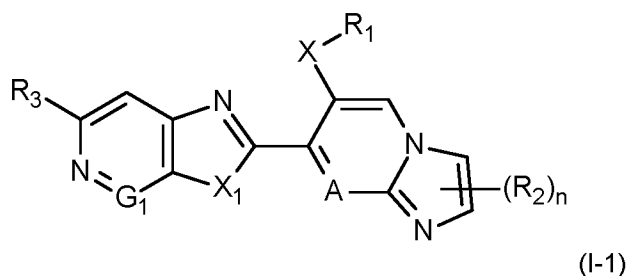
Embodiment 5 provides compounds, or an agrochemically acceptable salt, stereoisomer, enantiomer, tautomer or N-oxide thereof, according to embodiments 1, 2, or 3 with the proviso that R₂ is not C₁-C₂haloalkyl when Q is Q₄, G₁ is N and X₂ is NMe.

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Embodiment 6 provides compounds, or an agrochemically acceptable salt, stereoisomer, enantiomer, tautomer or N-oxide thereof, according to embodiments 1, 2, or 3 with the proviso that R₂ is not trifluoromethyl when Q is Q₄, G₁ is N and X₂ is NMe.

10 Embodiment 7 provides compounds, or an agrochemically acceptable salt, stereoisomer, enantiomer, tautomer or N-oxide thereof, according to embodiments 1, 2, or 3 with the proviso that the compound 2-[6-ethylsulfonyl-2-(trifluoromethyl)imidazo[1,2-a]pyridin-7-yl]-3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridine is excluded.

15 A preferred group of compounds of formula I is represented by the compounds of formula I-1



wherein A, X, R₁, R₂, R₃, n, X₁ and G₁ are as defined under formula I above.

20 In one preferred group of compounds of formula I-1, A is CH or N; X is S, SO or SO₂; R₁ is C₁-C₄alkyl; R₂ is C₁-C₄haloalkyl, halogen, cyano, aminocarbonyl, or C₁-C₂alkoxycarbonyl; R₃ is C₁-C₄haloalkyl, C₁-C₄haloalkylsulfanyl, C₁-C₄haloalkylsulfinyl, or C₁-C₄haloalkylsulfonyl; n is 0 or 1; X₁ is O or NCH₃; and G₁ is N or CH.

25 In another preferred group of compounds of formula I-1, A is CH or N; X is S or SO₂; R₁ is C₁-C₃alkyl; R₂ is C₁-C₂fluoroalkyl, halogen, cyano, aminocarbonyl, or methoxycarbonyl; R₃ is C₁-C₂fluoroalkyl, C₁-C₂fluoroalkylsulfanyl, C₁-C₂fluoroalkylsulfinyl, or C₁-C₂fluoroalkylsulfonyl; n is 0 or 1; X₁ is O or NCH₃; and G₁ is N or CH.

30 In another preferred group of compounds of formula I-1, A is CH; X is S or SO₂; R₁ is C₁-C₃alkyl; R₂ is C₁-C₂fluoroalkyl, halogen, cyano, aminocarbonyl, or methoxycarbonyl; R₃ is C₁-C₂fluoroalkyl, C₁-C₂fluoroalkylsulfanyl, C₁-C₂fluoroalkylsulfinyl, or C₁-C₂fluoroalkylsulfonyl; n is 0 or 1; X₁ is NCH₃; and G₁ is CH.

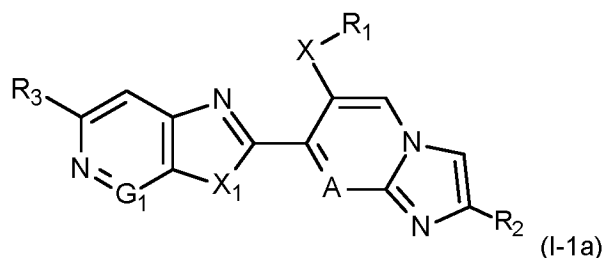
In another preferred group of compounds of formula I-1, G₁ is CH, X₁ is NMe and A is CH.

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In a further preferred group of compounds of formula I-1, R₁ is C₁-C₃alkyl; preferably ethyl, propyl, or isopropyl; R₂ is 1,1-difluoroethyl, pentafluoroethyl, trifluoromethyl, halogen, cyano, aminocarbonyl, or methoxycarbonyl; and R₃ is C₁-C₂fluoroalkyl, C₁-C₂fluoroalkylsulfanyl, C₁-C₂fluoroalkylsulfinyl, or C₁-C₂fluoroalkylsulfonyl; preferably trifluoromethyl.

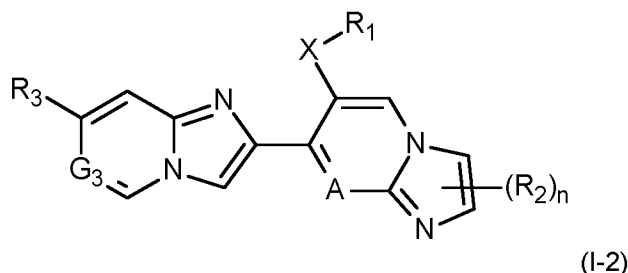
In compounds of formula I-1 and all of the preferred embodiments of compounds of formula I-1 mentioned above, unless otherwise specified, A, X, R₁, R₂, R₃, n, X₁ and G₁ are as defined under formula I above; preferably A is CH or N, more preferably A is CH; preferably R₁ is C₁-C₂alkyl, more preferably R₁ is ethyl; preferably R₂ is 1,1-difluoroethyl, pentafluoroethyl, trifluoromethyl, halogen, cyano, aminocarbonyl, or methoxycarbonyl; more preferably R₂ is pentafluoroethyl, trifluoromethyl, bromo, cyano, aminocarbonyl, or methoxycarbonyl; preferably R₃ is trifluoromethyl, pentafluoroethyl, trifluoromethylsulfanyl, trifluoromethylsulfinyl, or trifluoromethylsulfonyl; more preferably R₃ is trifluoromethyl; preferably n is 0 or 1; more preferably n is 1; preferably X₁ is O or NCH₃; more preferably X₁ is NCH₃; and preferably G₁ is N or CH; more preferably G₁ is CH.

Another preferred embodiment of the compounds of formula I-1 is represented by the formula I-1a



wherein A, X, R₁, R₂, R₃, X₁ and G₁ are as defined under formula I above or as defined under any of the preferred embodiments of the compounds of formula I-1.

Another preferred group of compounds of formula I is represented by the compounds of formula I-2



wherein A, X, R₁, R₂, R₃, n and G₃ are as defined under formula I above.

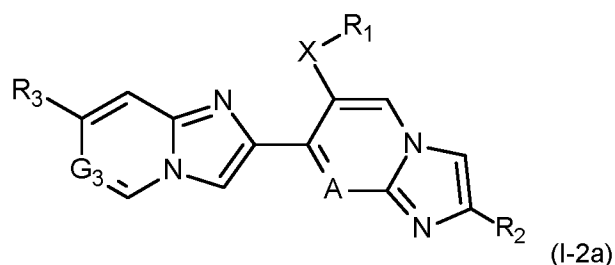
In one preferred group of compounds of formula I-2, A is CH or N; X is S, SO or SO₂; R₁ is C₁-C₄alkyl; R₂ is C₁-C₄haloalkyl, halogen or cyano; R₃ is C₁-C₄haloalkyl, C₁-C₄haloalkylsulfanyl, C₁-C₄haloalkylsulfinyl, or C₁-C₄haloalkylsulfonyl; n is 0 or 1; and G₃ is N or CH.

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In another preferred group of compounds of formula I-2, A is CH or N; X is S, SO or SO₂; R₁ is C₁-C₃alkyl; R₂ is C₁-C₂haloalkyl, halogen or cyano; R₃ is C₁-C₂haloalkyl, C₁-C₂haloalkylsulfanyl, C₁-C₂haloalkylsulfinyl, or C₁-C₂haloalkylsulfonyl; n is 0 or 1; and G₃ is N or CH.

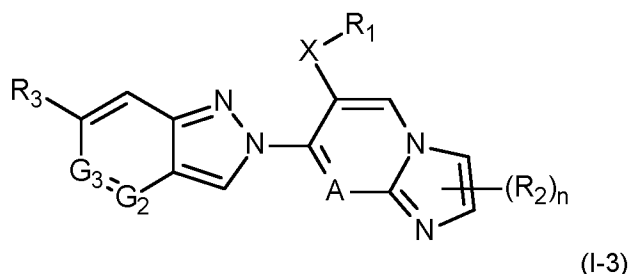
- 5 In compounds of formula I-2 and all of the preferred embodiments of compounds of formula I-2 mentioned above, unless otherwise specified, A, X, R₁, R₂, R₃, n and G₃ are as defined under formula I above; preferably A is CH or N; preferably X is S, SO or SO₂; preferably R₁ is C₁-C₂alkyl; preferably R₂ is 1,1-difluoroethyl, pentafluoroethyl, trifluoromethyl, halogen or cyano; preferably R₃ is trifluoromethyl, pentafluoroethyl, trifluoromethylsulfanyl, trifluoromethylsulfinyl, or trifluoromethylsulfonyl; preferably n is 0 or 1; more preferably n is 1; and preferably G₃ is N or CH.
- 10

Another preferred embodiment of the compounds of formula I-2 is represented by the formula I-2a



- wherein A, X, R₁, R₂, R₃ and G₃ are as defined under formula I above or as defined under any of the preferred embodiments of the compounds of formula I-2.
- 15

A further preferred group of compounds of formula I is represented by the compounds of formula I-3



wherein A, X, R₁, R₂, R₃, n, G₂ and G₃ are as defined under formula I above.

20

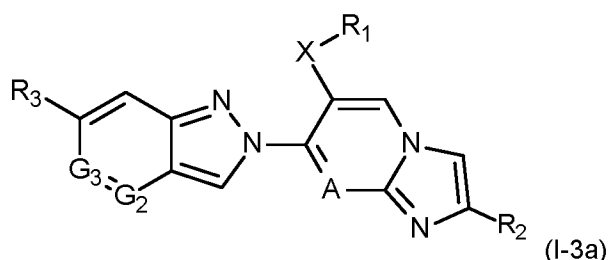
In one preferred group of compounds of formula I-3, A is CH or N; X is S, SO or SO₂; R₁ is C₁-C₄alkyl; R₂ is C₁-C₄haloalkyl, halogen or cyano; R₃ is C₁-C₄haloalkyl, C₁-C₄haloalkylsulfanyl, C₁-C₄haloalkylsulfinyl, or C₁-C₄haloalkylsulfonyl; n is 0 or 1; G₂ is N and G₃ is CH.

- 25 In another preferred group of compounds of formula I-3, A is CH or N; X is S, SO or SO₂; R₁ is C₁-C₃alkyl; R₂ is C₁-C₄haloalkyl, halogen or cyano; R₃ is C₁-C₄haloalkyl, C₁-C₄haloalkylsulfanyl, C₁-C₄haloalkylsulfinyl, or C₁-C₄haloalkylsulfonyl; n is 0 or 1; G₂ is CH and G₃ is N.

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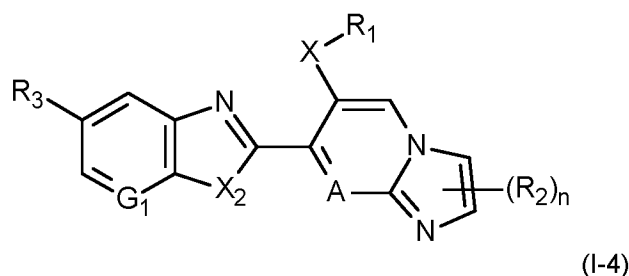
In compounds of formula I-3 and all of the preferred embodiments of compounds of formula I-3 mentioned above, unless otherwise specified, A, X, R₁, R₂, R₃, n, G₂ and G₃ are as defined under formula I above; preferably A is CH or N; X is S, SO or SO₂; preferably R₁ is C₁-C₂alkyl; preferably R₂ is 1,1-difluoroethyl, pentafluoroethyl, trifluoromethyl, halogen or cyano; preferably R₃ is trifluoromethyl, pentafluoroethyl, trifluoromethylsulfanyl, trifluoromethylsulfinyl, or trifluoromethylsulfonyl; preferably n is 0 or 1; more preferably n is 1; in one preferred embodiment G₂ is N and G₃ is CH; and in another preferred embodiment G₂ is CH and G₃ is N.

Another preferred embodiment of the compounds of formula I-3 is represented by the formula I-3a



wherein A, X, R₁, R₂, R₃, G₂ and G₃ are as defined under formula I above or as defined under any of the preferred embodiments of the compounds of formula I-3.

Another preferred group of compounds of formula I is represented by the compounds of formula I-4



wherein A, X, R₁, R₂, R₃, n, X₂ and G₁ are as defined under formula I above.

In one preferred group of compounds of formula I-4, A is CH or N; X is S, SO or SO₂; R₁ is C₁-C₄alkyl; R₂ is C₁-C₄haloalkyl, halogen, cyano; R₃ is C₁-C₄haloalkyl, C₁-C₄haloalkylsulfanyl, C₁-C₄haloalkylsulfinyl, or C₁-C₄haloalkylsulfonyl; n is 0 or 1; X₂ is O or NCH₃; and G₁ is N or CH.

In another preferred group of compounds of formula I-4, A is CH or N; X is S or SO₂; R₁ is C₁-C₃alkyl; R₂ is C₁-C₂fluoroalkyl, halogen, cyano, aminocarbonyl, or methoxycarbonyl; R₃ is C₁-C₂fluoroalkyl, C₁-C₂fluoroalkylsulfanyl, C₁-C₂fluoroalkylsulfinyl, or C₁-C₂fluoroalkylsulfonyl; n is 0 or 1; X₂ is O or NCH₃; and G₁ is N or CH.

In another preferred group of compounds of formula I-4, A is CH; X is S or SO₂; R₁ is C₁-C₃alkyl; R₂ is C₁-C₂fluoroalkyl, halogen, cyano, aminocarbonyl, or methoxycarbonyl; R₃ is C₁-C₂fluoroalkyl, C₁-

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C₂fluoroalkylsulfanyl, C₁-C₂fluoroalkylsulfinyl, or C₁-C₂fluoroalkylsulfonyl; n is 0 or 1; X₂ is NCH₃; and G₁ is CH.

5 In a further preferred group of compounds of formula I-4, R₁ is C₁-C₂alkyl; preferably ethyl; R₂ is 1,1-difluoroethyl, pentafluoroethyl, trifluoromethyl, halogen, or cyano; and R₃ is C₁-C₂fluoroalkyl, C₁-C₂fluoroalkylsulfanyl, C₁-C₂fluoroalkylsulfinyl, or C₁-C₂fluoroalkylsulfonyl; preferably trifluoromethyl.

In another preferred group of compounds of formula I-4, G₁ is CH, X₂ is NMe and A is CH.

10 In another preferred group of compounds of formula I-4, G₁ is CH, X₂ is O and A is CH.

In a further preferred group of compounds of formula I-4, G₁ is N, X₂ is NMe and A is CH.

15 In a further preferred group of compounds of formula I-4, R₂ is not C₁-C₂haloalkyl when G₁ is N, X₂ is NMe and A is CH.

In a further preferred group of compounds of formula I-4, R₂ is not trifluoromethyl when G₁ is N, X₂ is NMe and A is CH.

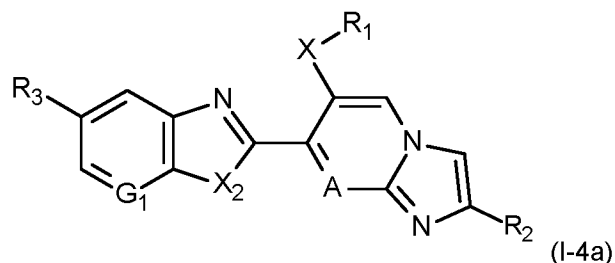
20 In a further preferred group of compounds of formula I-4, the compound 2-[6-ethylsulfonyl-2-(trifluoromethyl)imidazo[1,2-a]pyridin-7-yl]-3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridine is excluded.

25 In a further preferred group of compounds of formula I-4, the compound 2-[6-ethylsulfonyl-2-(1,1,2,2,2-pentafluoroethyl)imidazo[1,2-a]pyridin-7-yl]-3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridine is excluded.

30 In compounds of formula I-4 and all of the preferred embodiments of compounds of formula I-4 mentioned above, unless otherwise specified, A, X, R₁, R₂, R₃, n, X₂ and G₁ are as defined under formula I above; preferably A is CH or N, more preferably A is CH; preferably R₁ is ethyl; preferably R₂ is 1,1-difluoroethyl, pentafluoroethyl, trifluoromethyl, halogen, cyano, aminocarbonyl, or methoxycarbonyl; more preferably R₂ is pentafluoroethyl, trifluoromethyl, bromo, cyano, aminocarbonyl, or methoxycarbonyl; preferably R₃ is trifluoromethyl, pentafluoroethyl, trifluoromethylsulfanyl, trifluoromethylsulfinyl, or trifluoromethylsulfonyl; more preferably R₃ is trifluoromethyl; preferably n is 0 or 1; more preferably n is 1; preferably X₂ is O or NCH₃; more preferably X₂ is NCH₃; and preferably G₁ is N or CH; more preferably G₁ is CH.

Another preferred embodiment of the compounds of formula I-4 is represented by the formula I-4a

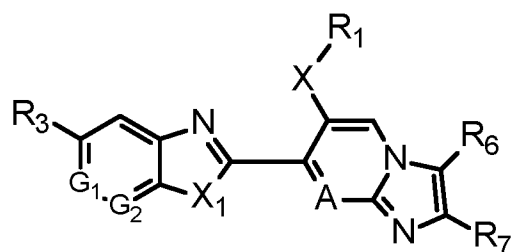
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wherein A, X, R₁, R₂, R₃, X₂ and G₁ are as defined under formula I above or as defined under any of the preferred embodiments of the compounds of formula I-4.

- 5 Another especially preferred group of compounds of formula I are those represented by the compounds of formula I-1, I-2, I-3, or I-4 wherein
- A is CH or N, preferably A is CH;
- R₁ is ethyl, propyl or isopropyl; preferably R₁ is ethyl;
- R₃ is trifluoromethyl, pentafluoroethyl, trifluoromethylsulfanyl, trifluoromethylsulfinyl, or
- 10 trifluoromethylsulfonyl; preferably R₃ is trifluoromethyl; and
- n is 0 or 1; preferably n is 1.

Another preferred group of compounds of formula I is represented by the compounds of formula I-5



15 I-5

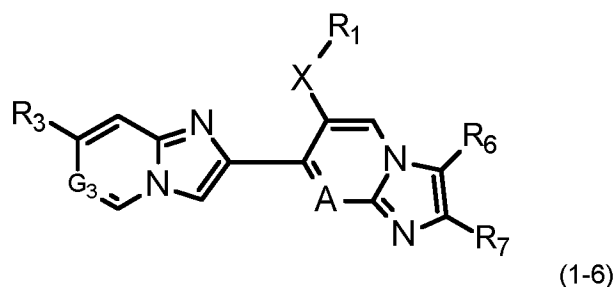
wherein

- A is CH or N;
- X is S, SO or SO₂;
- R₁ is C₁-C₄alkyl;
- 20 R₃ is C₁-C₄haloalkyl, C₁-C₄haloalkylsulfanyl, C₁-C₄haloalkylsulfinyl, or C₁-C₄haloalkylsulfonyl;
- R₆ and R₇ are, independently, hydrogen, C₁-C₄alkyl, C₁-C₄haloalkyl, halogen, cyano, aminocarbonyl, or C₁-C₂alkoxycarbonyl;
- X₁ is O or NMe; and
- G₁ and G₂ are, independently, N or CH.

25

Another preferred group of compounds of formula I is represented by the compounds of formula I-6

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wherein

A is CH or N;

X is S, SO or SO₂;

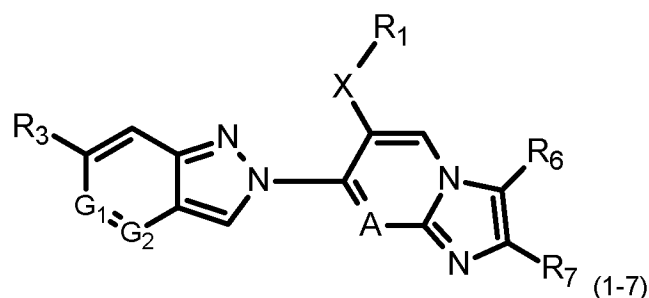
5 R₁ is C₁-C₄alkyl;

R₃ is C₁-C₄haloalkyl, C₁-C₄haloalkylsulfanyl, C₁-C₄haloalkylsulfinyl, or C₁-C₄haloalkylsulfonyl;

R₆ and R₇ are, independently, hydrogen, C₁-C₄alkyl, C₁-C₄haloalkyl, halogen, or cyano; and

G₃ is N or CH.

10 Another preferred group of compounds of formula I is represented by the compounds of formula I-7



wherein

A is CH or N;

X is S, SO or SO₂;

15 R₁ is C₁-C₄alkyl;

R₃ is C₁-C₄haloalkyl, C₁-C₄haloalkylsulfanyl, C₁-C₄haloalkylsulfinyl, or C₁-C₄haloalkylsulfonyl;

R₆ and R₇ are, independently, hydrogen, C₁-C₄alkyl, C₁-C₄haloalkyl, halogen, or cyano; and

G₁ is N and G₂ is CH, or G₁ is CH and G₂ is N.

20 Compounds according to the invention may possess any number of benefits including, inter alia, advantageous levels of biological activity for protecting plants against insects or superior properties for use as agrochemical active ingredients (for example, greater biological activity, an advantageous spectrum of activity, an increased safety profile, improved physico-chemical properties, or increased biodegradability or environmental profile). In particular, it has been surprisingly found that certain

25 compounds of formula (I) may show an advantageous safety profile with respect to non-target arthropods, in particular pollinators such as honey bees, solitary bees, and bumble bees. Most particularly, *Apis mellifera*.

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In another aspect the present invention provides a composition comprising an insecticidally, acaricidally, nematocidally or molluscicidally effective amount of a compound of formula (I), or an agrochemically acceptable salt, stereoisomer, enantiomer, tautomer or N-oxide thereof, as defined in any of the embodiments under compounds of formula (I-1), (I-2), (I-3), (I-4), (I-5), (I-6) and (I-7), and, optionally, an auxiliary or diluent.

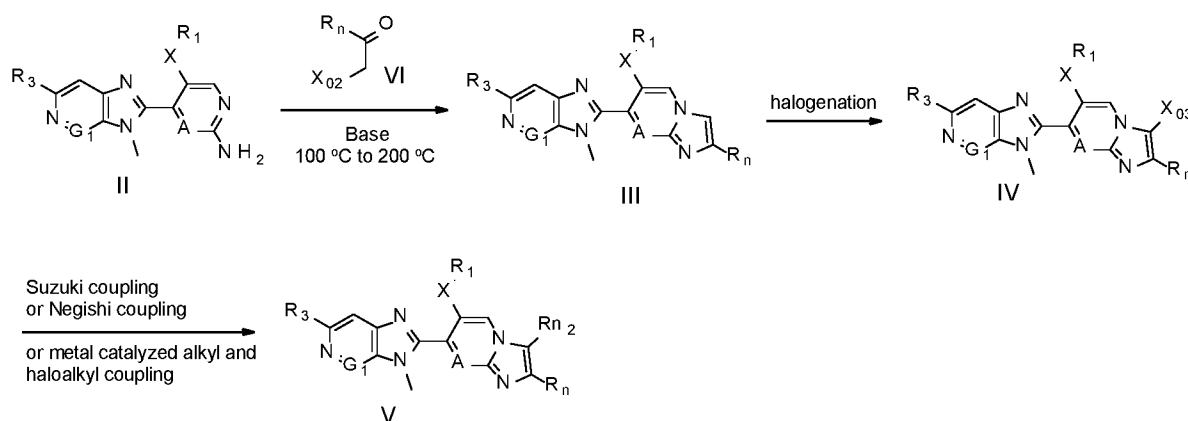
In a further aspect the present invention provides a method of combating and controlling insects, acarines, nematodes or molluscs which comprises applying to a pest, to a locus of a pest, or to a plant susceptible to attack by a pest an insecticidally, acaricidally, nematocidally or molluscicidally effective amount of a compound of formula (I), or an agrochemically acceptable salt, stereoisomer, enantiomer, tautomer or N-oxide thereof, as defined in any of the embodiments under compounds of formula (I-1), (I-2), (I-3), (I-4), (I-5), (I-6) and (I-7) (above) or a composition as defined above.

In a yet further aspect, the present invention provides a method for the protection of plant propagation material from the attack by insects, acarines, nematodes or molluscs, which comprises treating the propagation material or the site, where the propagation material is planted, with a composition as defined above.

The process according to the invention for preparing compounds of formula I is carried out by methods known to those skilled in the art.

Compounds of formula I, where Q is Q₁ may be represented by formula V or formula III, where R₁, R₃, G₁, A, X are as defined above and R_n and R_{n2} may be independently hydrogen or R₂ as defined above.

Scheme 1:

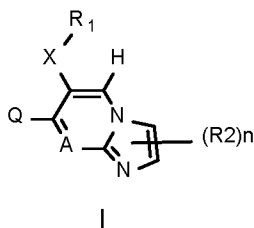


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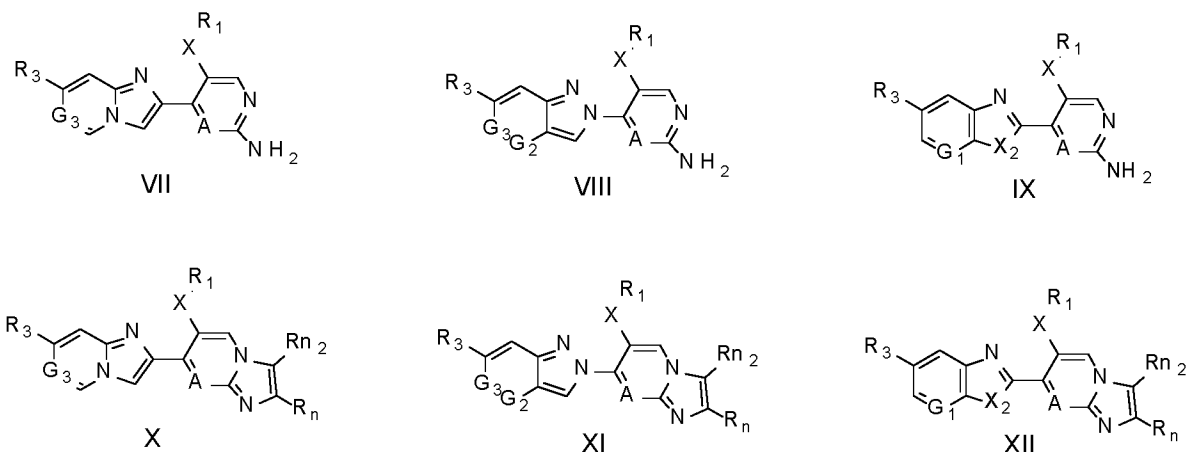
Compounds of formula V may be prepared following scheme 1. Compounds of formula V, wherein R_3 , G_1 , A, X are as defined above and R_n and R_{n2} may be independently R_2 as defined above, may be prepared from compound IV, wherein R_3 , G_1 , A, X are as defined above and R_n is R_2 as defined above and X_{03} is halogen, by reacting with compounds $R_{n2}-M_0$, wherein M_0 is a boronic acid, and R_{n2} is R_2 in the presence of a palladium catalyst. When M_0 is a boronic acid, the reaction is usually carried out in the presence of a base, for example potassium carbonate, cesium carbonate, or potassium phosphate, in an inert solvent, such as dioxane, optionally in the presence of water, with a palladium(0) catalyst, for example tetrakis(triphenylphosphine)palladium, at a temperature between 80-120°C. Such Suzuki reactions are well preceded in the literature, see for example Masuda, Naoyuki *et al*, WO 2012/133607. Halogenation of compounds of formula III, wherein R_3 , G_1 , A, X are as defined above and R_n is R_2 as defined above, with a halogenating agent such as N-chlorosuccinamide, N-bromosuccinamide, or N-iodosuccinamide, in a polar aprotic solvent such as acetonitrile or dimethylformamide, at ambient temperature, leads to compounds of formula IV wherein R_3 , G_1 , A, X are as defined above and R_n is R_2 as defined above and X_{03} is halogen. Compounds of formula III, wherein R_3 , G_1 , A, X are as defined above and R_n is R_2 as defined above, can be prepared by reacting a compound of formula II wherein R_3 , G_1 , A, X are as defined above with a compound of formula VI wherein X_{02} is a halogen or a leaving group OSO_2R_8 (wherein R_8 is phenyl, toluol, C_1 - C_4 alkyl or C_1 - C_4 haloalkyl) and R_n is R_2 as defined above, optionally in the presence of a suitable base in an inert solvent in the temperature range from 100 °C to 200 °C.

Those skilled in the art would realise that below compounds of formula I, wherein Q is Q_2 , Q_3 and Q_4 which can be represented by compounds of formula X, XI, XII respectively, wherein R_1 , R_3 , G_1 , G_2 , G_3 , A, X are as defined above and R_n and R_{n2} are independently R_2 as defined above, could be prepared analogous to above procedure as well from compounds of formula VII, VIII and IX respectively, wherein R_1 , R_3 , G_1 , G_2 , G_3 , A and X are as defined above.

Figure 1:

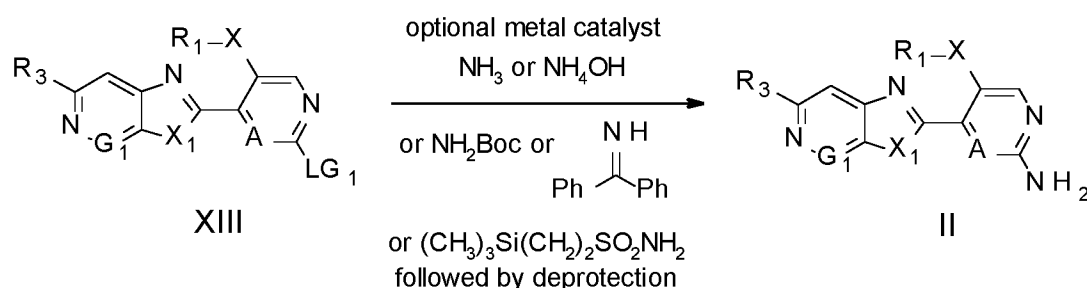


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Compounds of formula II, wherein R_1 , R_3 , G_1 , A , X , X_1 are as defined above can be prepared as shown in scheme 2:

5

Scheme 2:

by an amination reaction, which involves for example, reacting compounds of formula XIII, wherein R_3 , G_1 , A , X , X_1 are as defined above and LG_1 is a leaving group like, for example, chlorine, bromine or iodine (preferably chlorine or bromine), or an aryl- or (halo)alkyl-sulfonate such as trifluoromethanesulfonate, with amino reagents like, for example, ammonia NH_3 , or ammonia equivalent ammonium hydroxide NH_4OH , ammonium chloride NH_4Cl , ammonium acetate NH_4OAc , ammonium carbonate $(\text{NH}_4)_2\text{CO}_3$, and other NH_3 surrogates. This transformations is preferably performed in suitable solvents (or diluents) such as alcohols, amides, esters, ethers, nitriles and water, particularly preferred are methanol, ethanol, 2,2,2-trifluoroethanol, propanol, iso-propanol, N,N-dimethylformamide, N,N-dimethylacetamide, dioxane, tetrahydrofuran, dimethoxyethane, acetonitrile, ethyl acetate, water or mixtures thereof, optionally in presence of a base, at temperatures between 0-150°C, preferably at temperatures ranging from room temperature to the boiling point of the reaction mixture, optionally under microwave irradiation. This transformation may also be performed in the presence of protected ammonia source such as for example *tert*-Butyl carbamate NH_2Boc , benzophenone imine $\text{Ph}_2\text{C}=\text{NH}$, or 2-

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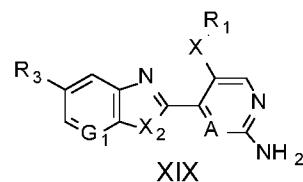
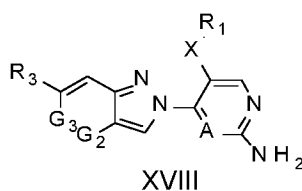
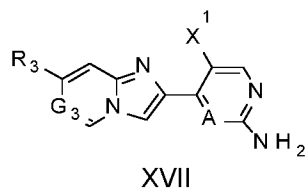
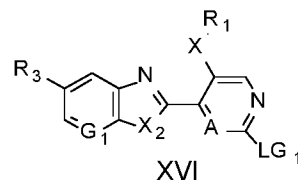
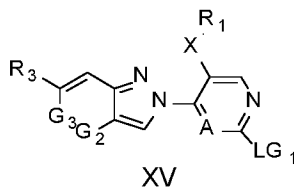
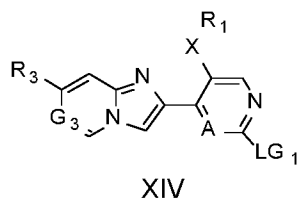
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(trimethylsilyl)ethanesulfonamide $(\text{CH}_3)_3\text{SiCH}_2\text{CH}_2\text{SO}_2\text{NH}_2$ which may be deprotected in the presence of suitable reagents. Examples of suitable deprotecting reagents include for example trifluoroacetic acid and hydrochloric acid for the deprotection of $-\text{NHBoc}$ and $-\text{N}=\text{CPh}_2$. Examples of suitable deprotecting reagents for $-\text{NHSO}_2\text{CH}_2\text{CH}_2\text{Si}(\text{CH}_3)_3$ include cesium fluoride, tetramethylammonium fluoride, tetra-*n*-butylammonium fluoride amongst others. Amination reaction to convert compounds of formula XIII, wherein R_3 , G_1 , A , X , X_1 are as defined above and LG_1 is a leaving group like, for example, chlorine, bromine or iodine (preferably chlorine or bromine), or an aryl- or (halo)alkyl-sulfonate such as trifluoromethanesulfonate, to compounds of formula II, wherein R_3 , G_1 , A , X , X_1 are as defined above may be performed optionally in the presence of suitable transition metal catalysts like, for example palladium(II) acetate $\text{Pd}(\text{OAc})_2$, tris(dibenzylideneacetone)dipalladium(0) Pd_2dba_3 , [1,1'-Bis(diphenylphosphino)ferrocene]dichloropalladium(II) $\text{Pd}(\text{dppf})\text{Cl}_2$, Palladium(π -cinnamyl) chloride dimer $[(\text{Cinnamyl})\text{PdCl}]_2$, Cu powder, copper oxide CuO or Cu_2O , copper sulfate CuSO_4 in combination with ligands for example triphenylphosphine Ph_3P , tricyclohexylphosphine PCy_3 , tri-*tert*-butylphosphine $\text{P}(t\text{-Bu})_3$, *N,N'*-Dimethylethylenediamine, or bidentate bisphosphine ligands such as 2-Diphenylphosphoryl-2'-diphenylphosphino-1,1'-biphenyl, 2,2'-Bis(diphenylphosphino)-1,1'-biphenyl amongst others. This transformations is preferably performed in suitable solvents such as alcohols, amides, esters, ethers, nitriles and water, particularly preferred are methanol, ethanol, 2,2,2-trifluoroethanol, propanol, iso-propanol, ethylene glycol, *N,N*-dimethylformamide, *N,N*-dimethylacetamide, dioxane, tetrahydrofuran, dimethoxyethane, acetonitrile, ethyl acetate, water or mixtures thereof, optionally in presence of a base, at temperatures between 0-150°C, preferably at temperatures ranging from room temperature to the boiling point of the reaction mixture, optionally under microwave irradiation. Such transformations are known in the literature and reported in *Org. Process Res. Dev.*, **2017**, 21 (9), 1447–1451, *Chem. Commun.*, **2010**, 46, 925-927, *J. Org. Chem.*, **2004**, 69 (19), 6504–6506, *Chem. Eur. J.* **2010**, 16, 1983-1991.

Those skilled in the art would realise that below compounds of formula XVII, XVIII, XIX, wherein G_1 , G_2 , G_3 , A , R_1 , R_2 , R_3 , X are as defined above, could be prepared analogous to above procedure as well from compounds of formula XIV, XV and XVI respectively, wherein G_1 , G_2 , G_3 , A , R_1 , R_2 , R_3 and X_2 are as defined above (figure 2).

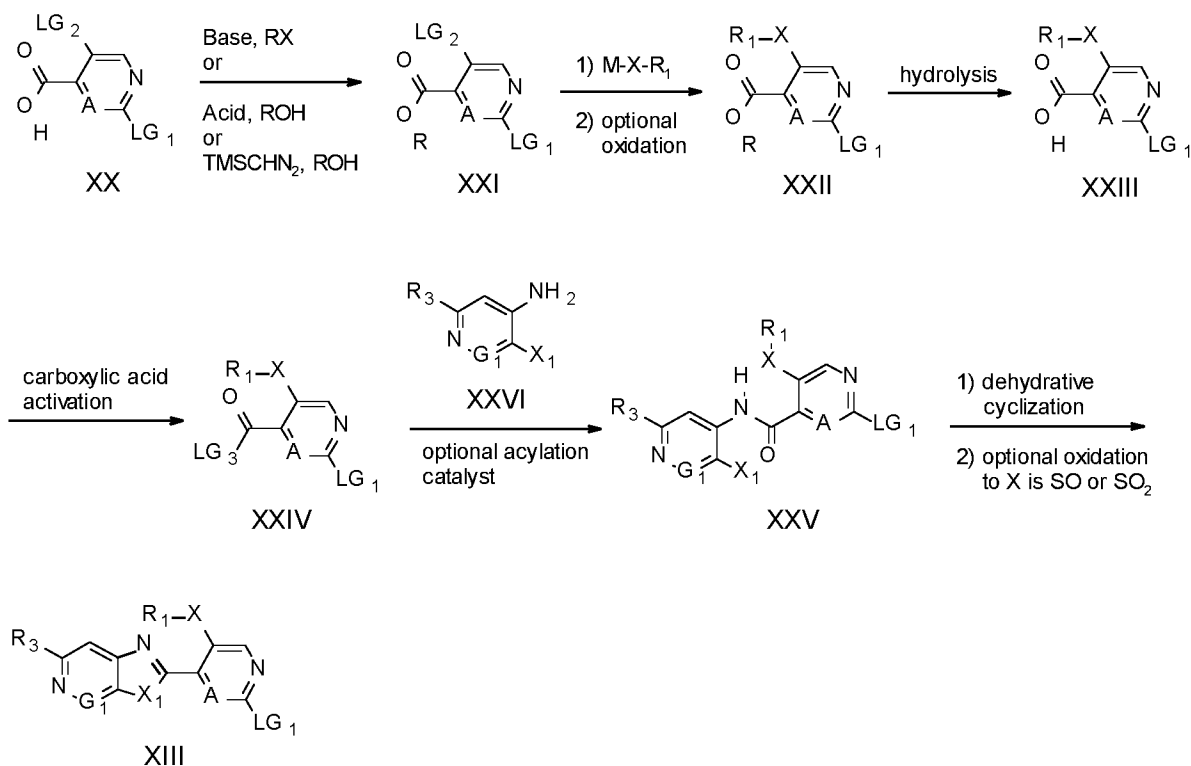
Figure 2:

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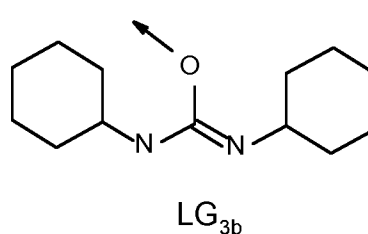
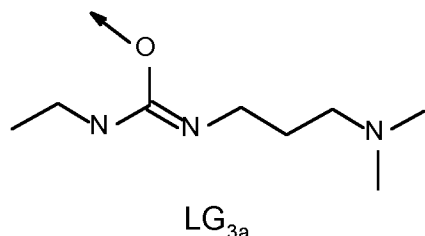
Compounds of formula XIII, wherein R_1 , R_3 , G_1 , A , X , X_1 are as defined above and LG_1 is a leaving group like, for example, chlorine, bromine or iodine (preferably chlorine or bromine), or an aryl- or (halo)alkyl-sulfonate such as trifluoromethanesulfonate, can be prepared following scheme 3. Compounds of formula XIII, wherein R_3 , G_1 , A , X , X_1 are as defined above and LG_1 is a leaving group like, for example, chlorine, bromine or iodine (preferably chlorine or bromine), or an aryl- or (halo)alkyl-sulfonate such as trifluoromethanesulfonate, can be prepared by oxidation of compounds of formula XIII, wherein R_1 , R_3 , G_1 , A , X , X_1 are as defined above and LG_1 is a leaving group like, for example, chlorine, bromine or

10 Scheme 3:



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iodine (preferably chlorine or bromine), or an aryl- or (halo)alkyl-sulfonate such as trifluoromethanesulfonate. The reaction can be performed with reagents such as a peracid, for example peracetic acid or m-chloroperbenzoic acid, or a hydroperoxide, as for example, hydrogen peroxide or tert-butylhydroperoxide, or an inorganic oxidant, such as a monoperoxo-disulfate salt or potassium permanganate. These reactions can be performed in various organic or aqueous solvents compatible to these conditions, by temperatures from below 0 °C up to the boiling point of the solvent system. Compounds of formula XIII, wherein R₁, R₃, G₁, A, X, X₁ are as defined above and LG₁ is a leaving group like, for example, chlorine, bromine or iodine (preferably chlorine or bromine), or an aryl- or (halo)alkyl-sulfonate such as trifluoromethanesulfonate, may be obtained by dehydrative cyclization, e.g. by heating the compounds in a microwave, in the presence of an acid catalyst, for example methane sulfonic acid, or *para*-toluene sulfonic acid, in an inert solvent such as N-methyl pyrrolidine at temperatures between 25-180 °C, preferably 130-170 °C. Such processes have been described previously in WO 2010125985. Alternatively, compounds of formula XXV can be converted to compounds of formula XIII (wherein X₁ is O) using triphenyl phosphine, di-isopropyl azo dicarboxylate in an inert solvent such as THF at temperatures between 25-50°C. Such Mitsunobu conditions have been previously described for such transformations (see WO2009131237). Compounds of formula XXV, wherein R₁, R₃, G₁, A, X, X₁ are as defined above and LG₁ is a leaving group like, for example, chlorine, bromine or iodine (preferably chlorine or bromine), or an aryl- or (halo)alkyl-sulfonate such as trifluoromethanesulfonate, may be prepared from compound of formula XXIII by carboxylic group activation to form compounds of formula XXIV wherein A, X are as defined above and LG₁ is a leaving group like, for example, chlorine, bromine or iodine (preferably chlorine or bromine), or an aryl- or (halo)alkyl-sulfonate such as trifluoromethanesulfonate, and LG₃ is a leaving group like, for example chlorine, bromine or iodine (preferably chlorine), and then treating with compounds of formula XXVI, wherein R₃, G₁, X₁ are as defined above, optionally in the presence of base e.g. triethylamine or pyridine. Such transformations are known to the person skilled in the art and are described in for example *Tetrahedron*, 61 (46) , 10827-10852, 2005. For example compound XIV where LG₃ is halogen are formed by treatment with for example, oxalyl chloride or thionyl chloride in the presence of catalytic quantities of DMF in inert solvents such as methylene chloride or THF at temperatures between 20 °C to 100 °C., preferably 25 °C. Alternatively, compounds of formula XXV can be prepared by treatment of compounds of formula XXIII with dicyclohexyl carbodiimide (DCC) or 1-Ethyl-3-(3-dimethylaminopropyl)carbodiimide (EDC) to give the activated species XXIV, wherein LG₃ is LG_{3a} and LG_{3b} respectively, in an inert solvent, e.g. pyridine, or THF optionally in the presence of a base, e.g. triethylamine, at temperatures between 50-180 °C.



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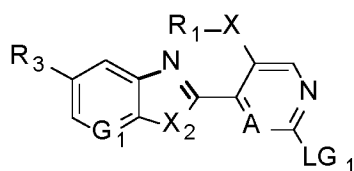
Subgroups of compounds of formula XXIII may be obtained from compound of formula XXII, wherein R_1 , X, A, are as defined in formula I above and LG_1 is a leaving group like, for example, chlorine, bromine or iodine (preferably chlorine or bromine), or an aryl- or (halo)alkyl-sulfonate such as trifluoromethanesulfonate, and R is C_1 - C_6 alkyl, C_1 - C_6 haloalkyl, or benzyl, by hydrolysis reaction employing suitable hydrolyzing agent such as for example NaOH, LiOH, KOH, amongst others.

Compound of formula XXII, wherein R_1 , A, are as defined in formula I above and X is SO or SO_2 , and LG_1 is a leaving group like, for example, chlorine, bromine or iodine (preferably chlorine or bromine), or an aryl- or (halo)alkyl-sulfonate such as trifluoromethanesulfonate, and R is C_1 - C_6 alkyl, C_1 - C_6 haloalkyl or benzyl, may be obtained from compounds of formula XXII, wherein R_1 , A, are as defined in formula I above and X is S or SO, and LG_1 is a leaving group like, for example, chlorine, bromine or iodine (preferably chlorine or bromine), or an aryl- or (halo)alkyl-sulfonate such as trifluoromethanesulfonate, and R is C_1 - C_6 alkyl, C_1 - C_6 haloalkyl, or benzyl, via oxidation reaction. The reaction as described in the synthesis of XIII in scheme 3 can be performed with reagents such as a peracid, for example peracetic acid or m-chloroperbenzoic acid, or a hydroperoxide, as for example, hydrogen peroxide or tert-butylhydroperoxide, or an inorganic oxidant, such as a monoperoxo-disulfate salt or potassium permanganate. Alternatively compounds of formula XXII may be obtained from compounds of formula XXI via nucleophilic aromatic substitution and regiocontrolled S_NAr reaction using R_1 -X-M reagents, wherein R_1 and X are as defined in formula I above and M is monovalent metal such as Na, K, Li, optionally in the presence of transition metal complexes such as palladium complex, copper complex for example $Pd(PPh_3)_4$, $Pd(OAc)_2$, Pd_2dba_3 , CuI, Cu_2O in combination with monodentate or bidentate ligands such as tricyclohexylphosphine PCy_3 , tri-tert-butylphosphine $P(t-Bu)_3$, N,N'-dimethylethylenediamine, 2-diphenylphosphoryl-2'-diphenylphosphino-1,1'-biphenyl, 2,2'-bis(diphenylphosphino)-1,1'-biphenyl amongst others. This transformations is preferably performed in suitable solvents such as alcohols, amides, esters, ethers, nitriles and water, particularly preferred are N,N-dimethylformamide, N,N-dimethylacetamide, dioxane, tetrahydrofuran, dimethoxyethane, acetonitrile, ethyl acetate, water or mixtures thereof, optionally in presence of a base, at temperatures between 0-150°C, preferably at temperatures ranging from room temperature to the boiling point of the reaction mixture, optionally under microwave irradiation. Such transformations are described for example in Synthesis 2013, 45(11), 1489-1496 and Chemistry - A European Journal, 2014, 20(39), 12584-12594. Compounds of formula XXI, wherein A is C or N, R is C_1 - C_6 alkyl, C_1 - C_6 haloalkyl, or benzyl, LG_1 and LG_2 are leaving groups like, for example, chlorine, bromine or iodine, or an aryl- or (halo)alkyl-sulfonate such as trifluoromethanesulfonate, may be prepared via esterification reactions from compounds of formula XX. Such reactions are well known to those skilled in the state of art and may performed under basic conditions in the presence of alkyl halide, haloalkyl halide or benzyl halide in the presence of suitable base such as trimethylamine, pyridine, potassium carbonate, cesium carbonate amongst others. Alternatively these reactions may be performed in the presence of acid or Lewis acids and suitable alcohols, examples of acid include HCl, H_2SO_4 , TFA, tosic acid amongst others and example of Lewis acid include Scandium triflate $Sc(OTf)_2$, $FeCl_3$, $Yb(OTf)_2$ amongst others to convert compounds of formula XX to compounds of formula XXI. These reactions have been reported

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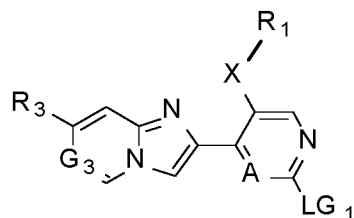
in literature for example in *Synthesis*, 2008, 3407-3410, *Chem. Commun.*, 1997, 351-352, *J. Org. Chem.*, 2006, 71, 3332-3334. Such reactions are known by the name of Fischer–Speier esterification. Alternatively transformation of compound of formula XX to compound of formula XXI may also be performed in the presence of trimethylsilyl (TMS) derivative of diazomethane and suitable alcohol reagent ROH, wherein R is C₁-C₆ alkyl, C₁-C₆ haloalkyl or benzyl. Such reactions are preferably performed in the presence of solvent or combination of solvents such as for example toluene, diethyl ether, tetrahydrofuran. Such reactions are described in *Angew. Chem. Int. Ed.* 2007, 46, 7075 –7078.

Those skilled in the art would realize that compounds of formula XXVII, wherein R₁, R₃, G₁, X₂, A, X are as defined above and LG₁ is a leaving group like, for example, chlorine, bromine or iodine (preferably chlorine or bromine), or an aryl- or (halo)alkyl-sulfonate such as trifluoromethanesulfonate, may be prepared in analogous method following the above protocol.



XXVII

The subgroup of compounds of formula XXIV, wherein R₃, G₃, A, X, R₁, are as defined above and LG₁ is a leaving group like, for example, chlorine, bromine or iodine (preferably chlorine or bromine), or an

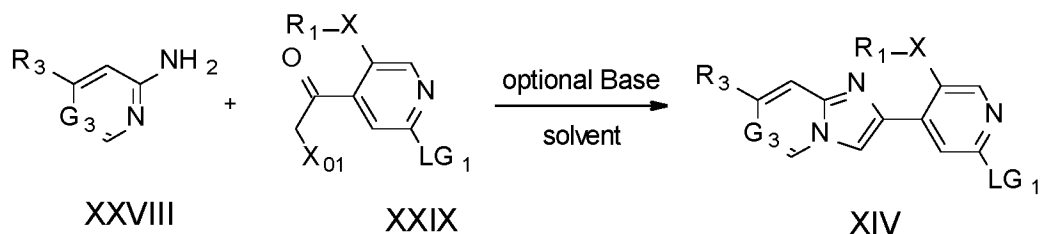


XXIV

aryl- or (halo)alkyl-sulfonate such as trifluoromethanesulfonate, can be prepared by reacting a compound of formula XXVIII wherein R₃, G₃ are as described in formula (I) with a compound of formula XXIX wherein X₀₁ is a halogen or a leaving group aryl- or (halo)alkyl-sulfonate such as trifluoromethanesulfonate, and LG₁ is a leaving group like, for example, chlorine, bromine or iodine (preferably chlorine or bromine), or an aryl- or (halo)alkyl-sulfonate such as trifluoromethanesulfonate, and A, X are as defined in formula (I), optionally in the presence of a suitable base in an inert solvent.

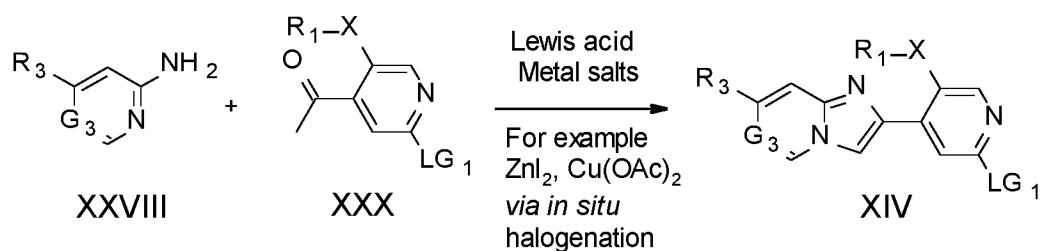
Scheme 4:-

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A further process to prepare compounds of formula XIV, involves reacting a compound of formula

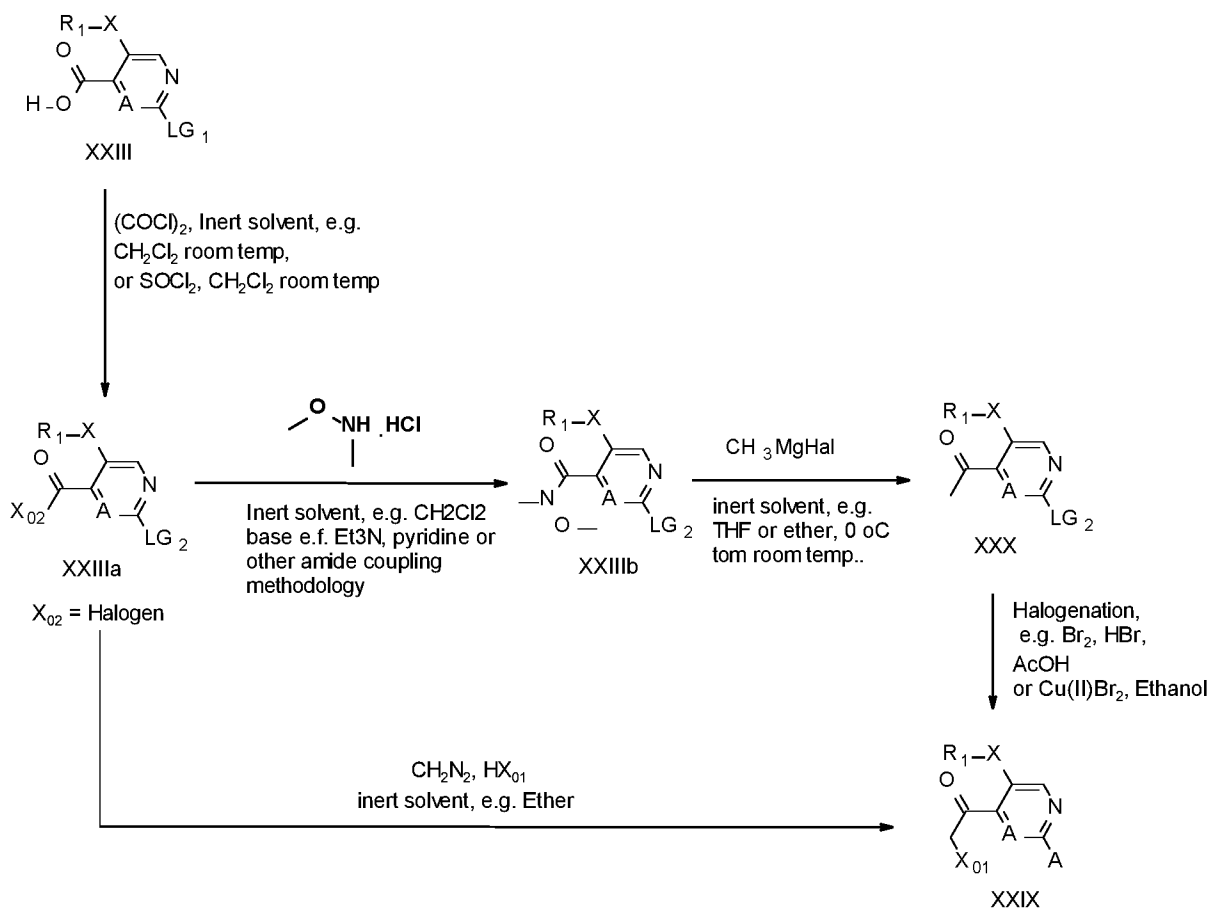
Scheme 5:-



- 5 XXVIII with a compound of XXX in the presence of a Lewis acid, such as Zinc(II)iodide or Indium(III) triflate, in an inert solvent such as chlorobenzene or 1,2-dichlorobenzene, with a catalytic copper(II) salt, such as Cu(II)acetate, under an oxygen or air atmosphere at temperatures between 100-180 °C, preferably 110-140 °C. Such reactions have previously been described in the literature (see *Adv. Synth. Catal.* **2013**, 355, 1741 – 1747, and *J. Org. Chem.*, **2013**, 78, 12494-12504).
- 10 Compounds of formula XXIX and XXX can be prepared from compounds of formula XXIII by, for example, the methods shown in scheme 6.

Scheme 6:-

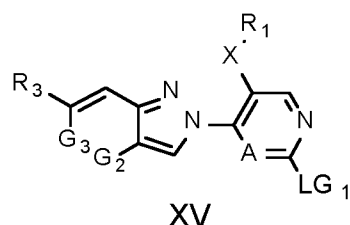
-23-



In scheme 6, an acyl halide of formula XXIIIa is converted to a Weinreb amide XXIIIb upon reaction with *N,O*-Dimethylhydroxylamine by methods known to those skilled in the art and described for example in *Synthesis* **2015**, 47, 1413–1422. The Weinreb amide of formula XXIIIb is then reacted with a Grignard reagent of formula CH₃MgHal according to the method of Weinreb (*Tetrahedron Letters* **1981**, 22, 3815-3818) to give compounds of formula XXX. Compounds of formula XXXI can be halogenated to compounds of formula XXIX, with for example mixtures of bromine and hydrobromic acid in acetic acid (as described in *Phosphorus, Sulfur and Silicon and the Related Elements*, **2013**, 188(12), 1835-1844) or with, for example, copper(II)bromide in an inert solvent, for example chloroform, ethyl acetate and the like, as described in *J. Med. Chem.*, **2013**, 56(1), 84-96. Alternatively compounds of formula XXX, can be prepared directly from compounds of formula XXIIIa by treatment with diazomethane or trimethyl silyl diazomethane and subsequent treatment with an halogen acid, for example, hydrobromic acid or hydrochloric acid in an inert solvent such as diethyl ether. Such procedures are well known in the literature, for example see *Eu. J. Med. Chem.*, **1987**, 22(5), 457-62 and WO 2009010455.

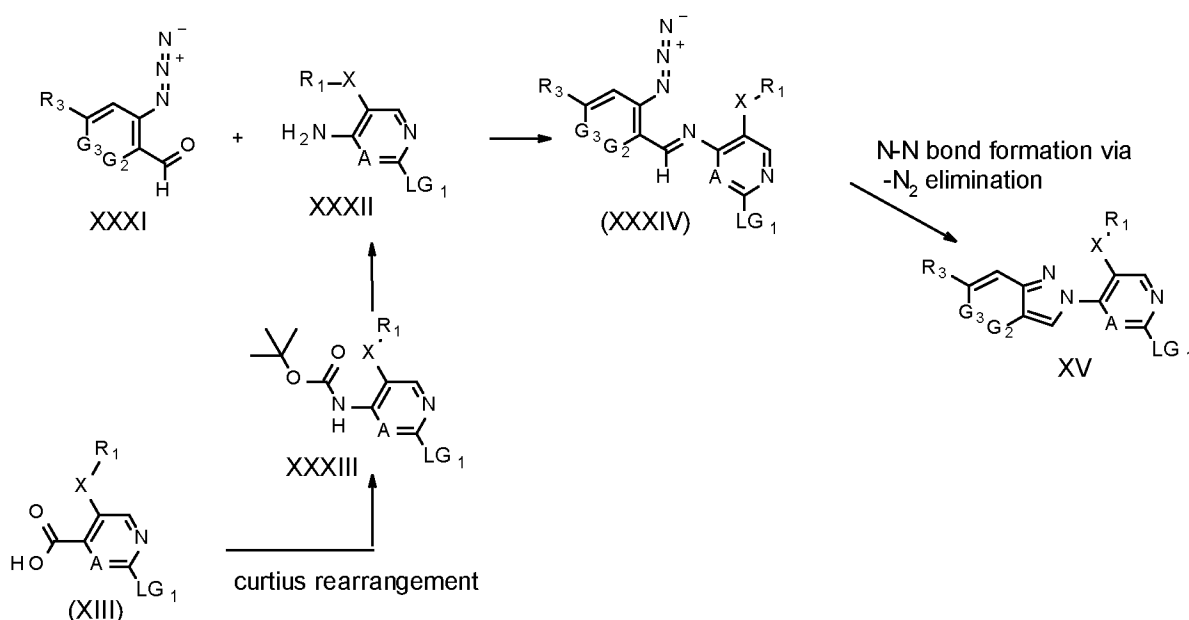
Compounds of the formula XV, wherein R₃, G₂, G₃, R₁, A, X are as defined in formula I above and LG₁

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is a leaving group like, for example, chlorine, bromine or iodine (preferably chlorine or bromine), or an aryl- or (halo)alkyl-sulfonate such as trifluoromethanesulfonate,

Scheme 7:-



may be prepared (scheme 7) via N-N bond forming reaction of azido imines of compounds of the formula (XXXIV), wherein R_3 , G_2 , G_3 , R_1 , A , X are as defined in formula I above, under pyrolytic condition which facilitates extrusion of N_2 . Alternatively, this reaction may be conducted in presence of a metal catalyst, for example a Cu(I) catalyst, such as CuI, CuBr, CuCl or CuCN, or more generally with transition metals, in combination with a ligand such as tetramethylethylenediamine, 2,2'-bipyridine or 1,10-phenanthroline. Suitable solvents may include use of e toluene, chlorobenzene, or xylene, at temperatures between room temperature and 200°C, preferably between 100 and 160°C, optionally under microwave heating conditions. Such reductive cyclisation reaction conditions were described in, for example, *Organic Letters*, **2011**, Vol. 13, No. 13, 3542–3545, US 2017/0260183,

Compounds of the formula (XXXIV), wherein R_3 , G_2 , G_3 , R_1 , A , X are as defined in formula I above, and LG_1 is a leaving group like, for example, chlorine, bromine or iodine (preferably chlorine or bromine), or

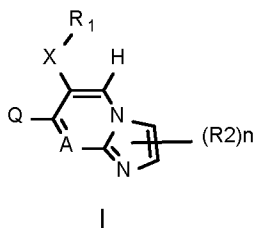
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an aryl- or (halo)alkyl-sulfonate such as trifluoromethanesulfonate, may be prepared by reaction between compounds of formula (XXXI), wherein R_3 , G_2 , G_3 are as defined in formula I, and compounds of formula (XXXII), wherein R_1 , X are as defined in formula I above and LG_1 is a leaving group like, for example, chlorine, bromine or iodine (preferably chlorine or bromine), or an aryl- or (halo)alkyl-sulfonate such as trifluoromethanesulfonate, usually upon heating at temperatures between room temperature and 200°C, preferably between 40 °C and 160°C, optionally under microwave heating conditions, in suitable solvents that may include, for example, *t*-BuOH, toluene or xylene or combinations of two or more solvents. The formation of compounds of formula (XXXIV) may require water removal, either by azeotropic distillation, or by means of a drying agent such as for example $TiCl_4$ or molecular sieves. Such formation of Schiff bases of formula (XXXIV) is known to those skilled in the art, and are described in, for example, WO 2017/134066. Compounds of formula XXXI, wherein G_2 is C, G_3 is N, R_3 is CF_3 are reported in literature with CAS 2211908-96-0 and reported in WO 2018/052136.

Compounds of the formula XXXII, may be prepared by the reaction of compound of formula XXXIII in the presence of acid such as HCl, H_2SO_4 , H_3PO_4 , HNO_3 , TFA. Such deprotection reaction of N-linked carbamate are well known to those skilled in the art and described for example in *RSC Advances*, 5(5), 3200-3205; 2015

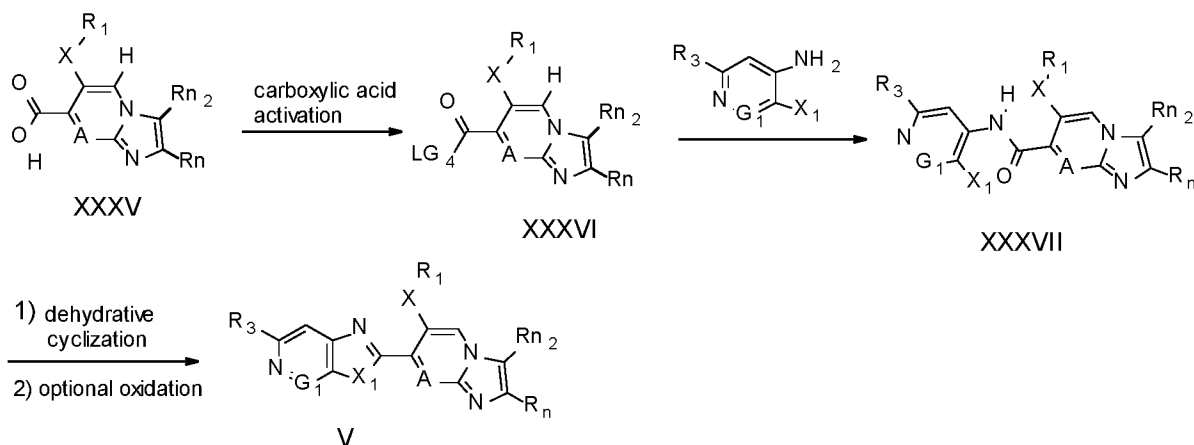
Compounds of formula XXXIII, may be prepared by the reaction of compounds of formula XIII and organo-azide or an ammonia derivatives for example NH_4OH , NH_3 , NH_2Boc in the presence of a suitable base and in the presence or absence of Lewis acids and solvent at temperatures between 50 °C and 200 °C. Examples of organo-azide include $TMSN_3$, sodium azide, diphenyl phosphoryl azide or tosyl azide and suitable solvent may be toluene, xylene, THF or acetonitrile. Example of suitable Lewis acid may include $Zn(OTf)_2$ amongst others. Such reactions of converting carboxylic acids to amines are well known to those skilled in the art by the name of Curtius rearrangement and reported in *Org. Lett.*, **2005**, 7, 4107-4110; *Journal of Medicinal Chemistry*, 49(12), 3614-3627; **2006**.

Alternatively compounds of formula I,

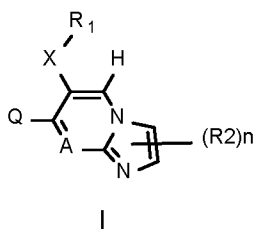


wherein Q , X , R_1 , A and R_2 are as defined above may be prepared using carboxylic acid derivative XXXV, wherein X , R_1 and R_2 are as described in formula I above. For example compound of formula I, wherein Q is Q_1 may be represented by formula V, wherein R_3 , G_1 , X_1 , X , R_1 are as described in formula I and R_{n2} and R_n are independently R_2 as defined in formula I, may be prepared following scheme 8 analogous to procedure described in scheme 3. People skilled in the state of art will realize compounds of formula I wherein Q is Q_4 may also be prepared following procedure analogous to scheme 8.

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Scheme 8:-

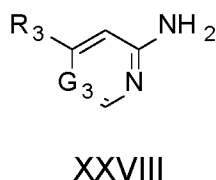
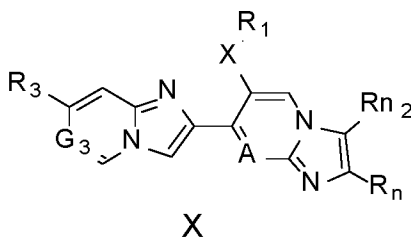
Alternatively compounds of formula I,



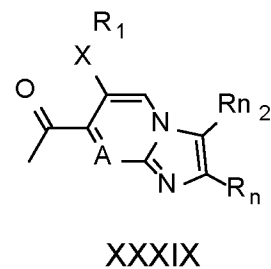
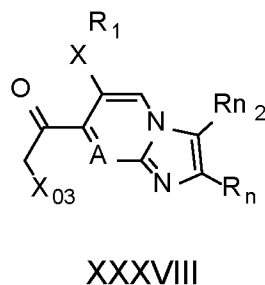
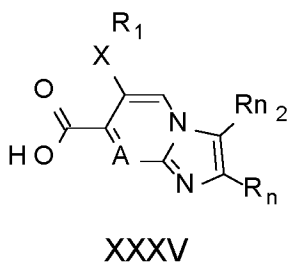
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wherein X, R₁, A and R₂ are as defined above and Q is Q₂ may be represented by compounds of formula X, wherein R₃, G₃, X, R₁, A are as define in formula I above, and R_{n2} and R_n are independently R₂ as described in formula I above, may be prepared using carboxylic acid XXXV to form either halo ketone XXXVIII or ketone XXXIX and reacting with amine XXVIII analogous to procedure described in scheme 4, scheme 5 and scheme 6.

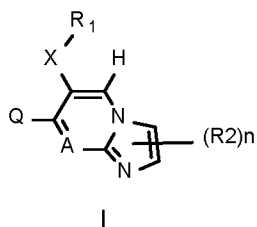
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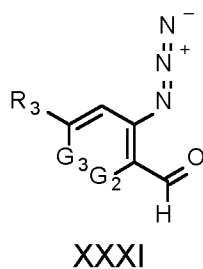
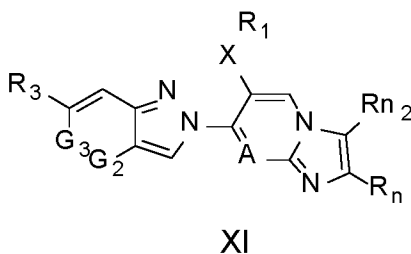
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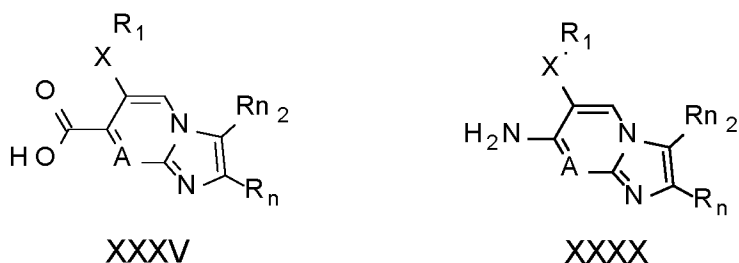
Alternatively compounds of formula I,



- 5 wherein X, R₁, A and R₂ are as defined above and Q is Q₃ may be represented by compounds of formula XI, wherein R₃, G₃, X, R₁, A are as define in formula I above, and R_{n2} and R_n are independently R₂ as described in formula I above, may be prepared using carboxylic acid XXXV and azido aldehyde XXXI analogous to procedure described in scheme 7. People skilled in the state of art will realize amine XXXX serves as a key intermediate for the synthesis of XI in this procedure.

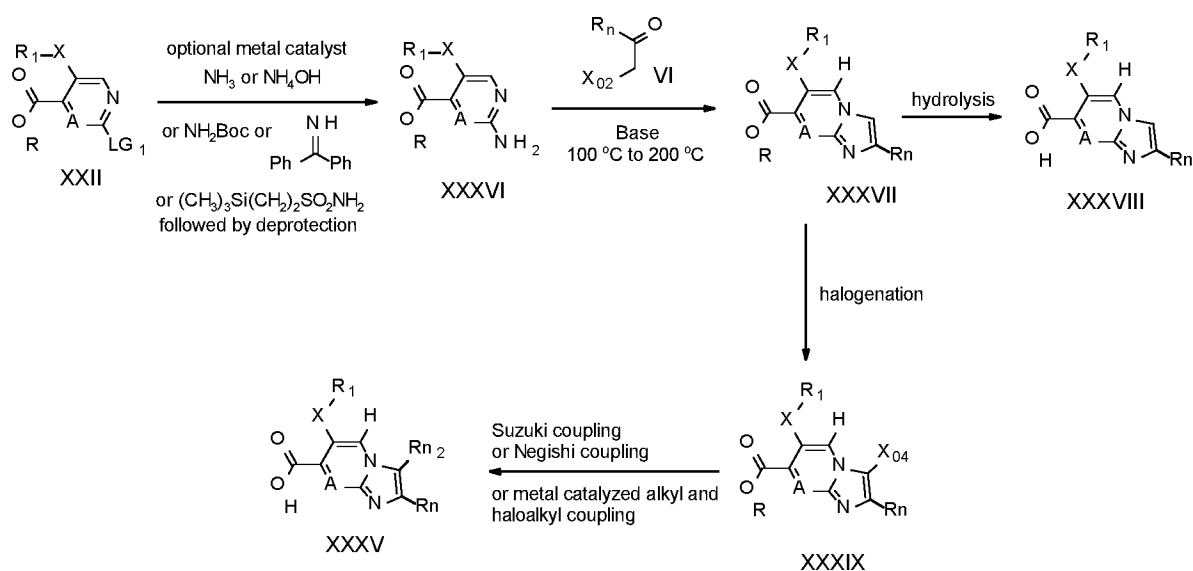


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Compounds of formula XXXV, wherein R_1 , X, A are as defined above and R_{n2} is H and R_n is R_2 as described in formula I above, may be represented by compounds of formula XXXVIII.

5 Scheme 9:-



Compounds of formula XXXVIII may be obtained from compound of formula XXXVII, wherein R_1 , X, A, are as defined in formula I above and R_n is R_2 as defined in formula I above and R is C_1 - C_6 alkyl, C_1 - C_6 haloalkyl, or benzyl, by hydrolysis reaction employing suitable hydrolyzing agent such as for example NaOH, LiOH, KOH, amongst others. Compounds of formula XXXVII may be obtained from compounds of formula XXXVI analogous to procedure described in scheme 4. Compounds of formula XXXVI may be obtained from compounds of formula XXII analogous to procedure described in scheme 2. Compounds of formula XXXV wherein R_1 , X, A are as defined in formula I above and R_n and R_{n2} are independently R_2 as described in formula I above, may be prepared from compounds of formula XXXVII analogues to procedure described in scheme 1 for the transformation of compounds of formula III to compounds of formula V.

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

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ion exchanger reagent and salts with bases are obtained by treatment with a suitable base or with a suitable ion exchanger reagent.

Salts of compounds of formula I can be converted in the customary manner into the free compounds I, acid addition salts, for example, by treatment with a suitable basic compound or with a suitable ion exchanger reagent and salts with bases, for example, by treatment with a suitable acid or with a suitable ion exchanger reagent.

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

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

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

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

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

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

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

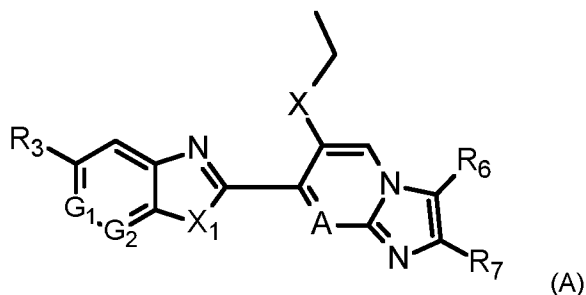
N-oxides can be prepared by reacting a compound of the formula I with a suitable oxidizing agent, for example the H_2O_2 /urea adduct in the presence of an acid anhydride, e.g. trifluoroacetic anhydride.
15 Such oxidations are known from the literature, for example from *J. Med. Chem.*, 32 (12), 2561-73, 1989 or WO 2000/15615.

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

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

The compounds according to the following Tables Z-1 to Z-240, Za-1 – Za-60, and Zb-1 – Zb30 below can be prepared according to the methods described above. The examples which follow are intended to illustrate the invention and show certain preferred compounds of formula I.

30 The tables Z below illustrate specific compounds of the invention.



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Table Z-1 provides 17 compounds Z-1.001 to Z-1.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is N, X is S, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Y: Substituent definitions of R₆ and R₇ for the compounds of formula A in tables Z:

Index	R ₇	R ₆
1	H	CF ₃
2	H	CF ₂ CF ₃
3	H	CF ₂ CH ₃
4	H	Cl
5	H	Br
6	H	I
7	H	F
8	H	CN
9	CF ₃	H
10	CF ₂ CF ₃	H
11	CF ₂ CH ₃	H
12	Cl	H
13	Br	H
14	I	H
15	F	H
16	CN	H
17	H	H

5

Table Z-2 provides 17 compounds Z-2.001 to Z-2.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is N, X is S, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-3 provides 17 compounds Z-3.001 to Z-3.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is N, X is S, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

10 Table Z-4 provides 17 compounds Z-4.001 to Z-4.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is N, X is S, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-5 provides 17 compounds Z-5.001 to Z-5.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is N, X is SO, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

15 Table Z-6 provides 17 compounds Z-6.001 to Z-6.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is N, X is SO, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-7 provides 17 compounds Z-7.001 to Z-7.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is N, X is SO, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

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Table Z-8 provides 17 compounds Z-8.001 to Z-8.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is N, X is SO, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-9 provides 17 compounds Z-9.001 to Z-9.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is N, X is SO₂, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 5 Table Z-10 provides 17 compounds Z-10.001 to Z-10.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is N, X is SO₂, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-11 provides 17 compounds Z-11.001 to Z-11.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is N, X is SO₂, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 10 Table Z-12 provides 17 compounds Z-12.001 to Z-12.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is N, X is SO₂, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-13 provides 17 compounds Z-13.001 to Z-13.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is CH, X is S, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-14 provides 17 compounds Z-14.001 to Z-14.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is CH, X is S, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 15 Table Z-15 provides 17 compounds Z-15.001 to Z-15.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is CH, X is S, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-16 provides 17 compounds Z-16.001 to Z-16.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is CH, X is S, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 20 Table Z-17 provides 17 compounds Z-17.001 to Z-17.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is CH, X is SO, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-18 provides 17 compounds Z-18.001 to Z-18.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is CH, X is SO, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-19 provides 17 compounds Z-19.001 to Z-19.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is CH, X is SO, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 25 Table Z-20 provides 17 compounds Z-20.001 to Z-20.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is CH, X is SO, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-21 provides 17 compounds Z-21.001 to Z-21.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 30 Table Z-22 provides 17 compounds Z-22.001 to Z-22.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

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Table Z-23 provides 17 compounds Z-23.001 to Z-23.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-24 provides 17 compounds Z-24.001 to Z-24.017 of formula A wherein R₃ is CF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 5 Table Z-25 provides 17 compounds Z-25.001 to Z-25.017 of formula A wherein R₃ is CF₃, X₁ is O, A is N, X is S, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-26 provides 17 compounds Z-26.001 to Z-26.017 of formula A wherein R₃ is CF₃, X₁ is O, A is N, X is S, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 10 Table Z-27 provides 17 compounds Z-27.001 to Z-27.017 of formula A wherein R₃ is CF₃, X₁ is O, A is N, X is S, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-28 provides 17 compounds Z-28.001 to Z-28.017 of formula A wherein R₃ is CF₃, X₁ is O, A is N, X is S, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-29 provides 17 compounds Z-29.001 to Z-29.017 of formula A wherein R₃ is CF₃, X₁ is O, A is N, X is SO, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 15 Table Z-30 provides 17 compounds Z-30.001 to Z-30.017 of formula A wherein R₃ is CF₃, X₁ is O, A is N, X is SO, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-31 provides 17 compounds Z-31.001 to Z-31.017 of formula A wherein R₃ is CF₃, X₁ is O, A is N, X is SO, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 20 Table Z-32 provides 17 compounds Z-32.001 to Z-32.017 of formula A wherein R₃ is CF₃, X₁ is O, A is N, X is SO, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-33 provides 17 compounds Z-33.001 to Z-33.017 of formula A wherein R₃ is CF₃, X₁ is O, A is N, X is SO₂, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-34 provides 17 compounds Z-34.001 to Z-34.017 of formula A wherein R₃ is CF₃, X₁ is O, A is N, X is SO₂, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 25 Table Z-35 provides 17 compounds Z-35.001 to Z-35.017 of formula A wherein R₃ is CF₃, X₁ is O, A is N, X is SO₂, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-36 provides 17 compounds Z-36.001 to Z-36.017 of formula A wherein R₃ is CF₃, X₁ is O, A is N, X is SO₂, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 30 Table Z-37 provides 17 compounds Z-37.001 to Z-37.017 of formula A wherein R₃ is CF₃, X₁ is O, A is CH, X is S, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

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Table Z-38 provides 17 compounds Z-38.001 to Z-38.017 of formula A wherein R_3 is CF_3 , X_1 is O, A is CH, X is S, G_1 is CH, G_2 is N and R_6 , R_7 are as defined in table Y.

Table Z-39 provides 17 compounds Z-39.001 to Z-39.017 of formula A wherein R_3 is CF_3 , X_1 is O, A is CH, X is S, G_1 is N, G_2 is CH and R_6 , R_7 are as defined in table Y.

- 5 Table Z-40 provides 17 compounds Z-40.001 to Z-40.017 of formula A wherein R_3 is CF_3 , X_1 is O, A is CH, X is S, G_1 is N, G_2 is N and R_6 , R_7 are as defined in table Y.

Table Z-41 provides 17 compounds Z-41.001 to Z-41.017 of formula A wherein R_3 is CF_3 , X_1 is O, A is CH, X is SO, G_1 is CH, G_2 is CH and R_6 , R_7 are as defined in table Y.

- 10 Table Z-42 provides 17 compounds Z-42.001 to Z-42.017 of formula A wherein R_3 is CF_3 , X_1 is O, A is CH, X is SO, G_1 is CH, G_2 is N and R_6 , R_7 are as defined in table Y.

Table Z-43 provides 17 compounds Z-43.001 to Z-43.017 of formula A wherein R_3 is CF_3 , X_1 is O, A is CH, X is SO, G_1 is N, G_2 is CH and R_6 , R_7 are as defined in table Y.

Table Z-44 provides 17 compounds Z-44.001 to Z-44.017 of formula A wherein R_3 is CF_3 , X_1 is O, A is CH, X is SO, G_1 is N, G_2 is N and R_6 , R_7 are as defined in table Y.

- 15 Table Z-45 provides 17 compounds Z-45.001 to Z-45.017 of formula A wherein R_3 is CF_3 , X_1 is O, A is CH, X is SO_2 , G_1 is CH, G_2 is CH and R_6 , R_7 are as defined in table Y.

Table Z-46 provides 17 compounds Z-46.001 to Z-46.017 of formula A wherein R_3 is CF_3 , X_1 is O, A is CH, X is SO_2 , G_1 is CH, G_2 is N and R_6 , R_7 are as defined in table Y.

- 20 Table Z-47 provides 17 compounds Z-47.001 to Z-47.017 of formula A wherein R_3 is CF_3 , X_1 is O, A is CH, X is SO_2 , G_1 is N, G_2 is CH and R_6 , R_7 are as defined in table Y.

Table Z-48 provides 17 compounds Z-48.001 to Z-48.017 of formula A wherein R_3 is CF_3 , X_1 is O, A is CH, X is SO_2 , G_1 is N, G_2 is N and R_6 , R_7 are as defined in table Y.

Table Z-49 provides 17 compounds Z-49.001 to Z-49.017 of formula A wherein R_3 is CF_2CF_3 , X_1 is NMe, A is N, X is S, G_1 is CH, G_2 is CH and R_6 , R_7 are as defined in table Y.

- 25 Table Z-50 provides 17 compounds Z-50.001 to Z-50.017 of formula A wherein R_3 is CF_2CF_3 , X_1 is NMe, A is N, X is S, G_1 is CH, G_2 is N and R_6 , R_7 are as defined in table Y.

Table Z-51 provides 17 compounds Z-51.001 to Z-51.017 of formula A wherein R_3 is CF_2CF_3 , X_1 is NMe, A is N, X is S, G_1 is N, G_2 is CH and R_6 , R_7 are as defined in table Y.

- 30 Table Z-52 provides 17 compounds Z-52.001 to Z-52.017 of formula A wherein R_3 is CF_2CF_3 , X_1 is NMe, A is N, X is S, G_1 is N, G_2 is N and R_6 , R_7 are as defined in table Y.

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Table Z-53 provides 17 compounds Z-53.001 to Z-53.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is N, X is SO, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-54 provides 17 compounds Z-54.001 to Z-54.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is N, X is SO, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 5 Table Z-55 provides 17 compounds Z-55.001 to Z-55.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is N, X is SO, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-56 provides 17 compounds Z-56.001 to Z-56.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is N, X is SO, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 10 Table Z-57 provides 17 compounds Z-57.001 to Z-57.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is N, X is SO₂, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-58 provides 17 compounds Z-58.001 to Z-58.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is N, X is SO₂, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-59 provides 17 compounds Z-59.001 to Z-59.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is N, X is SO₂, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 15 Table Z-60 provides 17 compounds Z-60.001 to Z-60.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is N, X is SO₂, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-61 provides 17 compounds Z-61.001 to Z-61.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is CH, X is S, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 20 Table Z-62 provides 17 compounds Z-62.001 to Z-62.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is CH, X is S, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-63 provides 17 compounds Z-63.001 to Z-63.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is CH, X is S, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-64 provides 17 compounds Z-64.001 to Z-64.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is CH, X is S, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 25 Table Z-65 provides 17 compounds Z-65.001 to Z-65.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is CH, X is SO, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-66 provides 17 compounds Z-66.001 to Z-66.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is CH, X is SO, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 30 Table Z-67 provides 17 compounds Z-67.001 to Z-67.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is CH, X is SO, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

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Table Z-68 provides 17 compounds Z-68.001 to Z-68.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is CH, X is SO, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-69 provides 17 compounds Z-69.001 to Z-69.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 5 Table Z-70 provides 17 compounds Z-70.001 to Z-70.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-71 provides 17 compounds Z-71.001 to Z-71.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 10 Table Z-72 provides 17 compounds Z-72.001 to Z-72.017 of formula A wherein R₃ is CF₂CF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-73 provides 17 compounds Z-73.001 to Z-73.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is N, X is S, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-74 provides 17 compounds Z-74.001 to Z-74.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is N, X is S, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 15 Table Z-75 provides 17 compounds Z-75.001 to Z-75.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is N, X is S, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-76 provides 17 compounds Z-76.001 to Z-76.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is N, X is S, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 20 Table Z-77 provides 17 compounds Z-77.001 to Z-77.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is N, X is SO, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-78 provides 17 compounds Z-78.001 to Z-78.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is N, X is SO, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-79 provides 17 compounds Z-79.001 to Z-79.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is N, X is SO, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 25 Table Z-80 provides 17 compounds Z-80.001 to Z-80.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is N, X is SO, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-81 provides 17 compounds Z-81.001 to Z-81.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is N, X is SO₂, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 30 Table Z-82 provides 17 compounds Z-82.001 to Z-82.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is N, X is SO₂, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

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Table Z-83 provides 17 compounds Z-83.001 to Z-83.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is N, X is SO₂, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-84 provides 17 compounds Z-84.001 to Z-84.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is N, X is SO₂, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 5 Table Z-85 provides 17 compounds Z-85.001 to Z-85.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is CH, X is S, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-86 provides 17 compounds Z-86.001 to Z-86.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is CH, X is S, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 10 Table Z-87 provides 17 compounds Z-87.001 to Z-87.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is CH, X is S, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-88 provides 17 compounds Z-88.001 to Z-88.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is CH, X is S, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-89 provides 17 compounds Z-89.001 to Z-89.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is CH, X is SO, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 15 Table Z-90 provides 17 compounds Z-90.001 to Z-90.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is CH, X is SO, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-91 provides 17 compounds Z-91.001 to Z-91.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is CH, X is SO, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 20 Table Z-92 provides 17 compounds Z-92.001 to Z-92.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is CH, X is SO, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-93 provides 17 compounds Z-93.001 to Z-93.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is CH, X is SO₂, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-94 provides 17 compounds Z-94.001 to Z-94.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is CH, X is SO₂, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 25 Table Z-95 provides 17 compounds Z-95.001 to Z-95.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is CH, X is SO₂, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-96 provides 17 compounds Z-96.001 to Z-96.017 of formula A wherein R₃ is CF₂CF₃, X₁ is O, A is CH, X is SO₂, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 30 Table Z-97 provides 17 compounds Z-97.001 to Z-97.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is N, X is S, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

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Table Z-98 provides 17 compounds Z-98.001 to Z-98.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is N, X is S, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-99 provides 17 compounds Z-99.001 to Z-99.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is N, X is S, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 5 Table Z-100 provides 17 compounds Z-100.001 to Z-100.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is N, X is S, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-101 provides 17 compounds Z-101.001 to Z-101.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is N, X is SO, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 10 Table Z-102 provides 17 compounds Z-102.001 to Z-102.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is N, X is SO, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-103 provides 17 compounds Z-103.001 to Z-103.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is N, X is SO, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-104 provides 17 compounds Z-104.001 to Z-104.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is N, X is SO, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 15 Table Z-105 provides 17 compounds Z-105.001 to Z-105.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is N, X is SO₂, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-106 provides 17 compounds Z-106.001 to Z-106.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is N, X is SO₂, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 20 Table Z-107 provides 17 compounds Z-107.001 to Z-107.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is N, X is SO₂, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-108 provides 17 compounds Z-108.001 to Z-108.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is N, X is SO₂, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-109 provides 17 compounds Z-109.001 to Z-109.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is CH, X is S, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 25 Table Z-110 provides 17 compounds Z-110.001 to Z-110.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is CH, X is S, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-111 provides 17 compounds Z-111.001 to Z-111.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is CH, X is S, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 30 Table Z-112 provides 17 compounds Z-112.001 to Z-112.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is CH, X is S, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

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Table Z-113 provides 17 compounds Z-113.001 to Z-113.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is CH, X is SO, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-114 provides 17 compounds Z-114.001 to Z-114.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is CH, X is SO, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 5 Table Z-115 provides 17 compounds Z-115.001 to Z-115.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is CH, X is SO, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-116 provides 17 compounds Z-116.001 to Z-116.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is CH, X is SO, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 10 Table Z-117 provides 17 compounds Z-117.001 to Z-117.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-118 provides 17 compounds Z-118.001 to Z-118.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-119 provides 17 compounds Z-119.001 to Z-119.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 15 Table Z-120 provides 17 compounds Z-120.001 to Z-120.017 of formula A wherein R₃ is SCF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-121 provides 17 compounds Z-121.001 to Z-121.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is N, X is S, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 20 Table Z-122 provides 17 compounds Z-122.001 to Z-122.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is N, X is S, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-123 provides 17 compounds Z-123.001 to Z-123.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is N, X is S, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-124 provides 17 compounds Z-124.001 to Z-124.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is N, X is S, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 25 Table Z-125 provides 17 compounds Z-125.001 to Z-125.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is N, X is SO, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-126 provides 17 compounds Z-126.001 to Z-126.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is N, X is SO, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 30 Table Z-127 provides 17 compounds Z-127.001 to Z-127.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is N, X is SO, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

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Table Z-128 provides 17 compounds Z-128.001 to Z-128.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is N, X is SO, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-129 provides 17 compounds Z-129.001 to Z-129.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is N, X is SO₂, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 5 Table Z-130 provides 17 compounds Z-130.001 to Z-130.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is N, X is SO₂, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-131 provides 17 compounds Z-131.001 to Z-131.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is N, X is SO₂, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 10 Table Z-132 provides 17 compounds Z-132.001 to Z-132.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is N, X is SO₂, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-133 provides 17 compounds Z-133.001 to Z-133.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is CH, X is S, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-134 provides 17 compounds Z-134.001 to Z-134.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is CH, X is S, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 15 Table Z-135 provides 17 compounds Z-135.001 to Z-135.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is CH, X is S, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-136 provides 17 compounds Z-136.001 to Z-136.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is CH, X is S, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 20 Table Z-137 provides 17 compounds Z-137.001 to Z-137.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is CH, X is SO, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-138 provides 17 compounds Z-138.001 to Z-138.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is CH, X is SO, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-139 provides 17 compounds Z-139.001 to Z-139.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is CH, X is SO, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 25 Table Z-140 provides 17 compounds Z-140.001 to Z-140.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is CH, X is SO, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-141 provides 17 compounds Z-141.001 to Z-141.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is CH, X is SO₂, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 30 Table Z-142 provides 17 compounds Z-142.001 to Z-142.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is CH, X is SO₂, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

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Table Z-143 provides 17 compounds Z-143.001 to Z-143.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is CH, X is SO₂, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-144 provides 17 compounds Z-144.001 to Z-144.017 of formula A wherein R₃ is SCF₃, X₁ is O, A is CH, X is SO₂, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 5 Table Z-145 provides 17 compounds Z-145.001 to Z-145.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is N, X is S, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-146 provides 17 compounds Z-146.001 to Z-146.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is N, X is S, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 10 Table Z-147 provides 17 compounds Z-147.001 to Z-147.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is N, X is S, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-148 provides 17 compounds Z-148.001 to Z-148.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is N, X is S, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-149 provides 17 compounds Z-149.001 to Z-149.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is N, X is SO, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 15 Table Z-150 provides 17 compounds Z-150.001 to Z-150.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is N, X is SO, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-151 provides 17 compounds Z-151.001 to Z-151.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is N, X is SO, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 20 Table Z-152 provides 17 compounds Z-152.001 to Z-152.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is N, X is SO, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-153 provides 17 compounds Z-153.001 to Z-153.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is N, X is SO₂, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-154 provides 17 compounds Z-154.001 to Z-154.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is N, X is SO₂, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 25 Table Z-155 provides 17 compounds Z-155.001 to Z-155.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is N, X is SO₂, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-156 provides 17 compounds Z-156.001 to Z-156.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is N, X is SO₂, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 30 Table Z-157 provides 17 compounds Z-157.001 to Z-157.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is CH, X is S, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

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Table Z-158 provides 17 compounds Z-158.001 to Z-158.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is CH, X is S, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-159 provides 17 compounds Z-159.001 to Z-159.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is CH, X is S, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 5 Table Z-160 provides 17 compounds Z-160.001 to Z-160.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is CH, X is S, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-161 provides 17 compounds Z-161.001 to Z-161.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is CH, X is SO, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 10 Table Z-162 provides 17 compounds Z-162.001 to Z-162.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is CH, X is SO, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-163 provides 17 compounds Z-163.001 to Z-163.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is CH, X is SO, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-164 provides 17 compounds Z-164.001 to Z-164.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is CH, X is SO, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 15 Table Z-165 provides 17 compounds Z-165.001 to Z-165.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-166 provides 17 compounds Z-166.001 to Z-166.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 20 Table Z-167 provides 17 compounds Z-167.001 to Z-167.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-168 provides 17 compounds Z-168.001 to Z-168.017 of formula A wherein R₃ is SOCF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-169 provides 17 compounds Z-169.001 to Z-169.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is N, X is S, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 25 Table Z-170 provides 17 compounds Z-170.001 to Z-170.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is N, X is S, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-171 provides 17 compounds Z-171.001 to Z-171.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is N, X is S, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 30 Table Z-172 provides 17 compounds Z-172.001 to Z-172.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is N, X is S, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

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Table Z-173 provides 17 compounds Z-173.001 to Z-173.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is N, X is SO, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-174 provides 17 compounds Z-174.001 to Z-174.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is N, X is SO, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 5 Table Z-175 provides 17 compounds Z-175.001 to Z-175.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is N, X is SO, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-176 provides 17 compounds Z-176.001 to Z-176.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is N, X is SO, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 10 Table Z-177 provides 17 compounds Z-177.001 to Z-177.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is N, X is SO₂, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-178 provides 17 compounds Z-178.001 to Z-178.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is N, X is SO₂, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-179 provides 17 compounds Z-179.001 to Z-179.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is N, X is SO₂, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 15 Table Z-180 provides 17 compounds Z-180.001 to Z-180.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is N, X is SO₂, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-181 provides 17 compounds Z-117.001 to Z-117.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is CH, X is S, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 20 Table Z-182 provides 17 compounds Z-182.001 to Z-182.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is CH, X is S, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-183 provides 17 compounds Z-183.001 to Z-183.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is CH, X is S, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-184 provides 17 compounds Z-184.001 to Z-184.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is CH, X is S, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 25 Table Z-185 provides 17 compounds Z-185.001 to Z-185.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is CH, X is SO, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-186 provides 17 compounds Z-186.001 to Z-186.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is CH, X is SO, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 30 Table Z-187 provides 17 compounds Z-187.001 to Z-187.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is CH, X is SO, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

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Table Z-188 provides 17 compounds Z-188.001 to Z-188.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is CH, X is SO, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-189 provides 17 compounds Z-189.001 to Z-189.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is CH, X is SO₂, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 5 Table Z-190 provides 17 compounds Z-190.001 to Z-190.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is CH, X is SO₂, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-191 provides 17 compounds Z-191.001 to Z-191.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is CH, X is SO₂, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 10 Table Z-192 provides 17 compounds Z-192.001 to Z-192.017 of formula A wherein R₃ is SOCF₃, X₁ is O, A is CH, X is SO₂, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-193 provides 17 compounds Z-193.001 to Z-193.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is N, X is S, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-194 provides 17 compounds Z-194.001 to Z-194.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is N, X is S, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 15 Table Z-195 provides 17 compounds Z-195.001 to Z-195.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is N, X is S, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-196 provides 17 compounds Z-196.001 to Z-196.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is N, X is S, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 20 Table Z-197 provides 17 compounds Z-197.001 to Z-197.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is N, X is SO, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-198 provides 17 compounds Z-198.001 to Z-198.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is N, X is SO, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-199 provides 17 compounds Z-199.001 to Z-199.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is N, X is SO, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 25 Table Z-200 provides 17 compounds Z-200.001 to Z-200.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is N, X is SO, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-201 provides 17 compounds Z-201.001 to Z-201.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is N, X is SO₂, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 30 Table Z-202 provides 17 compounds Z-202.001 to Z-202.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is N, X is SO₂, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

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Table Z-203 provides 17 compounds Z-203.001 to Z-203.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is N, X is SO₂, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-204 provides 17 compounds Z-204.001 to Z-204.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is N, X is SO₂, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 5 Table Z-205 provides 17 compounds Z-205.001 to Z-205.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is CH, X is S, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-206 provides 17 compounds Z-206.001 to Z-206.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is CH, X is S, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 10 Table Z-207 provides 17 compounds Z-207.001 to Z-207.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is CH, X is S, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-208 provides 17 compounds Z-208.001 to Z-208.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is CH, X is S, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-209 provides 17 compounds Z-209.001 to Z-209.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is CH, X is SO, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 15 Table Z-210 provides 17 compounds Z-210.001 to Z-210.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is CH, X is SO, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-211 provides 17 compounds Z-211.001 to Z-211.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is CH, X is SO, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 20 Table Z-212 provides 17 compounds Z-212.001 to Z-212.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is CH, X is SO, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-213 provides 17 compounds Z-213.001 to Z-213.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-214 provides 17 compounds Z-214.001 to Z-214.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 25 Table Z-215 provides 17 compounds Z-215.001 to Z-215.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-216 provides 17 compounds Z-216.001 to Z-216.017 of formula A wherein R₃ is SO₂CF₃, X₁ is NMe, A is CH, X is SO₂, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 30 Table Z-217 provides 17 compounds Z-217.001 to Z-217.017 of formula A wherein R₃ is SO₂CF₃, X₁ is O, A is N, X is S, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

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Table Z-218 provides 17 compounds Z-218.001 to Z-218.017 of formula A wherein R₃ is SO₂CF₃, X₁ is O, A is N, X is S, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-219 provides 17 compounds Z-219.001 to Z-219.017 of formula A wherein R₃ is SO₂CF₃, X₁ is O, A is N, X is S, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 5 Table Z-220 provides 17 compounds Z-220.001 to Z-220.017 of formula A wherein R₃ is SO₂CF₃, X₁ is O, A is N, X is S, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-221 provides 17 compounds Z-221.001 to Z-221.017 of formula A wherein R₃ is SO₂CF₃, X₁ is O, A is N, X is SO, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 10 Table Z-222 provides 17 compounds Z-222.001 to Z-222.017 of formula A wherein R₃ is SO₂CF₃, X₁ is O, A is N, X is SO, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-223 provides 17 compounds Z-223.001 to Z-223.017 of formula A wherein R₃ is SO₂CF₃, X₁ is O, A is N, X is SO, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-224 provides 17 compounds Z-224.001 to Z-224.017 of formula A wherein R₃ is SO₂CF₃, X₁ is O, A is N, X is SO, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

- 15 Table Z-225 provides 17 compounds Z-225.001 to Z-225.017 of formula A wherein R₃ is SO₂CF₃, X₁ is O, A is N, X is SO₂, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-226 provides 17 compounds Z-226.001 to Z-226.017 of formula A wherein R₃ is SO₂CF₃, X₁ is O, A is N, X is SO₂, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

- 20 Table Z-227 provides 17 compounds Z-227.001 to Z-227.017 of formula A wherein R₃ is SO₂CF₃, X₁ is O, A is N, X is SO₂, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

Table Z-228 provides 17 compounds Z-228.001 to Z-228.017 of formula A wherein R₃ is SO₂CF₃, X₁ is O, A is N, X is SO₂, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-229 provides 17 compounds Z-229.001 to Z-229.017 of formula A wherein R₃ is SO₂CF₃, X₁ is O, A is CH, X is S, G₁ is CH, G₂ is CH and R₆, R₇ are as defined in table Y.

- 25 Table Z-230 provides 17 compounds Z-230.001 to Z-230.017 of formula A wherein R₃ is SO₂CF₃, X₁ is O, A is CH, X is S, G₁ is CH, G₂ is N and R₆, R₇ are as defined in table Y.

Table Z-231 provides 17 compounds Z-231.001 to Z-231.017 of formula A wherein R₃ is SO₂CF₃, X₁ is O, A is CH, X is S, G₁ is N, G₂ is CH and R₆, R₇ are as defined in table Y.

- 30 Table Z-232 provides 17 compounds Z-232.001 to Z-232.017 of formula A wherein R₃ is SO₂CF₃, X₁ is O, A is CH, X is S, G₁ is N, G₂ is N and R₆, R₇ are as defined in table Y.

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Table Z-233 provides 17 compounds Z-233.001 to Z-233.017 of formula A wherein R_3 is SO_2CF_3 , X_1 is O, A is CH, X is SO, G_1 is CH, G_2 is CH and R_6 , R_7 are as defined in table Y.

Table Z-234 provides 17 compounds Z-234.001 to Z-234.017 of formula A wherein R_3 is SO_2CF_3 , X_1 is O, A is CH, X is SO, G_1 is CH, G_2 is N and R_6 , R_7 are as defined in table Y.

- 5 Table Z-235 provides 17 compounds Z-235.001 to Z-235.017 of formula A wherein R_3 is SO_2CF_3 , X_1 is O, A is CH, X is SO, G_1 is N, G_2 is CH and R_6 , R_7 are as defined in table Y.

Table Z-236 provides 17 compounds Z-236.001 to Z-236.017 of formula A wherein R_3 is SO_2CF_3 , X_1 is O, A is CH, X is SO, G_1 is N, G_2 is N and R_6 , R_7 are as defined in table Y.

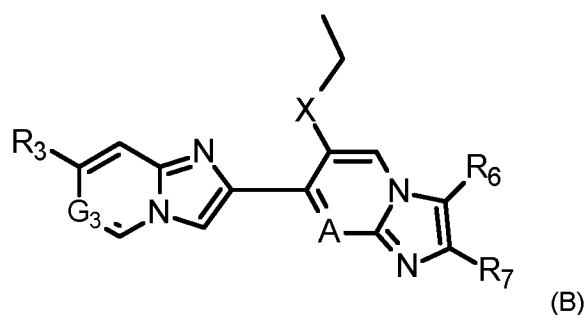
- 10 Table Z-237 provides 17 compounds Z-237.001 to Z-237.017 of formula A wherein R_3 is SO_2CF_3 , X_1 is O, A is CH, X is SO_2 , G_1 is CH, G_2 is CH and R_6 , R_7 are as defined in table Y.

Table Z-238 provides 17 compounds Z-238.001 to Z-238.017 of formula A wherein R_3 is SO_2CF_3 , X_1 is O, A is CH, X is SO_2 , G_1 is CH, G_2 is N and R_6 , R_7 are as defined in table Y.

Table Z-239 provides 17 compounds Z-239.001 to Z-239.017 of formula A wherein R_3 is SO_2CF_3 , X_1 is O, A is CH, X is SO_2 , G_1 is N, G_2 is CH and R_6 , R_7 are as defined in table Y.

- 15 Table Z-240 provides 17 compounds Z-240.001 to Z-240.017 of formula A wherein R_3 is SO_2CF_3 , X_1 is O, A is CH, X is SO_2 , G_1 is N, G_2 is N and R_6 , R_7 are as defined in table Y.

The tables Za below illustrate further specific compounds of the invention.



- 20 Table Za-1 provides 17 compounds Za-1.001 to Za-1.017 of formula B wherein R_3 is CF_3 , A is CH, X is S, G_3 is CH and R_6 , R_7 are as defined in table X.

Table X: Substituent definitions of R_6 and R_7 for the compounds of formula B in tables Za

Index	R_7	R_6
1	H	CF_3
2	H	CF_2CF_3
3	H	CF_2CH_3
4	H	Cl

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5	H	Br
6	H	I
7	H	F
8	H	CN
9	CF ₃	H
10	CF ₂ CF ₃	H
11	CF ₂ CH ₃	H
12	Cl	H
13	Br	H
14	I	H
15	F	H
16	CN	H
17	H	H

Table Za-2 provides 17 compounds Za-2.001 to Za-2.017 of formula B wherein R₃ is CF₃, A is CH, X is S, G₃ is N and R₆, R₇ are as defined in table X.

Table Za-3 provides 17 compounds Za-3.001 to Za-3.017 of formula B wherein R₃ is CF₃, A is CH, X is SO, G₃ is CH and R₆, R₇ are as defined in table X.

Table Za-4 provides 17 compounds Za-4.001 to Za-4.017 of formula B wherein R₃ is CF₃, A is CH, X is SO, G₃ is N and R₆, R₇ are as defined in table X.

Table Za-5 provides 17 compounds Za-5.001 to Za-5.017 of formula B wherein R₃ is CF₃, A is CH, X is SO₂, G₃ is CH and R₆, R₇ are as defined in table X.

Table Za-6 provides 17 compounds Za-6.001 to Za-6.017 of formula B wherein R₃ is CF₃, A is CH, X is SO₂, G₃ is N and R₆, R₇ are as defined in table X.

Table Za-7 provides 17 compounds Za-7.001 to Za-7.017 of formula B wherein R₃ is CF₃, A is N, X is S, G₃ is CH and R₆, R₇ are as defined in table X.

Table Za-8 provides 17 compounds Za-8.001 to Za-8.017 of formula B wherein R₃ is CF₃, A is N, X is S, G₃ is N and R₆, R₇ are as defined in table X.

Table Za-9 provides 17 compounds Za-9.001 to Za-9.017 of formula B wherein R₃ is CF₃, A is N, X is SO, G₃ is CH and R₆, R₇ are as defined in table X.

Table Za-10 provides 17 compounds Za-10.001 to Za-10.017 of formula B wherein R₃ is CF₃, A is N, X is SO, G₃ is N and R₆, R₇ are as defined in table X.

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Table Za-11 provides 17 compounds Za-11.001 to Za-11.017 of formula B wherein R₃ is CF₃, A is N, X is SO₂, G₃ is CH and R₆, R₇ are as defined in table X.

Table Za-12 provides 17 compounds Za-12.001 to Za-12.017 of formula B wherein R₃ is CF₃, A is N, X is SO₂, G₃ is N and R₆, R₇ are as defined in table X.

- 5 Table Za-13 provides 17 compounds Za-13.001 to Za-13.017 of formula B wherein R₃ is CF₂CF₃, A is CH, X is S, G₃ is CH and R₆, R₇ are as defined in table X.

Table Za-14 provides 17 compounds Za-14.001 to Za-14.017 of formula B wherein R₃ is CF₂CF₃, A is CH, X is S, G₃ is N and R₆, R₇ are as defined in table X.

- 10 Table Za-15 provides 17 compounds Za-15.001 to Za-15.017 of formula B wherein R₃ is CF₂CF₃, A is CH, X is SO, G₃ is CH and R₆, R₇ are as defined in table X.

Table Za-16 provides 17 compounds Za-16.001 to Za-16.017 of formula B wherein R₃ is CF₂CF₃, A is CH, X is SO, G₃ is N and R₆, R₇ are as defined in table X.

Table Za-17 provides 17 compounds Za-17.001 to Za-17.017 of formula B wherein R₃ is CF₂CF₃, A is CH, X is SO₂, G₃ is CH and R₆, R₇ are as defined in table X.

- 15 Table Za-18 provides 17 compounds Za-18.001 to Za-18.017 of formula B wherein R₃ is CF₂CF₃, A is CH, X is SO₂, G₃ is N and R₆, R₇ are as defined in table X.

Table Za-19 provides 17 compounds Za-19.001 to Za-19.017 of formula B wherein R₃ is CF₂CF₃, A is N, X is S, G₃ is CH and R₆, R₇ are as defined in table X.

- 20 Table Za-20 provides 17 compounds Za-20.001 to Za-20.017 of formula B wherein R₃ is CF₂CF₃, A is N, X is S, G₃ is N and R₆, R₇ are as defined in table X.

Table Za-21 provides 17 compounds Za-21.001 to Za-21.017 of formula B wherein R₃ is CF₂CF₃, A is N, X is SO, G₃ is CH and R₆, R₇ are as defined in table X.

Table Za-22 provides 17 compounds Za-22.001 to Za-22.017 of formula B wherein R₃ is CF₂CF₃, A is N, X is SO, G₃ is N and R₆, R₇ are as defined in table X.

- 25 Table Za-23 provides 17 compounds Za-23.001 to Za-23.017 of formula B wherein R₃ is CF₂CF₃, A is N, X is SO₂, G₃ is CH and R₆, R₇ are as defined in table X.

Table Za-24 provides 17 compounds Za-24.001 to Za-24.017 of formula B wherein R₃ is CF₂CF₃, A is N, X is SO₂, G₃ is N and R₆, R₇ are as defined in table X.

- 30 Table Za-25 provides 17 compounds Za-25.001 to Za-25.017 of formula B wherein R₃ is SCF₃, A is CH, X is S, G₃ is CH and R₆, R₇ are as defined in table X.

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Table Za-26 provides 17 compounds Za-26.001 to Za-26.017 of formula B wherein R_3 is SCF_3 , A is CH, X is S, G_3 is N and R_6 , R_7 are as defined in table X.

Table Za-27 provides 17 compounds Za-27.001 to Za-27.017 of formula B wherein R_3 is SCF_3 , A is CH, X is SO, G_3 is CH and R_6 , R_7 are as defined in table X.

- 5 Table Za-28 provides 17 compounds Za-28.001 to Za-28.017 of formula B wherein R_3 is SCF_3 , A is CH, X is SO, G_3 is N and R_6 , R_7 are as defined in table X.

Table Za-29 provides 17 compounds Za-29.001 to Za-29.017 of formula B wherein R_3 is SCF_3 , A is CH, X is SO_2 , G_3 is CH and R_6 , R_7 are as defined in table X.

- 10 Table Za-30 provides 17 compounds Za-30.001 to Za-30.017 of formula B wherein R_3 is SCF_3 , A is CH, X is SO_2 , G_3 is N and R_6 , R_7 are as defined in table X.

Table Za-31 provides 17 compounds Za-31.001 to Za-31.017 of formula B wherein R_3 is SCF_3 , A is N, X is S, G_3 is CH and R_6 , R_7 are as defined in table X.

Table Za-32 provides 17 compounds Za-32.001 to Za-32.017 of formula B wherein R_3 is SCF_3 , A is N, X is S, G_3 is N and R_6 , R_7 are as defined in table X.

- 15 Table Za-33 provides 17 compounds Za-33.001 to Za-33.017 of formula B wherein R_3 is SCF_3 , A is N, X is SO, G_3 is CH and R_6 , R_7 are as defined in table X.

Table Za-34 provides 17 compounds Za-34.001 to Za-34.017 of formula B wherein R_3 is SCF_3 , A is N, X is SO, G_3 is N and R_6 , R_7 are as defined in table X.

- 20 Table Za-35 provides 17 compounds Za-35.001 to Za-35.017 of formula B wherein R_3 is SCF_3 , A is N, X is SO_2 , G_3 is CH and R_6 , R_7 are as defined in table X.

Table Za-36 provides 17 compounds Za-36.001 to Za-36.017 of formula B wherein R_3 is SCF_3 , A is N, X is SO_2 , G_3 is N and R_6 , R_7 are as defined in table X.

Table Za-37 provides 17 compounds Za-37.001 to Za-37.017 of formula B wherein R_3 is $SOCF_3$, A is CH, X is S, G_3 is CH and R_6 , R_7 are as defined in table X.

- 25 Table Za-38 provides 17 compounds Za-38.001 to Za-38.017 of formula B wherein R_3 is $SOCF_3$, A is CH, X is S, G_3 is N and R_6 , R_7 are as defined in table X.

Table Za-39 provides 17 compounds Za-39.001 to Za-39.017 of formula B wherein R_3 is $SOCF_3$, A is CH, X is SO, G_3 is CH and R_6 , R_7 are as defined in table X.

- 30 Table Za-40 provides 17 compounds Za-40.001 to Za-40.017 of formula B wherein R_3 is $SOCF_3$, A is CH, X is SO, G_3 is N and R_6 , R_7 are as defined in table X.

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Table Za-41 provides 17 compounds Za-41.001 to Za-41.017 of formula B wherein R_3 is SOCF_3 , A is CH, X is SO_2 , G_3 is CH and R_6 , R_7 are as defined in table X.

Table Za-42 provides 17 compounds Za-42.001 to Za-42.017 of formula B wherein R_3 is SOCF_3 , A is CH, X is SO_2 , G_3 is N and R_6 , R_7 are as defined in table X.

- 5 Table Za-43 provides 17 compounds Za-43.001 to Za-43.017 of formula B wherein R_3 is SOCF_3 , A is N, X is S, G_3 is CH and R_6 , R_7 are as defined in table X.

Table Za-44 provides 17 compounds Za-44.001 to Za-44.017 of formula B wherein R_3 is SOCF_3 , A is N, X is S, G_3 is N and R_6 , R_7 are as defined in table X.

- 10 Table Za-45 provides 17 compounds Za-45.001 to Za-45.017 of formula B wherein R_3 is SOCF_3 , A is N, X is SO, G_3 is CH and R_6 , R_7 are as defined in table X.

Table Za-46 provides 17 compounds Za-46.001 to Za-46.017 of formula B wherein R_3 is SOCF_3 , A is N, X is SO, G_3 is N and R_6 , R_7 are as defined in table X.

Table Za-47 provides 17 compounds Za-47.001 to Za-47.017 of formula B wherein R_3 is SOCF_3 , A is N, X is SO_2 , G_3 is CH and R_6 , R_7 are as defined in table X.

- 15 Table Za-48 provides 17 compounds Za-48.001 to Za-48.017 of formula B wherein R_3 is SOCF_3 , A is N, X is SO_2 , G_3 is N and R_6 , R_7 are as defined in table X.

Table Za-49 provides 17 compounds Za-49.001 to Za-49.017 of formula B wherein R_3 is SO_2CF_3 , A is CH, X is S, G_3 is CH and R_6 , R_7 are as defined in table X.

- 20 Table Za-50 provides 17 compounds Za-50.001 to Za-50.017 of formula B wherein R_3 is SO_2CF_3 , A is CH, X is S, G_3 is N and R_6 , R_7 are as defined in table X.

Table Za-51 provides 17 compounds Za-51.001 to Za-51.017 of formula B wherein R_3 is SO_2CF_3 , A is CH, X is SO, G_3 is CH and R_6 , R_7 are as defined in table X.

Table Za-52 provides 17 compounds Za-52.001 to Za-52.017 of formula B wherein R_3 is SO_2CF_3 , A is CH, X is SO, G_3 is N and R_6 , R_7 are as defined in table X.

- 25 Table Za-53 provides 17 compounds Za-53.001 to Za-53.017 of formula B wherein R_3 is SO_2CF_3 , A is CH, X is SO_2 , G_3 is CH and R_6 , R_7 are as defined in table X.

Table Za-54 provides 17 compounds Za-54.001 to Za-54.017 of formula B wherein R_3 is SO_2CF_3 , A is CH, X is SO_2 , G_3 is N and R_6 , R_7 are as defined in table X.

- 30 Table Za-55 provides 17 compounds Za-55.001 to Za-55.017 of formula B wherein R_3 is SO_2CF_3 , A is N, X is S, G_3 is CH and R_6 , R_7 are as defined in table X.

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Table Za-56 provides 17 compounds Za-56.001 to Za-56.017 of formula B wherein R_3 is SO_2CF_3 , A is N, X is S, G_3 is N and R_6 , R_7 are as defined in table X.

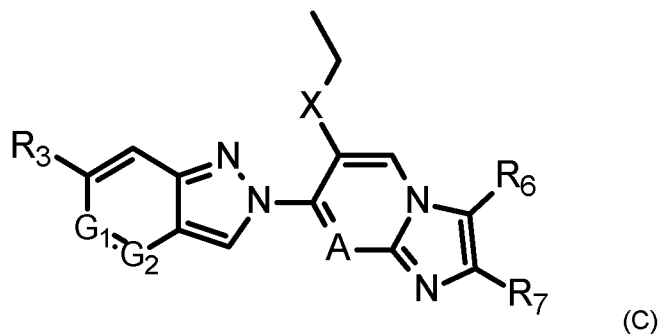
Table Za-57 provides 17 compounds Za-57.001 to Za-57.017 of formula B wherein R_3 is SO_2CF_3 , A is N, X is SO, G_3 is CH and R_6 , R_7 are as defined in table X.

- 5 Table Za-58 provides 17 compounds Za-58.001 to Za-58.017 of formula B wherein R_3 is SO_2CF_3 , A is N, X is SO, G_3 is N and R_6 , R_7 are as defined in table X.

Table Za-59 provides 17 compounds Za-59.001 to Za-59.017 of formula B wherein R_3 is SO_2CF_3 , A is N, X is SO_2 , G_3 is CH and R_6 , R_7 are as defined in table X.

- 10 Table Za-60 provides 17 compounds Za-60.001 to Za-60.017 of formula B wherein R_3 is SO_2CF_3 , A is N, X is SO_2 , G_3 is N and R_6 , R_7 are as defined in table X.

The tables Zb below illustrate further specific compounds of the invention.



- 15 Table Zb-1 provides 34 compounds Zb-1.001 to Zb-1.34 of formula C wherein R_3 is CF_3 , A is CH, X is S and R_6 , R_7 , G_1 , G_2 are as defined in table W.

Table W:

Substituent definitions of R_6 , R_7 , G_1 and G_2 for the compounds of formula C in tables Zb

Index	R_7	G_1	G_2	R_6
1	H	CH	N	CF_3
2	H	N	CH	CF_3
3	H	CH	N	CF_2CF_3
4	H	N	CH	CF_2CF_3
5	H	CH	N	CF_2CH_3
6	H	N	CH	CF_2CH_3
7	H	CH	N	Cl
8	H	N	CH	Cl
9	H	CH	N	Br

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10	H	N	CH	Br
11	H	CH	N	I
12	H	N	CH	I
13	H	CH	N	F
14	H	N	CH	F
15	H	CH	N	CN
16	H	N	CH	CN
17	CF ₃	CH	N	H
18	CF ₃	N	CH	H
19	CF ₂ CF ₃	CH	N	H
20	CF ₂ CF ₃	N	CH	H
21	CF ₂ CH ₃	CH	N	H
22	CF ₂ CH ₃	N	CH	H
23	Cl	CH	N	H
24	Cl	N	CH	H
25	Br	CH	N	H
26	Br	N	CH	H
27	I	CH	N	H
28	I	N	CH	H
29	F	CH	N	H
30	F	N	CH	H
31	CN	CH	N	H
32	CN	N	CH	H
33	H	CH	N	H
34	H	N	CH	H

Table Zb-2 provides 34 compounds Zb-2.001 to Zb-2.34 of formula C wherein R₃ is CF₃, A is CH, X is SO and R₆, R₇, G₁, G₂ are as defined in table W.

5 Table Zb-3 provides 34 compounds Zb-3.001 to Zb-3.34 of formula C wherein R₃ is CF₃, A is CH, X is SO₂ and R₆, R₇, G₁, G₂ are as defined in table W.

Table Zb-4 provides 34 compounds Zb-4.001 to Zb-4.34 of formula C wherein R₃ is CF₃, A is N, X is S and R₆, R₇, G₁, G₂ are as defined in table W.

Table Zb-5 provides 34 compounds Zb-5.001 to Zb-5.34 of formula C wherein R₃ is CF₃, A is N, X is SO and R₆, R₇, G₁, G₂ are as defined in table W.

10 Table Zb-6 provides 34 compounds Zb-6.001 to Zb-6.34 of formula C wherein R₃ is CF₃, A is N, X is SO₂ and R₆, R₇, G₁, G₂ are as defined in table W.

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Table Zb-7 provides 34 compounds Zb-7.001 to Zb-7.34 of formula C wherein R_3 is CF_2CF_3 , A is CH, X is S and R_6 , R_7 , G_1 , G_2 are as defined in table W.

Table Zb-8 provides 34 compounds Zb-8.001 to Zb-8.34 of formula C wherein R_3 is CF_2CF_3 , A is CH, X is SO and R_6 , R_7 , G_1 , G_2 are as defined in table W.

- 5 Table Zb-9 provides 34 compounds Zb-9.001 to Zb-9.34 of formula C wherein R_3 is CF_2CF_3 , A is CH, X is SO_2 and R_6 , R_7 , G_1 , G_2 are as defined in table W.

Table Zb-10 provides 34 compounds Zb-10.001 to Zb-10.34 of formula C wherein R_3 is CF_2CF_3 , A is N, X is S and R_6 , R_7 , G_1 , G_2 are as defined in table W.

- 10 Table Zb-11 provides 34 compounds Zb-11.001 to Zb-11.34 of formula C wherein R_3 is CF_2CF_3 , A is N, X is SO and R_6 , R_7 , G_1 , G_2 are as defined in table W.

Table Zb-12 provides 34 compounds Zb-12.001 to Zb-12.34 of formula C wherein R_3 is CF_2CF_3 , A is N, X is SO_2 and R_6 , R_7 , G_1 , G_2 are as defined in table W.

Table Zb-13 provides 34 compounds Zb-13.001 to Zb-13.34 of formula C wherein R_3 is SCF_3 , A is CH, X is S and R_6 , R_7 , G_1 , G_2 are as defined in table W.

- 15 Table Zb-14 provides 34 compounds Zb-14.001 to Zb-14.34 of formula C wherein R_3 is SCF_3 , A is CH, X is SO and R_6 , R_7 , G_1 , G_2 are as defined in table W.

Table Zb-15 provides 34 compounds Zb-15.001 to Zb-15.34 of formula C wherein R_3 is SCF_3 , A is CH, X is SO_2 and R_6 , R_7 , G_1 , G_2 are as defined in table W.

- 20 Table Zb-16 provides 34 compounds Zb-16.001 to Zb-16.34 of formula C wherein R_3 is SCF_3 , A is N, X is S and R_6 , R_7 , G_1 , G_2 are as defined in table W.

Table Zb-17 provides 34 compounds Zb-17.001 to Zb-17.34 of formula C wherein R_3 is SCF_3 , A is N, X is SO and R_6 , R_7 , G_1 , G_2 are as defined in table W.

Table Zb-18 provides 34 compounds Zb-18.001 to Zb-18.34 of formula C wherein R_3 is SCF_3 , A is N, X is SO_2 and R_6 , R_7 , G_1 , G_2 are as defined in table W.

- 25 Table Zb-19 provides 34 compounds Zb-19.001 to Zb-19.34 of formula C wherein R_3 is $SOCF_3$, A is CH, X is S and R_6 , R_7 , G_1 , G_2 are as defined in table W.

Table Zb-20 provides 34 compounds Zb-20.001 to Zb-20.34 of formula C wherein R_3 is $SOCF_3$, A is CH, X is SO and R_6 , R_7 , G_1 , G_2 are as defined in table W.

- 30 Table Zb-21 provides 34 compounds Zb-21.001 to Zb-21.34 of formula C wherein R_3 is $SOCF_3$, A is CH, X is SO_2 and R_6 , R_7 , G_1 , G_2 are as defined in table W.

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Table Zb-22 provides 34 compounds Zb-22.001 to Zb-22.34 of formula C wherein R₃ is SOCF₃, A is N, X is S and R₆, R₇, G₁, G₂ are as defined in table W.

Table Zb-23 provides 34 compounds Zb-23.001 to Zb-23.34 of formula C wherein R₃ is SOCF₃, A is N, X is SO and R₆, R₇, G₁, G₂ are as defined in table W.

- 5 Table Zb-24 provides 34 compounds Zb-24.001 to Zb-24.34 of formula C wherein R₃ is SOCF₃, A is N, X is SO₂ and R₆, R₇, G₁, G₂ are as defined in table W.

Table Zb-25 provides 34 compounds Zb-25.001 to Zb-25.34 of formula C wherein R₃ is SO₂CF₃, A is CH, X is S and R₆, R₇, G₁, G₂ are as defined in table W.

- 10 Table Zb-26 provides 34 compounds Zb-26.001 to Zb-26.34 of formula C wherein R₃ is SO₂CF₃, A is CH, X is SO and R₆, R₇, G₁, G₂ are as defined in table W.

Table Zb-27 provides 34 compounds Zb-27.001 to Zb-27.34 of formula C wherein R₃ is SO₂CF₃, A is CH, X is SO₂ and R₆, R₇, G₁, G₂ are as defined in table W.

Table Zb-28 provides 34 compounds Zb-28.001 to Zb-28.34 of formula C wherein R₃ is SO₂CF₃, A is N, X is S and R₆, R₇, G₁, G₂ are as defined in table W.

- 15 Table Zb-29 provides 34 compounds Zb-29.001 to Zb-29.34 of formula C wherein R₃ is SO₂CF₃, A is N, X is SO and R₆, R₇, G₁, G₂ are as defined in table W.

Table Zb-30 provides 34 compounds Zb-30.001 to Zb-30.34 of formula C wherein R₃ is SO₂CF₃, A is N, X is SO₂ and R₆, R₇, G₁, G₂ are as defined in table W.

- 20 The compounds of formula I according to the invention are preventively and/or curatively valuable active ingredients in the field of pest control, even at low rates of application, which have a very favorable biocidal spectrum and are well tolerated by warm-blooded species, fish and plants. The active ingredients according to the invention act against all or individual developmental stages of normally sensitive, but also resistant, animal pests, such as insects or representatives of the order Acarina,
- 25 nematodes or molluscs. The insecticidal, nematocidal, molluscicidal or acaricidal activity of the active ingredients according to the invention can manifest itself directly, i. e. in mortality or destruction of the pests, which takes place either immediately or only after some time has elapsed, for example during ecdysis, or indirectly, for example in a reduced oviposition and/or hatching rate, anti-feedant effect, and/or growth inhibition.

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Examples of the abovementioned animal pests are:

from the order *Acarina*, for example,

Acalitus spp, Aculus spp, Acaricalus spp, Aceria spp, Acarus siro, Amblyomma spp., Argas spp., Boophilus spp., Brevipalpus spp., Bryobia spp, Calipitimerus spp., Chorioptes spp., Dermanyssus gallinae, Dermatophagoides spp, Eotetranychus spp, Eriophyes spp., Hemitarsonemus spp,

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Hyalomma spp., Ixodes spp., Olygonychus spp, Ornithodoros spp., Polyphagotarsonus latus, Panonychus spp., Phyllocoptruta oleivora, Phytomemus spp, Polyphagotarsonemus spp, Psoroptes spp., Rhipicephalus spp., Rhizoglyphus spp., Sarcoptes spp., Steneotarsonemus spp, Tarsonemus spp. and Tetranychus spp.;

5 from the order *Anoplura*, for example,

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

from the order *Coleoptera*, for example,

Agriotes spp., Amphimallon majale, Anomala orientalis, Anthonomus spp., Aphodius spp, Astylus atromaculatus, Ataenius spp, Atomaria linearis, Chaetocnema tibialis, Cerotoma spp, Conoderus spp,

10 Cosmopolites spp., Cotinis nitida, Curculio spp., Cyclocephala spp, Dermestes spp., Diabrotica spp.,

Diloboderus abderus, Epilachna spp., Eremnus spp., Heteronychus arator, Hypothenemus hampei,

Lagria vilosa, Leptinotarsa decemlineata, Lissorhoptrus spp., Liogenys spp, Maecolaspis spp,

Maladera castanea, Megascelis spp, Meligethes aeneus, Melolontha spp., Myochrous armatus,

Orycaephilus spp., Otiorhynchus spp., Phyllophaga spp, Phlyctinus spp., Popillia spp., Psylliodes spp.,

15 Rhyssomatus aubtilis, Rhizopertha spp., Scarabeidae, Sitophilus spp., Sitotroga spp., Somaticus spp,

Sphenophorus spp, Sternechus subsignatus, Tenebrio spp., Tribolium spp. and Trogoderma spp.;

from the order *Diptera*, for example,

Aedes spp., Anopheles spp, Antherigona soccata, Bactrocea oleae, Bibio hortulanus, Bradysia spp,

Calliphora erythrocephala, Ceratitis spp., Chrysomyia spp., Culex spp., Cuterebra spp., Dacus spp.,

20 Delia spp, Drosophila melanogaster, Fannia spp., Gastrophilus spp., Geomyza tripunctata, Glossina

spp., Hypoderma spp., Hyppobosca spp., Liriomyza spp., Lucilia spp., Melanagromyza spp., Musca

spp., Oestrus spp., Orseolia spp., Oscinella frit, Pegomyia hyoscyami, Phorbia spp., Rhagoletis spp,

Rivelia quadrifasciata, Scatella spp, Sciara spp., Stomoxys spp., Tabanus spp., Tannia spp. and

Tipula spp.;

25 from the order *Hemiptera*, for example,

Acanthocoris scabrator, Acrosternum spp, Adelphocoris lineolatus, Amblypelta nitida, Bathycoelia

thalassina, Blissus spp, Cimex spp., Clavigralla tomentosicollis, Creontiades spp, Distantiella

theobroma, Dichelops furcatus, Dysdercus spp., Edessa spp, Euschistus spp., Eurydema pulchrum,

Eurygaster spp., Halyomorpha halys, Horcias nobilellus, Leptocoris spp., Lygus spp, Margarodes

30 spp, Murgantia histrionica, Neomegalotomus spp, Nesidiocoris tenuis, Nezara spp., Nysius simulans,

Oebalus insularis, Piesma spp., Piezodorus spp, Rhodnius spp., Sahlbergella singularis, Scaptocoris

castanea, Scotinophara spp. , Thyanta spp , Triatoma spp., Vatica illudens;

Acyrtosium pisum, Adalges spp, Agalliana ensigera, Agonoscena targionii, Aleurodicus spp,

Aleurocanthus spp, Aleurolobus barodensis, Aleurothrixus floccosus, Aleyrodes brassicae, Amarasca

35 biguttula, Amritodus atkinsoni, Aonidiella spp., Aphididae, Aphis spp., Aspidiotus spp., Aulacorthum

solani, Bactericera cockerelli, Bemisia spp, Brachycaudus spp, Brevicoryne brassicae, Cacopsylla

spp, Cavariella aegopodii Scop., Ceroplastes spp., Chrysomphalus aonidium, Chrysomphalus

dictyospermi, Cicadella spp, Cofana spectra, Cryptomyzus spp, Cicadulina spp, Coccus hesperidum,

Dalbulus maidis, Dialeurodes spp, Diaphorina citri, Diuraphis noxia, Dysaphis spp, Empoasca spp.,

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- Eriosoma larigerum, Erythroneura spp., Gascardia spp., Glycaspis brimblecombei, Hyadaphis pseudobrassicae, Hyalopterus spp, Hyperomyzus pallidus, Idioscopus clypealis, Jacobiasca lybica, Laodelphax spp., Lecanium corni, Lepidosaphes spp., Lopaphis erysimi, Lyogenys maidis, Macrosiphum spp., Mahanarva spp, Metcalfa pruinosa, Metopolophium dirhodum, Myndus crudus,
- 5 Myzus spp., Neotoxoptera sp, Nephrotettix spp., Nilaparvata spp., Nippolachnus piri Mats, Odonaspis ruthae, Oregma lanigera Zehnter, Parabemisia myricae, Paratrioza cockerelli, Parlatoria spp., Pemphigus spp., Peregrinus maidis, Perkinsiella spp, Phorodon humuli, Phylloxera spp, Planococcus spp., Pseudaulacaspis spp., Pseudococcus spp., Pseudatomoscelis seriatus, Psylla spp., Pulvinaria aethiopica, Quadraspidiotus spp., Quesada gigas, Recilia dorsalis, Rhopalosiphum spp., Saissetia
- 10 spp., Scaphoideus spp., Schizaphis spp., Sitobion spp., Sogatella furcifera, Spissistilus festinus, Tarophagus Proserpina, Toxoptera spp, Trialeurodes spp, Tridiscus sporoboli, Trionymus spp, Trioza erytreae , Unaspis citri, Zyginina flammigera, Zyginidia scutellaris, ;
- from the order *Hymenoptera*, for example,
- Acromyrmex, Arge spp, Atta spp., Cephus spp., Diprion spp., Diprionidae, Gilpinia polytoma, Hoplo-
- 15 campa spp., Lasius spp., Monomorium pharaonis, Neodiprion spp., Pogonomymex spp, Slenopsis invicta, Solenopsis spp. and Vespa spp.;
- from the order *Isoptera*, for example,
- Coptotermes spp, Cornitermes cumulans, Incisitermes spp, Macrotermes spp, Mastotermes spp, Microtermes spp, Reticulitermes spp.; Solenopsis geminate
- 20 from the order *Lepidoptera*, for example,
- Acleris spp., Adoxophyes spp., Aegeria spp., Agrotis spp., Alabama argillaceae, Amylois spp., Anticarsia gemmatilis, Archips spp., Argyresthia spp, Argyrotaenia spp., Autographa spp., Bucculatrix thurberiella, Busseola fusca, Cadra cautella, Carposina nipponensis, Chilo spp., Choristoneura spp., Chrysoteuchia topiaria, Clysia ambiguella, Cnaphalocrocis spp., Cnephasia spp., Cochylis spp.,
- 25 Coleophora spp., Colias lesbia, Cosmophila flava, Crambus spp, Crocidolomia binotalis, Cryptophlebia leucotreta, Cydalima perspectalis, Cydia spp., Diaphania perspectalis, Diatraea spp., Diparopsis castanea, Earias spp., Eldana saccharina, Ephestia spp., Epinotia spp, Estigmene acrea, Etiella zinckinella, Eucosma spp., Eupoecilia ambiguella, Euproctis spp., Euxoa spp., Feltia jaculiferia, Grapholita spp., Hedyia nubiferana, Heliothis spp., Hellula undalis, Herpetogramma spp, Hyphantria
- 30 cunea, Keiferia lycopersicella, Lasmopalpus lignosellus, Leucoptera scitella, Lithocolletis spp., Lobesia botrana, Loxostege bifidalis, Lymantria spp., Lyonetia spp., Malacosoma spp., Mamestra brassicae, Manduca sexta, Mythimna spp, Noctua spp, Operophtera spp., Orniodes indica, Ostrinia nubilalis, Pammene spp., Pandemis spp., Panolis flammea, Papaipema nebris, Pectinophora gossypiella, Perileucoptera coffeella, Pseudaletia unipuncta, Phthorimaea operculella, Pieris rapae, Pieris
- 35 spp., Plutella xylostella, Prays spp., Pseudoplusia spp, Rachiplusia nu, Richia albicosta, Scirpophaga spp., Sesamia spp., Sparganothis spp., Spodoptera spp., Sylepta derogate, Synanthedon spp., Thaumetopoea spp., Tortrix spp., Trichoplusia ni, Tuta absoluta, and Yponomeuta spp.;
- from the order *Mallophaga*, for example,
- Damalinea spp. and Trichodectes spp.;

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from the order *Orthoptera*, for example,

Blatta spp., *Blattella* spp., *Gryllotalpa* spp., *Leucophaea maderae*, *Locusta* spp., *Neocurtilla hexadactyla*, *Periplaneta* spp., *Scapteriscus* spp. and *Schistocerca* spp.;

from the order *Psocoptera*, for example,

5 *Liposcelis* spp.;

from the order *Siphonaptera*, for example,

Ceratophyllus spp., *Ctenocephalides* spp. and *Xenopsylla cheopis*;

from the order *Thysanoptera*, for example,

10 *Calliothrips phaseoli*, *Frankliniella* spp., *Heliothrips* spp., *Hercinothrips* spp., *Parthenothrips* spp., *Scirtothrips aurantii*, *Sericothrips variabilis*, *Taeniothrips* spp., *Thrips* spp.;

from the order *Thysanura*, for example, *Lepisma saccharina*.

The active ingredients according to the invention can be used for controlling, i. e. containing or

15 destroying, pests of the abovementioned type which occur in particular on plants, especially on useful plants and ornamentals in agriculture, in horticulture and in forests, or on organs, such as fruits, flowers, foliage, stalks, tubers or roots, of such plants, and in some cases even plant organs which are formed at a later point in time remain protected against these pests.

20 Suitable target crops are, in particular, cereals, such as wheat, barley, rye, oats, rice, maize or sorghum; beet, such as sugar or fodder beet; fruit, for example pomaceous fruit, stone fruit or soft fruit, such as apples, pears, plums, peaches, almonds, cherries or berries, for example strawberries, raspberries or blackberries; leguminous crops, such as beans, lentils, peas or soya; oil crops, such as oilseed rape, mustard, poppies, olives, sunflowers, coconut, castor, cocoa or ground nuts; cucurbits,

25 such as pumpkins, cucumbers or melons; fibre plants, such as cotton, flax, hemp or jute; citrus fruit, such as oranges, lemons, grapefruit or tangerines; vegetables, such as spinach, lettuce, asparagus, cabbages, carrots, onions, tomatoes, potatoes or bell peppers; Lauraceae, such as avocado, Cinnamomum or camphor; and also tobacco, nuts, coffee, eggplants, sugarcane, tea, pepper, grapevines, hops, the plantain family and latex plants.

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The compositions and/or methods of the present invention may be also used on any ornamental and/or vegetable crops, including flowers, shrubs, broad-leaved trees and evergreens.

For example the invention may be used on any of the following ornamental species: *Ageratum* spp., *Alonsoa* spp., *Anemone* spp., *Anisodonteia capensis*, *Anthemis* spp., *Antirrhinum* spp., *Aster* spp.,

35 *Begonia* spp. (e.g. *B. elatior*, *B. semperflorens*, *B. tubéux*), *Bougainvillea* spp., *Brachycome* spp., *Brassica* spp. (ornamental), *Calceolaria* spp., *Capsicum annuum*, *Catharanthus roseus*, *Canna* spp., *Centaurea* spp., *Chrysanthemum* spp., *Cineraria* spp. (*C. maritime*), *Coreopsis* spp., *Crassula coccinea*, *Cuphea ignea*, *Dahlia* spp., *Delphinium* spp., *Dicentra spectabilis*, *Dorotheantus* spp., *Eustoma grandiflorum*, *Forsythia* spp., *Fuchsia* spp., *Geranium gnaphalium*, *Gerbera* spp.,

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Gomphrena globosa, *Heliotropium* spp., *Helianthus* spp., *Hibiscus* spp., *Hortensia* spp., *Hydrangea* spp., *Hypoestes phyllostachya*, *Impatiens* spp. (*I. Walleriana*), *Iresines* spp., *Kalanchoe* spp., *Lantana camara*, *Lavatera trimestris*, *Leonotis leonurus*, *Lilium* spp., *Mesembryanthemum* spp., *Mimulus* spp., *Monarda* spp., *Nemesia* spp., *Tagetes* spp., *Dianthus* spp. (carnation), *Canna* spp., *Oxalis* spp., *Bellis* spp., *Pelargonium* spp. (*P. peltatum*, *P. Zonale*), *Viola* spp. (pansy), *Petunia* spp., *Phlox* spp., *Plecthranthus* spp., *Poinsettia* spp., *Parthenocissus* spp. (*P. quinquefolia*, *P. tricuspidata*), *Primula* spp., *Ranunculus* spp., *Rhododendron* spp., *Rosa* spp. (rose), *Rudbeckia* spp., *Saintpaulia* spp., *Salvia* spp., *Scaevola aemola*, *Schizanthus wisetonensis*, *Sedum* spp., *Solanum* spp., *Surfinia* spp., *Tagetes* spp., *Nicotinia* spp., *Verbena* spp., *Zinnia* spp. and other bedding plants.

For example the invention may be used on any of the following vegetable species: *Allium* spp. (*A. sativum*, *A. cepa*, *A. oschaninii*, *A. Porrum*, *A. ascalonicum*, *A. fistulosum*), *Anthriscus cerefolium*, *Apium graveolus*, *Asparagus officinalis*, *Beta vulgaris*, *Brassica* spp. (*B. Oleracea*, *B. Pekinensis*, *B. rapa*), *Capsicum annuum*, *Cicer arietinum*, *Cichorium endivia*, *Cichorium* spp. (*C. intybus*, *C. endivia*), *Citrillus lanatus*, *Cucumis* spp. (*C. sativus*, *C. melo*), *Cucurbita* spp. (*C. pepo*, *C. maxima*), *Cyanara* spp. (*C. scolymus*, *C. cardunculus*), *Daucus carota*, *Foeniculum vulgare*, *Hypericum* spp., *Lactuca sativa*, *Lycopersicon* spp. (*L. esculentum*, *L. lycopersicum*), *Mentha* spp., *Ocimum basilicum*, *Petroselinum crispum*, *Phaseolus* spp. (*P. vulgaris*, *P. coccineus*), *Pisum sativum*, *Raphanus sativus*, *Rheum rhaponticum*, *Rosemarinus* spp., *Salvia* spp., *Scorzonera hispanica*, *Solanum melongena*, *Spinacea oleracea*, *Valerianella* spp. (*V. locusta*, *V. eriocarpa*) and *Vicia faba*.

Preferred ornamental species include African violet, *Begonia*, *Dahlia*, *Gerbera*, *Hydrangea*, *Verbena*, *Rosa*, *Kalanchoe*, *Poinsettia*, *Aster*, *Centaurea*, *Coreopsis*, *Delphinium*, *Monarda*, *Phlox*, *Rudbeckia*, *Sedum*, *Petunia*, *Viola*, *Impatiens*, *Geranium*, *Chrysanthemum*, *Ranunculus*, *Fuchsia*, *Salvia*, *Hortensia*, rosemary, sage, St. Johnswort, mint, sweet pepper, tomato and cucumber.

The active ingredients according to the invention are especially suitable for controlling *Aphis craccivora*, *Diabrotica balteata*, *Heliothis virescens*, *Myzus persicae*, *Plutella xylostella* and *Spodoptera littoralis* in cotton, vegetable, maize, rice and soya crops. The active ingredients according to the invention are further especially suitable for controlling *Mamestra* (preferably in vegetables), *Cydia pomonella* (preferably in apples), *Empoasca* (preferably in vegetables, vineyards), *Leptinotarsa* (preferably in potatoes) and *Chilo suppressalis* (preferably in rice).

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In a further aspect, the invention may also relate to a method of controlling damage to plant and parts thereof by plant parasitic nematodes (Endoparasitic-, Semiendoparasitic- and Ectoparasitic

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nematodes), especially plant parasitic nematodes such as root knot nematodes, *Meloidogyne hapla*, *Meloidogyne incognita*, *Meloidogyne javanica*, *Meloidogyne arenaria* and other *Meloidogyne* species; cyst-forming nematodes, *Globodera rostochiensis* and other *Globodera* species; *Heterodera avenae*, *Heterodera glycines*, *Heterodera schachtii*, *Heterodera trifolii*, and other *Heterodera* species; Seed gall nematodes, *Anguina* species; Stem and foliar nematodes, *Aphelenchoides* species; Sting nematodes, *Belonolaimus longicaudatus* and other *Belonolaimus* species; Pine nematodes, *Bursaphelenchus xylophilus* and other *Bursaphelenchus* species; Ring nematodes, *Criconema* species, *Criconemella* species, *Criconemoides* species, *Mesocriconema* species; Stem and bulb nematodes, *Ditylenchus destructor*, *Ditylenchus dipsaci* and other *Ditylenchus* species; Awl nematodes, *Dolichodorus* species; Spiral nematodes, *Helicotylenchus multicinctus* and other *Helicotylenchus* species; Sheath and sheathoid nematodes, *Hemicyclophora* species and *Hemicriconemoides* species; *Hirshmanniella* species; Lance nematodes, *Hoploaimus* species; false rootknot nematodes, *Nacobbus* species; Needle nematodes, *Longidorus elongatus* and other *Longidorus* species; Pin nematodes, *Pratylenchus* species; Lesion nematodes, *Pratylenchus neglectus*, *Pratylenchus penetrans*, *Pratylenchus curvatus*, *Pratylenchus goodeyi* and other *Pratylenchus* species; Burrowing nematodes, *Radopholus similis* and other *Radopholus* species; Reniform nematodes, *Rotylenchus robustus*, *Rotylenchus reniformis* and other *Rotylenchus* species; *Scutellonema* species; Stubby root nematodes, *Trichodorus primitivus* and other *Trichodorus* species, *Paratrichodorus* species; Stunt nematodes, *Tylenchorhynchus claytoni*, *Tylenchorhynchus dubius* and other *Tylenchorhynchus* species; Citrus nematodes, *Tylenchulus* species; Dagger nematodes, *Xiphinema* species; and other plant parasitic nematode species, such as *Subanguina* spp., *Hypsoperine* spp., *Macroposthonia* spp., *Melinius* spp., *Punctodera* spp., and *Quinisulcius* spp..

The compounds of the invention may also have activity against the molluscs. Examples of which include, for example, *Ampullariidae*; *Arion* (*A. ater*, *A. circumscriptus*, *A. hortensis*, *A. rufus*); *Bradybaenidae* (*Bradybaena fruticum*); *Cepaea* (*C. hortensis*, *C. Nemoralis*); *ochlodina*; *Deroceras* (*D. agrestis*, *D. empiricorum*, *D. laeve*, *D. reticulatum*); *Discus* (*D. rotundatus*); *Euomphalia*; *Galba* (*G. trunculata*); *Helicelia* (*H. itala*, *H. obvia*); *Helicidae* *Helicigona arbustorum*); *Helicodiscus*; *Helix* (*H. aperta*); *Limax* (*L. cinereoniger*, *L. flavus*, *L. marginatus*, *L. maximus*, *L. tenellus*); *Lymnaea*; *Milax* (*M. gagates*, *M. marginatus*, *M. sowerbyi*); *Opeas*; *Pomacea* (*P. canaticulata*); *Vallonia* and *Zanitoides*.

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*.

Toxins that can be expressed by such transgenic plants include, for example, insecticidal proteins, for example insecticidal proteins from *Bacillus cereus* or *Bacillus popilliae*; or insecticidal proteins from *Bacillus thuringiensis*, such as δ -endotoxins, e.g. *Cry1Ab*, *Cry1Ac*, *Cry1F*, *Cry1Fa2*, *Cry2Ab*, *Cry3A*,

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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 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; 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.

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 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). 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 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. Such insects can occur in any taxonomic group of insects, but are especially commonly found in the beetles (Coleoptera), two-winged insects (Diptera) and moths (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 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

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expresses a 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®.

Further examples of such transgenic crops are:

1. **Bt11 Maize** from Syngenta Seeds SAS, Chemin de l'Hobit 27, F-31 790 St. Sauveur, France, registration number C/FR/96/05/10. Genetically modified *Zea mays* which has been rendered resistant to attack by the European corn borer (*Ostrinia nubilalis* and *Sesamia nonagrioides*) by transgenic expression of a truncated 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 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, 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.

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

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

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

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

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

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

Further areas of use of the compositions according to the invention are the protection of stored goods and store rooms and the protection of raw materials, such as wood, textiles, floor coverings or buildings, and also in the hygiene sector, especially the protection of humans, domestic animals and productive livestock against pests of the mentioned type.

The present invention also provides a method for controlling pests (such as mosquitoes and other disease vectors; see also http://www.who.int/malaria/vector_control/irs/en/). In one embodiment, the method for controlling pests comprises applying the compositions of the invention to the target pests, to their locus or to a surface or substrate by brushing, rolling, spraying, spreading or dipping. By way

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of example, an IRS (indoor residual spraying) application of a surface such as a wall, ceiling or floor surface is contemplated by the method of the invention. In another embodiment, it is contemplated to apply such compositions to a substrate such as non-woven or a fabric material in the form of (or which can be used in the manufacture of) netting, clothing, bedding, curtains and tents.

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In one embodiment, the method for controlling such pests comprises applying a pesticidally effective amount of the compositions of the invention to the target pests, to their locus, or to a surface or substrate so as to provide effective residual pesticidal activity on the surface or substrate. Such application may be made by brushing, rolling, spraying, spreading or dipping the pesticidal

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composition of the invention. By way of example, an IRS application of a surface such as a wall, ceiling or floor surface is contemplated by the method of the invention so as to provide effective residual pesticidal activity on the surface. In another embodiment, it is contemplated to apply such compositions for residual control of pests on a substrate such as a fabric material in the form of (or which can be used in the manufacture of) netting, clothing, bedding, curtains and tents.

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Substrates including non-woven, fabrics or netting to be treated may be made of natural fibres such as cotton, raffia, jute, flax, sisal, hessian, or wool, or synthetic fibres such as polyamide, polyester, polypropylene, polyacrylonitrile or the like. The polyesters are particularly suitable. The methods of textile treatment are known, e.g. WO 2008/151984, WO 2003/034823, US 5631072, WO 2005/64072, WO2006/128870, EP 1724392, WO 2005113886 or WO 2007/090739.

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Further areas of use of the compositions according to the invention are the field of tree injection/trunk treatment for all ornamental trees as well all sort of fruit and nut trees.

In the field of tree injection/trunk treatment, the compounds according to the present invention are especially suitable against wood-boring insects from the order *Lepidoptera* as mentioned above and from the order *Coleoptera*, especially against woodborers listed in the following tables A and B:

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Table A. Examples of exotic woodborers of economic importance.

Family	Species	Host or Crop Infested
Buprestidae	<i>Agilus planipennis</i>	Ash
Cerambycidae	<i>Anoplua glabripennis</i>	Hardwoods
Scolytidae	<i>Xylosandrus crassiusculus</i>	Hardwoods
	<i>X. mutilatus</i>	Hardwoods
	<i>Tomicus piniperda</i>	Conifers

Table B. Examples of native woodborers of economic importance.

Family	Species	Host or Crop Infested
Buprestidae	<i>Agrilus anxius</i>	Birch
	<i>Agrilus politus</i>	Willow, Maple
	<i>Agrilus sayi</i>	Bayberry, Sweetfern
	<i>Agrilus vittaticollis</i>	Apple, Pear, Cranberry, Serviceberry, Hawthorn
	<i>Chrysobothris femorata</i>	Apple, Apricot, Beech, Boxelder, Cherry, Chestnut, Currant, Elm, Hawthorn, Hackberry, Hickory, Horsechestnut, Linden, Maple, Mountain-ash, Oak, Pecan, Pear, Peach, Persimmon, Plum, Poplar, Quince, Redbud, Serviceberry, Sycamore, Walnut, Willow
	<i>Texania campestris</i>	Basswood, Beech, Maple, Oak, Sycamore, Willow, Yellow-poplar
Cerambycidae	<i>Goes pulverulentus</i>	Beech, Elm, Nuttall, Willow, Black oak, Cherrybark oak, Water oak, Sycamore
	<i>Goes tigrinus</i>	Oak
	<i>Neoclytus acuminatus</i>	Ash, Hickory, Oak, Walnut, Birch, Beech, Maple, Eastern hophornbeam, Dogwood, Persimmon, Redbud, Holly, Hackberry, Black locust, Honeylocust, Yellow-poplar, Chestnut, Osage-orange, Sassafras, Lilac, Mountain-mahogany, Pear, Cherry, Plum, Peach, Apple, Elm, Basswood, Sweetgum

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Family	Species	Host or Crop Infested
	<i>Neoptychodes trilineatus</i>	Fig, Alder, Mulberry, Willow, Nettleleaf hackberry
	<i>Oberea ocellata</i>	Sumac, Apple, Peach, Plum, Pear, Currant, Blackberry
	<i>Oberea tripunctata</i>	Dogwood, Viburnum, Elm, Sourwood, Blueberry, Rhododendron, Azalea, Laurel, Poplar, Willow, Mulberry
	<i>Oncideres cingulata</i>	Hickory, Pecan, Persimmon, Elm, Sourwood, Basswood, Honeylocust, Dogwood, Eucalyptus, Oak, Hackberry, Maple, Fruit trees
	<i>Saperda calcarata</i>	Poplar
	<i>Strophiona nitens</i>	Chestnut, Oak, Hickory, Walnut, Beech, Maple
Scolytidae	<i>Corthylus columbianus</i>	Maple, Oak, Yellow-poplar, Beech, Boxelder, Sycamore, Birch, Basswood, Chestnut, Elm
	<i>Dendroctonus frontalis</i>	Pine
	<i>Dryocoetes betulae</i>	Birch, Sweetgum, Wild cherry, Beech, Pear
	<i>Monarthrum fasciatum</i>	Oak, Maple, Birch, Chestnut, Sweetgum, Blackgum, Poplar, Hickory, Mimosa, Apple, Peach, Pine
	<i>Phloeotribus liminaris</i>	Peach, Cherry, Plum, Black cherry, Elm, Mulberry, Mountain-ash
	<i>Pseudopityophthorus pruinosis</i>	Oak, American beech, Black cherry, Chickasaw plum, Chestnut, Maple, Hickory, Hornbeam, Hophornbeam

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Family	Species	Host or Crop Infested
Sesiidae	<i>Paranthrene simulans</i>	Oak, American chestnut
	<i>Sannina uroceriformis</i>	Persimmon
	<i>Synanthedon exitiosa</i>	Peach, Plum, Nectarine, Cherry, Apricot, Almond, Black cherry
	<i>Synanthedon pictipes</i>	Peach, Plum, Cherry, Beach, Black Cherry
	<i>Synanthedon rubrofascia</i>	Tupelo
	<i>Synanthedon scitula</i>	Dogwood, Pecan, Hickory, Oak, Chestnut, Beech, Birch, Black cherry, Elm, Mountain-ash, Viburnum, Willow, Apple, Loquat, Ninebark, Bayberry
	<i>Vitacea polistiformis</i>	Grape

The present invention may be also used to control any insect pests that may be present in turfgrass, including for example beetles, caterpillars, fire ants, ground pearls, millipedes, sow bugs, mites, mole crickets, scales, mealybugs ticks, spittlebugs, southern chinch bugs and white grubs. The present invention may be used to control insect pests at various stages of their life cycle, including eggs, larvae, nymphs and adults.

In particular, the present invention may be used to control insect pests that feed on the roots of turfgrass including white grubs (such as *Cyclocephala* spp. (e.g. masked chafer, *C. lurida*), *Rhizotrogus* spp. (e.g. European chafer, *R. majalis*), *Cotinus* spp. (e.g. Green June beetle, *C. nitida*), *Popillia* spp. (e.g. Japanese beetle, *P. japonica*), *Phyllophaga* spp. (e.g. May/June beetle), *Ataenius* spp. (e.g. Black turfgrass ataenius, *A. spretulus*), *Maladera* spp. (e.g. Asiatic garden beetle, *M. castanea*) and *Tomarus* spp.), ground pearls (*Margarodes* spp.), mole crickets (tawny, southern, and short-winged; *Scapteriscus* spp., *Gryllotalpa africana*) and leatherjackets (European crane fly, *Tipula* spp.).

The present invention may also be used to control insect pests of turfgrass that are thatch dwelling, including armyworms (such as fall armyworm *Spodoptera frugiperda*, and common armyworm *Pseudaletia unipuncta*), cutworms, billbugs (*Sphenophorus* spp., such as *S. venatus verstitus* and *S. parvulus*), and sod webworms (such as *Crambus* spp. and the tropical sod webworm, *Herpetogramma phaeopteralis*).

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The present invention may also be used to control insect pests of turfgrass that live above the ground and feed on the turfgrass leaves, including chinch bugs (such as southern chinch bugs, *Blissus insularis*), Bermudagrass mite (*Eriophyes cynodontiensis*), rhodesgrass mealybug (*Antonina graminis*), two-lined spittlebug (*Prospapia bicincta*), leafhoppers, cutworms (*Noctuidae* family), and greenbugs.

- 5 The present invention may also be used to control other pests of turfgrass such as red imported fire ants (*Solenopsis invicta*) that create ant mounds in turf.

In the hygiene sector, the compositions according to the invention are active against ectoparasites such as hard ticks, soft ticks, mange mites, harvest mites, flies (biting and licking), parasitic fly larvae,
10 lice, hair lice, bird lice and fleas.

Examples of such parasites are:

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

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

Of the order Diptera and the suborders Nematocera and Brachycera, for example Aedes spp., Anopheles spp., Culex spp., Simulium spp., Eusimulium spp., Phlebotomus spp., Lutzomyia spp.,
20 Culicoides spp., Chrysops spp., Hybomitra spp., Atylotus spp., Tabanus spp., Haematopota spp., Philipomyia spp., Braula spp., Musca spp., Hydrotaea spp., Stomoxys spp., Haematobia spp., Morellia spp., Fannia spp., Glossina spp., Calliphora spp., Lucilia spp., Chrysomyia spp., Wohlfahrtia spp., Sarcophaga spp., Oestrus spp., Hypoderma spp., Gasterophilus spp., Hippobosca spp., Lipoptena spp. and Melophagus spp..

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

30 Of the order Heteroptera, for example Cimex spp., Triatoma spp., Rhodnius spp., Panstrongylus spp..

Of the order Blattellidae, for example Blatta orientalis, Periplaneta americana, Blattella germanica and Supella spp..

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

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

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

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

The compounds according to the invention can be used as pesticidal agents in unmodified form, but they are generally formulated into compositions in various ways using formulation adjuvants, such as carriers, solvents and surface-active substances. The formulations can be in various physical forms,
 25 e.g. in the form of dusting powders, gels, wettable powders, water-dispersible granules, water-dispersible tablets, effervescent pellets, emulsifiable concentrates, microemulsifiable concentrates, oil-in-water emulsions, oil-flowables, aqueous dispersions, oily dispersions, suspo-emulsions, capsule suspensions, emulsifiable granules, soluble liquids, water-soluble concentrates (with water or a water-miscible organic solvent as carrier), impregnated polymer films or in other forms known e.g. from the
 30 *Manual on Development and Use of FAO and WHO Specifications for Pesticides*, United Nations, First Edition, Second Revision (2010). Such formulations can either be used directly or diluted prior to use. The dilutions can be made, for example, with water, liquid fertilisers, micronutrients, biological organisms, oil or solvents.

The formulations can be prepared e.g. by mixing the active ingredient with the formulation adjuvants in order to obtain compositions in the form of finely divided solids, granules, solutions, dispersions or emulsions. The active ingredients can also be formulated with other adjuvants, such as finely divided solids, mineral oils, oils of vegetable or animal origin, modified oils of vegetable or animal origin, organic solvents, water, surface-active substances or combinations thereof.

The active ingredients can also be contained in very fine microcapsules. Microcapsules contain the active ingredients in a porous carrier. This enables the active ingredients to be released into the environment in controlled amounts (e.g. slow-release). Microcapsules usually have a diameter of from 0.1 to 500 microns. They contain active ingredients in an amount of about from 25 to 95 % by weight of the capsule weight. The active ingredients can be in the form of a monolithic solid, in the form of fine particles in solid or liquid dispersion or in the form of a suitable solution. The encapsulating membranes can comprise, for example, natural or synthetic rubbers, cellulose, styrene/butadiene copolymers, polyacrylonitrile, polyacrylate, polyesters, polyamides, polyureas, polyurethane or chemically modified polymers and starch xanthates or other polymers that are known to the person skilled in the art. Alternatively, very fine microcapsules can be formed in which the active ingredient is contained in the form of finely divided particles in a solid matrix of base substance, but the microcapsules are not themselves encapsulated.

The formulation adjuvants that are suitable for the preparation of the compositions according to the invention are known *per se*. As liquid carriers there may be used: water, toluene, xylene, petroleum ether, vegetable oils, acetone, methyl ethyl ketone, cyclohexanone, acid anhydrides, acetonitrile, acetophenone, amyl acetate, 2-butanone, butylene carbonate, chlorobenzene, cyclohexane, cyclohexanol, alkyl esters of acetic acid, diacetone alcohol, 1,2-dichloropropane, diethanolamine, p-diethylbenzene, diethylene glycol, diethylene glycol abietate, diethylene glycol butyl ether, diethylene glycol ethyl ether, diethylene glycol methyl ether, *N,N*-dimethylformamide, dimethyl sulfoxide, 1,4-dioxane, dipropylene glycol, dipropylene glycol methyl ether, dipropylene glycol dibenzoate, diproxitol, alkylpyrrolidone, ethyl acetate, 2-ethylhexanol, ethylene carbonate, 1,1,1-trichloroethane, 2-heptanone, alpha-pinene, d-limonene, ethyl lactate, ethylene glycol, ethylene glycol butyl ether, ethylene glycol methyl ether, gamma-butyrolactone, glycerol, glycerol acetate, glycerol diacetate, glycerol triacetate, hexadecane, hexylene glycol, isoamyl acetate, isobornyl acetate, isooctane, isophorone, isopropylbenzene, isopropyl myristate, lactic acid, laurylamine, mesityl oxide, methoxypropanol, methyl isoamyl ketone, methyl isobutyl ketone, methyl laurate, methyl octanoate, methyl oleate, methylene chloride, m-xylene, *n*-hexane, *n*-octylamine, octadecanoic acid, octylamine acetate, oleic acid, oleylamine, o-xylene, phenol, polyethylene glycol, propionic acid, propyl lactate, propylene carbonate, propylene glycol, propylene glycol methyl ether, p-xylene, toluene, triethyl phosphate, triethylene glycol, xylenesulfonic acid, paraffin, mineral oil, trichloroethylene, perchloroethylene, ethyl acetate, amyl acetate, butyl acetate, propylene glycol methyl ether, diethylene glycol methyl ether, methanol, ethanol, isopropanol, and alcohols of higher molecular weight, such as amyl alcohol, tetrahydrofurfuryl alcohol, hexanol, octanol, ethylene glycol, propylene glycol, glycerol, *N*-methyl-2-pyrrolidone and the like.

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Suitable solid carriers are, for example, talc, titanium dioxide, pyrophyllite clay, silica, attapulgite clay, kieselguhr, limestone, calcium carbonate, bentonite, calcium montmorillonite, cottonseed husks, wheat flour, soybean flour, pumice, wood flour, ground walnut shells, lignin and similar substances.

A large number of surface-active substances can advantageously be used in both solid and liquid

5 formulations, especially in those formulations which can be diluted with a carrier prior to use. Surface-active substances may be anionic, cationic, non-ionic or polymeric and they can be used as emulsifiers, wetting agents or suspending agents or for other purposes. Typical surface-active substances include, for example, salts of alkyl sulfates, such as diethanolammonium lauryl sulfate; salts of alkylarylsulfonates, such as calcium dodecylbenzenesulfonate; alkylphenol/alkylene oxide
10 addition products, such as nonylphenol ethoxylate; alcohol/alkylene oxide addition products, such as tridecylalcohol ethoxylate; soaps, such as sodium stearate; salts of alkyl naphthalenesulfonates, such as sodium dibutyl naphthalenesulfonate; dialkyl esters of sulfosuccinate salts, such as sodium di(2-ethylhexyl)sulfosuccinate; sorbitol esters, such as sorbitol oleate; quaternary amines, such as lauryltrimethylammonium chloride, polyethylene glycol esters of fatty acids, such as polyethylene
15 glycol stearate; block copolymers of ethylene oxide and propylene oxide; and salts of mono- and di-alkylphosphate esters; and also further substances described e.g. in McCutcheon's Detergents and Emulsifiers Annual, MC Publishing Corp., Ridgewood New Jersey (1981).

Further adjuvants that can be used in pesticidal formulations include crystallisation inhibitors, viscosity
20 modifiers, suspending agents, dyes, anti-oxidants, foaming agents, light absorbers, mixing auxiliaries, antifoams, complexing agents, neutralising or pH-modifying substances and buffers, corrosion inhibitors, fragrances, wetting agents, take-up enhancers, micronutrients, plasticisers, glidants, lubricants, dispersants, thickeners, antifreezes, microbicides, and liquid and solid fertilisers.

The compositions according to the invention can include an additive comprising an oil of vegetable or
25 animal origin, a mineral oil, alkyl esters of such oils or mixtures of such oils and oil derivatives. The amount of oil additive in the composition according to the invention is generally from 0.01 to 10 %, based on the mixture to be applied. For example, the oil additive can be added to a spray tank in the desired concentration after a spray mixture has been prepared. Preferred oil additives comprise mineral oils or an oil of vegetable origin, for example rapeseed oil, olive oil or sunflower oil, emulsified
30 vegetable oil, alkyl esters of oils of vegetable origin, for example the methyl derivatives, or an oil of animal origin, such as fish oil or beef tallow. Preferred oil additives comprise alkyl esters of C₈-C₂₂ fatty acids, especially the methyl derivatives of C₁₂-C₁₈ fatty acids, for example the methyl esters of lauric acid, palmitic acid and oleic acid (methyl laurate, methyl palmitate and methyl oleate, respectively). Many oil derivatives are known from the Compendium of Herbicide Adjuvants, 10th Edition, Southern
35 Illinois University, 2010.

The inventive compositions generally comprise from 0.1 to 99 % by weight, especially from 0.1 to 95 % by weight, of compounds of the present invention and from 1 to 99.9 % by weight of a formulation adjuvant which preferably includes from 0 to 25 % by weight of a surface-active substance.

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Whereas commercial products may preferably be formulated as concentrates, the end user will normally employ dilute formulations.

The rates of application vary within wide limits and depend on the nature of the soil, the method of application, the crop plant, the pest to be controlled, the prevailing climatic conditions, and other factors governed by the method of application, the time of application and the target crop. As a general guideline compounds may be applied at a rate of from 1 to 2000 l/ha, especially from 10 to 1000 l/ha.

Preferred formulations can have the following compositions (weight %):

Emulsifiable concentrates:

15	active ingredient:	1 to 95 %, preferably 60 to 90 %
	surface-active agent:	1 to 30 %, preferably 5 to 20 %
	liquid carrier:	1 to 80 %, preferably 1 to 35 %

Dusts:

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

Suspension concentrates:

	active ingredient:	5 to 75 %, preferably 10 to 50 %
25	water:	94 to 24 %, preferably 88 to 30 %
	surface-active agent:	1 to 40 %, preferably 2 to 30 %

Wettable powders:

	active ingredient:	0.5 to 90 %, preferably 1 to 80 %
30	surface-active agent:	0.5 to 20 %, preferably 1 to 15 %
	solid carrier:	5 to 95 %, preferably 15 to 90 %

Granules:

	active ingredient:	0.1 to 30 %, preferably 0.1 to 15 %
35	solid carrier:	99.5 to 70 %, preferably 97 to 85 %

The following Examples further illustrate, but do not limit, the invention.

<u>Wettable powders</u>	a)	b)	c)
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active ingredients	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 combination 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 ingredients	25 %	50 %	75 %
light mineral oil	5 %	5 %	5 %
highly dispersed silicic acid	5 %	5 %	-
Kaolin	65 %	40 %	-
Talcum	-	-	20%

The combination 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.

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<u>Emulsifiable concentrate</u>	
active ingredients	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 ingredients	5 %	6 %	4 %
Talcum	95 %	-	-
Kaolin	-	94 %	-
mineral filler	-	-	96 %

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

<u>Extruder granules</u>	
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-74-

Active ingredients	15 %
sodium lignosulfonate	2 %
carboxymethylcellulose	1 %
Kaolin	82 %

The combination 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.

<u>Coated granules</u>	
Active ingredients	8 %
polyethylene glycol (mol. wt. 200)	3 %
Kaolin	89 %

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

5 Suspension concentrate

active ingredients	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 %

The finely ground combination 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.

10 Flowable concentrate for seed treatment

active ingredients	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 combination 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.

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Slow Release Capsule Suspension

28 parts of the combination 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 polyvinylalcohol, 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.

Formulation types include 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), a soluble granule (SG) or any technically feasible formulation in combination with agriculturally acceptable adjuvants.

Preparative Examples:**LCMS Methods:****Method 1:**

Spectra were recorded on a Mass Spectrometer from Agilent Technologies (6410 Triple Quadrupole Mass Spectrometer) equipped with an electrospray source (Polarity: Positive and Negative Polarity Switch, Capillary: 4.00 kV, Fragmentor: 100.00 V, Gas Temperature: 350 °C, Gas Flow: 11 L/min, Nebulizer Gas: 45 psi, Mass range: 110-1000 Da, DAD Wavelength range: 210-400 nm). Column: KINETEX EVO C18, length 50 mm, diameter 4.6 mm, particle size 2.6 µm. Column oven temperature 40 °C. Solvent gradient: A= Water with 0.1% formic acid : Acetonitrile (95:5 v/v). B= Acetonitrile with 0.1% formic acid. Gradient= 0 min 90% A, 10% B; 0.9-1.8 min 0% A, 100% B, 2.2-2.5 min 90% A, 10% B. Flow rate 1.8 mL/min.

Method 2:

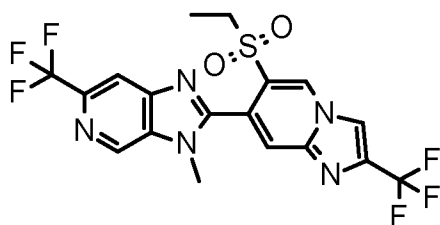
Spectra were recorded on a Mass Spectrometer from Waters (Acquity SDS Mass Spectrometer) equipped with an electrospray source (Polarity: Positive and Negative Polarity Switch, Capillary: 3.00 kV, Cone Voltage: 41.00 V, Source temperature: 150 °C, Desolvation Gas Flow: 1000 L/Hr, Desolvation temperature: 500 °C, Gas Flow @Cone: 50 L/hr, Mass range: 110-800 Da, PDA wavelength range: 210-

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400 nm. Column: Acquity UPLC HSS T3 C18, length 30 mm, diameter 2.1 mm, particle size 1.8 μ m. Column oven temperature 40 °C. Solvent gradient: A= Water with 0.1% formic acid : Acetonitrile (95:5 v/v). B= Acetonitrile with 0.05% formic acid. Gradient= 0 min 90% A, 10% B; 0.2 min 50% A, 50% B; 0.7-1.3 min 0% A, 100% B; 1.4-1.6 min 90% A, 10% B. Flow rate 0.8 mL/min.

5

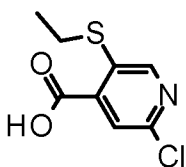
Example H1: Preparation of 2-[6-ethylsulfonyl-2-(trifluoromethyl)imidazo[1,2-a]pyridin-7-yl]-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine (Compound P4, Table P)



(Compound P4, Table P)

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Step 1: Preparation of 2-chloro-5-ethylsulfonyl-pyridine-4-carboxylic acid.

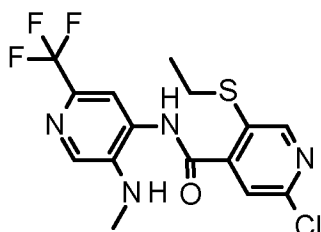


- 15 A solution of 2-chloro-5-fluoro-pyridine-4-carboxylic acid (3 g, 17.090 mmol) in tetrahydrofuran (66 mL) was cooled to 0°C, and treated portionwise at ~5°C with sodium ethanethiolate (3.774 g, 80%, 35.889 mmol). The thick mixture was shown by LC/MS to be complete after 1h at RT. The mixture was cooled to ~15°C, and treated slowly with 20 mL of aqueous HCl 2N, and extracted with EtOAc (x2), and the combined organic phases washed with aqueous NH₄Cl, dried over Na₂SO₄, filtered, and
- 20 concentrated in vacuo. The crude product was purified by combiflash (silica gel, cyclohexane:THF 20-100%,) to afford the title compound as a white solid.

¹H NMR (400 MHz, DMSO-*d*₆) δ ppm; 1.26 (t, *J*=7.34 Hz, 3 H) 3.09 (q, *J*=7.34 Hz, 2 H) 7.74 (s, 1 H) 8.46 (s, 1 H) 13.95 - 14.29 (m, 1 H)

- 25 Step 2: Preparation of 2-chloro-5-ethylsulfonyl-N-[5-(methylamino)-2-(trifluoromethyl)-4-pyridyl]pyridine-4-carboxamide

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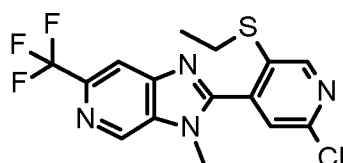


To a 0 °C cooled solution of 2-chloro-5-ethylsulfanyl-pyridine-4-carboxylic acid (0.4 g, 1.837 mmol) in dichloromethane (10 mL) and DMF (0.1 mL) was added oxalyl dichloride (0.32 mL, 3.675 mmol). The resulting mixture was stirred at room temperature for 2 hours and then concentrated *in vacuo* to remove volatiles to afford 2-chloro-5-ethylsulfanyl-pyridine-4-carbonyl chloride. This was used in the next step without further purification.

To a 0 °C cooled solution of N3-methyl-6-(trifluoromethyl)pyridine-3,4-diamine (0.259 g, 1.355 mmol, prepared as described in WO 2015000715), triethylamine (0.59 mL, 4.235 mmol) in tetrahydrofuran (30 mL) was added a solution of 2-chloro-5-ethylsulfanyl-pyridine-4-carbonyl chloride prepared as described above (0.4 g, 1.694 mmol) in tetrahydrofuran (50 mL). The reaction mixture was stirred at room temperature for 2 hours and then diluted with water (20 mL). The aqueous layer was extracted with ethyl acetate (3x50 mL). The combined organic layers were dried over sodium sulfate, filtered and concentrated *in vacuo* to afford 2-chloro-5-ethylsulfanyl-N-[5-(methylamino)-2-(trifluoromethyl)-4-pyridyl]pyridine-4-carboxamide.

LCMS: (Method 1). Retention time 0.93 min, 391 (M+H)

Step 3: Preparation of 2-(2-chloro-5-ethylsulfanyl-4-pyridyl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine



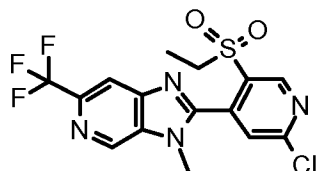
A solution of 2-chloro-5-ethylsulfanyl-N-[5-(methylamino)-2-(trifluoromethyl)-4-pyridyl]pyridine-4-carboxamide (1.0 g, 2.6 mmol) in acetic acid (10 mL) was heated at 120 °C for 12 Hr. The reaction mixture was cooled to RT, concentrated under reduced pressure to remove some of the AcOH, and then neutralised with saturated sodium carbonate solution (20 mL). The aqueous layer was extracted with ethyl acetate (3x20 mL) and the combined organic layers were dried over sodium sulfate, filtered and concentrated *in vacuo*. The crude product was purified by combiflash (silica gel, 50% EtOAc-cyclohexane) to afford 2-(2-chloro-5-ethylsulfanyl-4-pyridyl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine.

LCMS: (Method 1). Retention time 1.46 min, 373.08 (M+H)

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¹H NMR (400MHz, CHLOROFORM-d) δ = 9.00 (s, 1H), 8.55 (s, 1H), 8.18 - 8.15 (m, 1H), 7.48 (s, 1H), 3.88 - 3.85 (m, 3H), 2.88 (q, 2H), 1.24 (t, 3H)

Step 4: Preparation of 2-(2-chloro-5-ethylsulfonyl-4-pyridyl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine

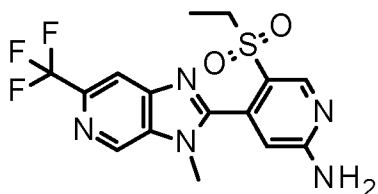


To a solution of 2-(2-chloro-5-ethylsulfonyl-4-pyridyl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine (0.24 g, 0.6438 mmol) in dichloromethane (10 mL) was added 3-chlorobenzenecarboxylic acid (0.3259 g, 1.416 mmol). The reaction was stirred at rt for 2-3 h, monitored by TLC. The reaction mixture was quenched with 1N NaOH solution, and the aqueous layer extracted with dichloromethane (3x20 mL). The combined organic layers were dried over sodium sulfate, filtered and concentrated *in vacuo*. The crude product was purified by combiflash (silica gel, 40% EtOAc-cyclohexane) to afford 2-(2-chloro-5-ethylsulfonyl-4-pyridyl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine.

LCMS: (Method 1). Retention time 1.38 min, 405.03 (M+H)

¹H NMR (400MHz, CHLOROFORM-d) δ = 9.15 (s, 1H), 9.00 (s, 1H), 8.13 - 8.10 (m, 1H), 7.56 (s, 1H), 3.82 (s, 3H), 3.39 (q, J=7.5 Hz, 2H), 1.34 - 1.28 (m, 3H).

Step 5: Preparation of 5-ethylsulfonyl-4-[3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridin-2-yl]pyridin-2-amine



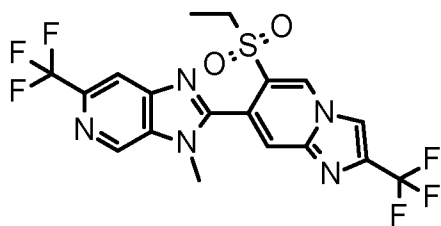
In a sealed vessel, 2-(2-chloro-5-ethylsulfonyl-4-pyridyl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine (0.15 g, 0.3706 mmol) in tetrahydrofuran (1.0 mL) and ammonium hydroxide (1.0 mL) were heated at 110 °C for 1-2 h. The reaction mixture was concentrated *in vacuo* and the crude product purified by chromatography to give 5-ethylsulfonyl-4-[3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridin-2-yl]pyridin-2-amine.

LCMS: (Method 1). Retention time 1.21 min, 386.10 (M+H)

¹H NMR (400MHz, CHLOROFORM-d) δ = 8.95 (s, 1H), 8.77 (s, 1H), 8.10 (s, 1H), 6.56 (s, 1H), 5.44 (br s, 2H), 3.81 (s, 3H), 3.24 (q, 2H), 1.26 (t, 3H).

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Step 6: Preparation of 2-[6-ethylsulfonyl-2-(trifluoromethyl)imidazo[1,2-a]pyridin-7-yl]-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine (Compound P4, Table P)



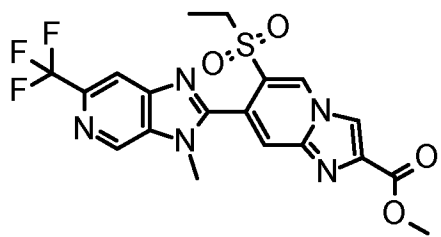
(Compound P4, Table P)

A solution of 5-ethylsulfonyl-4-[3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridin-2-yl]pyridin-2-amine (0.12 g, 0.3114 mmol), 3-bromo-1,1,1-trifluoroacetone (0.3033 g, 1.557 mmol, 0.1649 mL) and potassium carbonate (0.06455 g, 0.4670 mmol) in ethanol were placed in a microwave vial and heated in a microwave for 1.5 h at 120 °C then at 140 °C for 30 min. The reaction mixture was concentrated *in vacuo* and the crude product diluted with water (10 mL), extracted with ethyl acetate (3X20 mL). The combined organic layer was dried over sodium sulfate, filtered and concentrated *in vacuo*. The crude product was purified by combiflash (silica gel, 40% EtOAc-cyclohexane) to afford 2-[6-ethylsulfonyl-2-(trifluoromethyl)imidazo[1,2-a]pyridin-7-yl]-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine.

LCMS: (Method 1). Retention time 0.98 min, 478.06 (M+H)

¹H NMR (400 MHz, DMSO-*d*₆) δ ppm 1.16 - 1.21 (m, 3 H) 3.64 (q, 2 H) 3.85 (s, 3 H) 8.29 - 8.36 (m, 2 H) 8.91 (s, 1 H) 9.27 - 9.31 (m, 1 H) 9.51 (s, 1 H).

Example H2: Preparation of methyl 6-ethylsulfonyl-7-[3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridin-2-yl]imidazo[1,2-a]pyridine-2-carboxylate (Compound P11, Table P)



(Compound P11, Table P)

In a microwave vial, 5-ethylsulfonyl-4-[3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridin-2-yl]pyridin-2-amine (0.5 g, 1.297 mmol, prepared as in step 5, example H1) dissolved in acetonitrile (5 mL) treated with methyl 3-bromo-2-oxo-propanoate (1.174g, 6.487mmol, 0.69 mL) and potassium carbonate (0.2690 g, 1.946 mmol). The reaction mixture was subjected to microwave heating for 1.5 Hr at 120 °C then at 140 °C for 30 min. The reaction mixture was concentrated under reduced pressure to remove all volatiles. The residue was diluted with water (10 mL), and extracted with ethyl acetate (3X20 mL).

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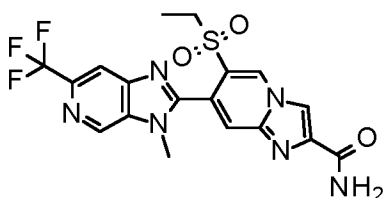
The combined organic layers were dried over sodium sulfate, filtered and concentrated *in vacuo*. The crude product was purified by chromatography over silica gel to afford methyl 6-ethylsulfonyl-7-[3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridin-2-yl]imidazo[1,2-a]pyridine-2-carboxylate.

LCMS: (Method 1). Retention time 1.24 min, 468.0 (M+H)

- 5 ^1H NMR (400 MHz, CHLOROFORM-*d*) δ ppm 1.21 - 1.40 (m, 3 H) 3.56 (d, $J=7.46$ Hz, 2 H) 3.75 - 3.95 (m, 3 H) 4.05 (s, 3 H) 7.87 (s, 1 H) 8.08 - 8.14 (m, 1 H) 8.48 (s, 1 H) 9.00 (s, 1 H) 9.09 (s, 1 H)

Example H3: Preparation of 6-ethylsulfonyl-7-[3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridin-2-yl]imidazo[1,2-a]pyridine-2-carboxamide (Compound P12, Table P)

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(Compound P12, Table P)

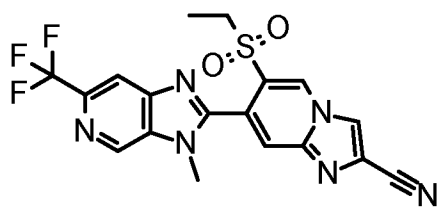
A solution of 6-ethylsulfonyl-7-[3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridin-2-yl]imidazo[1,2-a]pyridine-2-carboxylate (0.5 g, 1.07 mmol) in 1,4-dioxane (3 mL) was treated with ammonium hydroxide (30%, 6 mL) in a microwave vial, and the mixture heated at 80 °C for 1 h. The reaction mixture was concentrated under reduced pressure to remove all volatiles and the residue purified by chromatography to afford 6-ethylsulfonyl-7-[3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridin-2-yl]imidazo[1,2-a]pyridine-2-carboxamide.

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LCMS: (Method 2). Retention time 0.79 min, 453.29 (M+H)

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Example H4: Preparation of 6-ethylsulfonyl-7-[3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridin-2-yl]imidazo[1,2-a]pyridine-2-carbonitrile (Compound P2, Table P)



(Compound P2, Table P)

25

A solution of 6-ethylsulfonyl-7-[3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridin-2-yl]imidazo[1,2-a]pyridine-2-carboxamide (100 mg, 0.221 mmol) in tetrahydrofuran (1 mL) was treated with bis(trifluoromethyl) carbonate (0.043 mL, 0.331 mmol) followed by pyridine (0.054 mL, 0.663 mmol), and the resulting mixture was stirred at RT. After 1 hour, the reaction mixture was diluted with cold water (10mL), then extracted with ethyl acetate (10mLX3), and the combined organic phases dried

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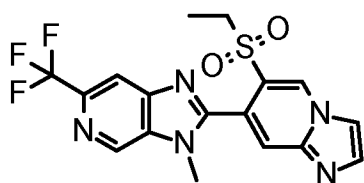
over sodium sulfate and concentrated *in vacuo*. The crude product was purified by chromatography to afford 6-ethylsulfonyl-7-[3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridin-2-yl]imidazo[1,2-a]pyridine-2-carbonitrile.

LCMS (Method 2). Retention time 0.91 shows 435.33 (M+H) mass

- 5 ¹H NMR (400 MHz, CHLOROFORM-d) δ ppm 1.40 - 1.58 (m, 3 H) 3.56 (d, J=7.46 Hz, 2 H) 3.87 (s, 3 H) 7.87 (s, 1 H) 8.13 (s, 1 H) 8.38 (s, 1 H) 9.01 (s, 1 H) 9.08 (s, 1 H).

Example H5: Preparation of 2-(6-ethylsulfonylimidazo[1,2-a]pyridin-7-yl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine (Compound P8, Table P)

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(Compound P8, Table P)

In a microwave vial, 5-ethylsulfonyl-4-[3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridin-2-yl]pyridin-2-amine (0.5 g, 1.297 mmol) in acetonitrile (5 mL) was treated with chloroacetaldehyde in water (1.018 g, 6.487 mmol, 0.8239 mL) and subjected to microwave heating for 1.0 h at 110 °C. The reaction mixture was then concentrated *in vacuo*, and the residue diluted with water (30 mL), and extracted with ethyl acetate (3x30 mL). The combined organic layers were dried over sodium sulfate, filtered and concentrated *in vacuo*. The crude product was purified by chromatography over silica gel to afford 2-(6-ethylsulfonylimidazo[1,2-a]pyridin-7-yl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine.

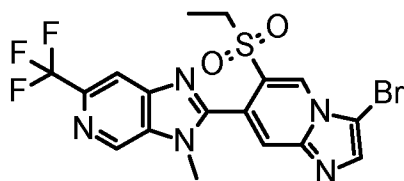
- 20 LCMS (Method 2). Retention time 0.81, 410.28 (M+H) mass

¹H NMR (400 MHz, CHLOROFORM-d) δ ppm 1.21 - 1.38 (m, 3 H) 3.53 (d, J=7.46 Hz, 2 H) 3.86 (s, 3 H) 7.27 (s, 1 H) 7.83 (s, 1 H) 7.94 (s, 1 H) 7.98 (d, J=1.22 Hz, 1 H) 8.12 (s, 1 H) 8.98 (s, 1 H) 9.08 (s, 1 H)

¹⁹F NMR (377 MHz, CHLOROFORM-d) δ ppm -66.21 (s, 1 F)

25

Example H6: Preparation of 2-(3-bromo-6-ethylsulfonyl-imidazo[1,2-a]pyridin-7-yl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine (Compound P5, Table P)



(Compound P5, Table P)

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To a solution of 2-(6-ethylsulfonylimidazo[1,2-a]pyridin-7-yl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-

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c]pyridine (0.3 g, 0.7328 mmol) in N,N-dimethylformamide (6.5 mL) was added N-bromosuccinimide (0.1581 g, 0.8793 mmol). The reaction mixture was stirred at room temperature for 1Hr, monitored by TLC. After completion, the reaction was quenched with water (10 mL), extracted with ethyl acetate (3X10 ml) and the combined organic layers were dried over sodium sulfate, filtered and concentrated *in vacuo*. The crude product was purified by chromatography to afford 2-(3-bromo-6-ethylsulfonyl-imidazo[1,2-a]pyridin-7-yl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine.

LCMS. (Method 2). Retention time 0.88 min, 488.06 (M+H)

¹H NMR (400 MHz, DMSO-d₆) δ ppm 1.13 - 1.27 (m, 3 H) 3.69 (q, 2 H) 3.85 (s, 3 H) 8.15 (s, 1 H) 8.28 - 8.33 (m, 2 H) 8.81 - 8.83 (m, 1 H) 9.28 (s, 1 H)

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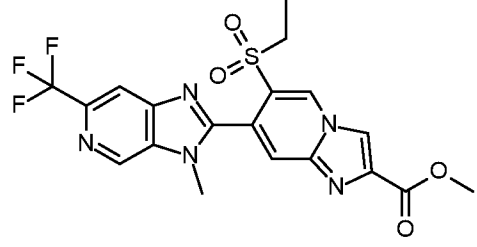
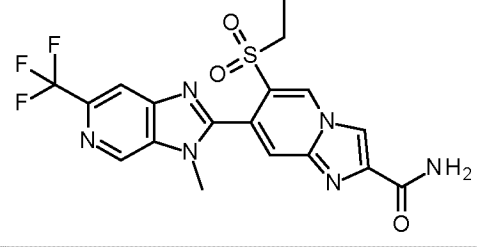
Table P: Prepared compounds with Analytical Data.

Entry	IUPAC name	STRUCTURE	RT (min)	[M+H] (measured)	Method	MP °C
P1	2-[6-ethylsulfonyl-2-(trifluoromethyl)imidazo[1,2-a]pyridin-7-yl]-1-methyl-5-(trifluoromethyl)benzimidazole		1.49	476.9	1	129 - 131
P2	6-ethylsulfonyl-7-[3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridin-2-yl]imidazo[1,2-a]pyridine-2-carbonitrile		0.92	435.31	2	293 - 295
P3	2-[6-ethylsulfonyl-2-(trifluoromethyl)imidazo[1,2-a]pyridin-7-yl]-5-(trifluoromethyl)-1,3-benzoxazole		1.54	463.9	1	262 - 264
P4	6-[6-ethylsulfonyl-2-(trifluoromethyl)imidazo[1,2-a]pyridin-7-yl]-7-methyl-3-(trifluoromethyl)imidazo[4,5-c]pyridazine		1.38	479.0	1	344 - 346

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P5	2-(3-bromo-6-ethylsulfonyl-imidazo[1,2-a]pyridin-7-yl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine		0.88	488.06	2	214 - 216
P6	2-[6-ethylsulfonyl-2-(1,1,2,2,2-pentafluoroethyl)imidazo[1,2-a]pyridin-7-yl]-3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridine		1.52	527.9	1	239 - 241
P7	2-[6-ethylsulfonyl-2-(trifluoromethyl)imidazo[1,2-a]pyridin-7-yl]-3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridine		0.96	478.32	2	260 - 262
P8	2-(6-ethylsulfonylimidazo[1,2-a]pyridin-7-yl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine		0.77	410.37	2	280 - 282
P9	2-[6-ethylsulfonyl-2-(1,1,2,2,2-pentafluoroethyl)imidazo[1,2-a]pyridin-7-yl]-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine		1.00	528.22	2	153 - 155
P10	2-[6-ethylsulfonyl-2-(trifluoromethyl)imidazo[1,2-a]pyridin-7-yl]-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine		1.42	478.03	1	287 - 289

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P11	methyl 6-ethylsulfonyl-7-[3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridin-2-yl]imidazo[1,2-a]pyridine-2-carboxylate		1.24	468.0	1	-
P12	6-ethylsulfonyl-7-[3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridin-2-yl]imidazo[1,2-a]pyridine-2-carboxamide		0.79	453.29	2	-

The following mixtures of the compounds of formula I with active ingredients are preferred (the abbreviation "TX" means "one compound selected from the group consisting of the compounds described in Tables Z-1 to Z-240, Za-1 – Za-60, Zb-1 – Zb-30 and Table P of the present invention"):

5 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 Abstracts name) (1059) + TX, 2-fluoro-N-methyl-N-1-naphthylacetamide (IUPAC name) (1295) + TX, 10 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, alpha-cypermethrin (202) + TX, amidithion (870) + TX, amidoflume [CCN] + TX, amidothioate (872) + TX, amiton (875) + TX, amiton hydrogen oxalate (875) + TX, amitraz (24) + TX, aramite (881) + TX, arsenous oxide (882) + TX, AVI 382 (compound code) + TX, AZ 60541 (compound code) + TX, 15 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, bromophos-ethyl (921) + TX, bromopropylate (94) + TX, 20 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) + TX, chlorfenapyr (130) + TX, 25 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

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(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, diafenthiuron (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, flucyclohexuron (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

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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,

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,

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,

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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, 5 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, 10 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* 15 *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* 20 *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* 25 *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, 30 *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, 35 *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*

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(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,

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,

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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) + 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-xylyloxy)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-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-xylyl 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 (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 (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

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(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) (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) + 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, 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) + TX, chlorfluazuron (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, clocythrins (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, coumaphos (174) + TX, coumithoate (1006) + TX, crotamiton (alternative name) [CCN] + TX, crotoxyphos (1010) + TX, cruformate (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) [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) + TX, dimpropyridaz + 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, dictrotophos (243) + TX, dicyclanil (244) + TX, dieldrin (1070) + TX, diethyl 5-methylpyrazol-3-yl phosphate (IUPAC name)

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(1076) + TX, diflubenzuron (250) + TX, dilor (alternative name) [CCN] + TX, dimefluthrin [CCN] + TX, dimefox (1081) + TX, dimetan (1085) + TX, dimethoate (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, 5 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 (development code) (1118) + TX, emamectin (291) + TX, emamectin benzoate (291) + TX, EMPC (1120) + TX, empenthrin (292) + TX, endosulfan (294) + TX, endothion (1121) + TX, endrin 10 (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 name) [CCN] + TX, ethyl-DDD (alternative name) (1056) + TX, ethylene dibromide (316) + TX, ethylene dichloride (chemical name) (1136) + TX, 15 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, fenpropathrin (342) + TX, fenpyrad (alternative name) + TX, fensulfothion (1158) + TX, fenthion (346) + TX, fenthion-ethyl 20 [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) + TX, fonofos (1191) + TX, formetanate (405) + TX, formetanate hydrochloride (405) 25 + 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, 30 heptenophos (432) + TX, heterophos [CCN] + TX, 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) + 35 TX, isolane (1237) + TX, isoprocarb (472) + TX, isopropyl O-(methoxy-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 (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,

5 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) + 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,

10 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 isothiocyanate (543) + TX, methylchloroform (alternative name) [CCN] + TX, methylene chloride [CCN] + TX, metofluthrin [CCN] + TX, metolcarb (550) + TX, metoxadiazone (1288) + TX, mevinphos (556) + TX,

15 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, 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,

20 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, normicotine (traditional name) (1319) + TX, novaluron (585) + TX, noviflumuron (586) + TX, *O*-5-dichloro-4-iodophenyl *O*-ethyl ethylphosphonothioate (IUPAC name) (1057) + TX, *O,O*-diethyl *O*-4-methyl-2-oxo-2*H*-chromen-7-yl phosphorothioate (IUPAC name) (1074)

25 + 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) + 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,

35 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,

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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,
 5 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,
 10 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) +
 15 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, spirotetmat (CCN) + TX, sulcofuron (746) + TX, sulcofuron-sodium
 20 (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
 25 [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] +
 30 TX, tolfenpyrad (809) + TX, tralomethrin (812) + TX, transfluthrin (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
 35 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, cyenopyrafen [560121-
 52-0] + TX, cyflumetofen [400882-07-7] + TX, pyrifluquinazon [337458-27-2] + TX, spinetoram

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- [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, fluxametamide (WO 2007/026965) + TX, epsilon-metofluthrin [240494-71-7] + TX, epsilon-momfluorothrin [1065124-65-3] + TX,
- 5 fluazaindolizine [1254304-22-7] + TX, chloroprallethrin [399572-87-3] + TX, fluxametamide [928783-29-3] + TX, cyhalodiamide [1262605-53-7] + TX, tioxazafen [330459-31-9] + TX, broflanilide [1207727-04-5] + TX, flufiprole [704886-18-0] + TX, cyclanilprole [1031756-98-5] + TX, tetranilprole [1229654-66-3] + TX, guadipyr (described in WO2010/060231) + TX, cycloxaprid (described in WO 2005/077934) + TX, spiropidion + TX, Afidopyropen + TX, flupyrimin + TX, Momfluorothrin + TX,
- 10 kappa-bifenthrin + TX, kappa-tefluthrin + TX, Dichloromezotiaz + TX, Tetrachloranilprole + TX, benzpyrimoxan + 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, trimethacarb (840) + TX, triphenyltin acetate (IUPAC name) (347) and triphenyltin hydroxide (IUPAC name) (347) + TX, pyriprole [394730-71-3] + TX,
- 20 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)
- 25 + TX, 6-isopentenylaminopurine (alternative name) (210) + TX, abamectin (1) + TX, acetoprole [CCN] + TX, alanycarb (15) + TX, aldicarb (16) + TX, aldoxycarb (863) + 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,
- 30 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) + TX, doramectin (alternative name) [CCN] + TX, emamectin (291) + TX, emamectin benzoate (291) + TX, eprinomectin (alternative name) [CCN] + TX, ethoprophos (312) + TX,
- 35 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, isazofos (1231) + TX, ivermectin (alternative

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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 (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, xlenols [CCN] + TX, YI-5302 (compound code) and zeatin (alternative name) (210) + TX, fluensulfone [318290-98-1] + TX, fluopyram + TX,

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,

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, bisthiosemi (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, flupropadine (1183) + TX, flupropadine hydrochloride (1183) + TX, gamma-HCH (430) + TX, HCH (430) + TX, hydrogen cyanide (444) + TX, iodomethane (IUPAC name) (542) + TX, lindane (430) + TX, 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,

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,

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propyl isomer (1358) + TX, S421 (development code) (724) + TX, sesamex (1393) + TX, sesasmolin (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, 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,

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

and biologically active compounds selected from the group consisting of ametocetradin [865318-97-4] + TX, amisulbrom [348635-87-0] + TX, azaconazole (60207-31-0) + TX, benzovindiflupyr [1072957-71-1] + TX, bitertanol [70585-36-3] + 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, pyrifenoxy [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,

30 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, fenpropidine [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, 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]

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+ TX, chlozolate [84332-86-5] + TX, dichlozolate [24201-58-9] + TX, iprodione [36734-19-7] + TX, myclozolate [54864-61-8] + TX, procymidone [32809-16-8] + TX, vinclozolate [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, oryastrobin [248593-16-0] + TX, picoxystrobin [117428-22-5] + TX, pyraclostrobin [175013-18-0] + TX, pyraoxystrobin [862588-11-2] + TX, fluoxapiprolin [1360819-11-9] + 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, captafol [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, acibenzo-lar-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, 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 [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 [11113-80-7] + 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, quinoxifen [124495-18-7] + TX, quintozone [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-

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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-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'-trifluoro-biphenyl-2-yl)-amide (disclosed in WO 2006/087343) + TX, [(3*S*,4*R*,4*aR*,6*S*,6*aS*,12*R*,12*aS*,12*bS*)-3-[(cyclopropylcarbonyl)oxy]-1,3,4,4*a*,5,6,6*a*,12,12*a*,12*b*-decahydro-6,12-dihydroxy-4,6*a*,12*b*-trimethyl-11-oxo-9-(3-pyridinyl)-2*H*,11*H*naphtho[2,1-*b*]pyrano[3,4-*e*]pyran-4-yl)methyl-cyclopropanecarboxylate [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; lancotrione [1486617-21-3] + TX, florpyrauxifen [943832-81-3] + TX, ipfentrifluconazole [1417782-08-1] + TX, mefentrifluconazole [1417782-03-6] + TX, quinofumelin [861647-84-9] + TX, chloroprallethrin [399572-87-3] + TX, cyhalodiamide [1262605-53-7] + TX, fluazaindolizine [1254304-22-7] + TX, fluxametamide [928783-29-3] + TX, epsilon-metofluthrin [240494-71-7] + TX, epsilon-momfluorothrin [1065124-65-3] + TX, pydiflumetofen [1228284-64-7] + TX, kappa-bifenthrin [439680-76-9] + TX, broflanilide [1207727-04-5] + TX, dicloromezotiaz [1263629-39-5] + TX, dipymetitron [16114-35-5] + TX, pyraziflumid [942515-63-1] + TX, kappa-tefluthrin [391634-71-2] + TX, fencicoxamid [517875-34-2] + TX; fluindapyr [1383809-87-7] + TX; alpha-bromadiolone [28772-56-7] + TX; flupyrimin [1689566-03-7] + TX; benzpyrimoxan [1449021-97-9] + TX; acynonapyr [1332838-17-1] + TX; inpyrfluxam [1352994-67-2] + TX, isoflucypram [1255734-28-1] + TX; rescalure [64309-03-1] + TX; aminopyrifen [1531626-08-0] + TX; tyclopyrazoflor [1477919-27-9] + TX; and spiropidion [1229023-00-0] + TX; and

microbials including: *Acinetobacter lwoffii* + TX, *Acremonium alternatum* + TX + TX, *Acremonium cephalosporium* + TX + TX, *Acremonium diospyri* + TX, *Acremonium obclavatum* + TX, *Adoxophyes orana granulovirus* (AdoxGV) (Capex®) + TX, *Agrobacterium radiobacter* strain K84 (Galltrol-A®) + TX, *Alternaria alternate* + TX, *Alternaria cassia* + TX, *Alternaria destruens* (Smolder®) + TX, *Ampelomyces quisqualis* (AQ10®) + TX, *Aspergillus flavus* AF36 (AF36®) + TX, *Aspergillus flavus* NRRL 21882 (Aflaguard®) + TX, *Aspergillus* spp. + TX, *Aureobasidium pullulans* + TX, *Azospirillum* + TX, (MicroAZ® + TX, TAZO B®) + TX, *Azotobacter* + TX, *Azotobacter chroococcum* (Azotomeal®) + TX, *Azotobacter* cysts (Bionatural Blooming Blossoms®) + TX, *Bacillus amyloliquefaciens* + TX, *Bacillus cereus* + TX, *Bacillus chitinosporus* strain CM-1 + TX, *Bacillus chitinosporus* strain AQ746 + TX, *Bacillus licheniformis* strain HB-2 (Biostart™ Rhizoboost®) + TX, *Bacillus licheniformis* strain 3086 (EcoGuard® + TX, Green Releaf®) + TX, *Bacillus circulans* + TX, *Bacillus firmus* (BioSafe® + TX, BioNem-WP® + TX, VOTiVO®) + TX, *Bacillus firmus* strain I-1582 + TX, *Bacillus macerans* + TX, *Bacillus marismortui* + TX, *Bacillus megaterium* + TX, *Bacillus mycoides* strain AQ726 + TX, *Bacillus papillae* (Milky Spore Powder®) + TX, *Bacillus pumilus* spp. + TX, *Bacillus pumilus* strain GB34 (Yield Shield®) + TX, *Bacillus pumilus* strain AQ717 + TX, *Bacillus pumilus* strain QST 2808 (Sonata® + TX, Ballad Plus®) + TX, *Bacillus spahericus* (VectoLex®) + TX, *Bacillus* spp. + TX, *Bacillus* spp. strain

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- AQ175 + TX, *Bacillus* spp. strain AQ177 + TX, *Bacillus* spp. strain AQ178 + TX, *Bacillus subtilis* strain QST 713 (CEASE® + TX, Serenade® + TX, Rhapsody®) + TX, *Bacillus subtilis* strain QST 714 (JAZZ®) + TX, *Bacillus subtilis* strain AQ153 + TX, *Bacillus subtilis* strain AQ743 + TX, *Bacillus subtilis* strain QST3002 + TX, *Bacillus subtilis* strain QST3004 + TX, *Bacillus subtilis* var. *amyloliquefaciens* strain FZB24 (Taegro® + TX, Rhizopro®) + TX, *Bacillus thuringiensis* Cry 2Ae + TX, *Bacillus thuringiensis* Cry1Ab + TX, *Bacillus thuringiensis* aizawai GC 91 (Agree®) + TX, *Bacillus thuringiensis israelensis* (BMP123® + TX, Aquabac® + TX, VectoBac®) + TX, *Bacillus thuringiensis kurstaki* (Javelin® + TX, Deliver® + TX, CryMax® + TX, Bonide® + TX, Scutella WP® + TX, Turilav WP® + TX, Astuto® + TX, Dipel WP® + TX, Biobit® + TX, Foray®) + TX, *Bacillus thuringiensis kurstaki* BMP 123 (Baritone®) + TX, *Bacillus thuringiensis kurstaki* HD-1 (Bioprotec-CAF / 3P®) + TX, *Bacillus thuringiensis* strain BD#32 + TX, *Bacillus thuringiensis* strain AQ52 + TX, *Bacillus thuringiensis* var. *aizawai* (XenTari® + TX, DiPel®) + TX, bacteria spp. (GROWMEND® + TX, GROWSWEET® + TX, Shootup®) + TX, bacteriophage of *Clavipacter michiganensis* (AgriPhage®) + TX, Bakflor® + TX, *Beauveria bassiana* (Beaugenic® + TX, Brocaril WP®) + TX, *Beauveria bassiana* GHA (Mycotrol ES® + TX, Mycotrol O® + TX, BotaniGuard®) + TX, *Beauveria brongniartii* (Engerlingspilz® + TX, Schweizer Beauveria® + TX, Melocont®) + TX, *Beauveria* spp. + TX, *Botrytis cineria* + TX, *Bradyrhizobium japonicum* (TerraMax®) + TX, *Brevibacillus brevis* + TX, *Bacillus thuringiensis tenebrionis* (Novodor®) + TX, BtBooster + TX, *Burkholderia cepacia* (Deny® + TX, Intercept® + TX, Blue Circle®) + TX, *Burkholderia gladii* + TX, *Burkholderia gladioli* + TX, *Burkholderia* spp. + TX, Canadian thistle fungus (CBH Canadian Bioherbicide®) + TX, *Candida butyri* + TX, *Candida famata* + TX, *Candida fructus* + TX, *Candida glabrata* + TX, *Candida guilliermondii* + TX, *Candida melibiosica* + TX, *Candida oleophila* strain O + TX, *Candida parapsilosis* + TX, *Candida pelliculosa* + TX, *Candida pulcherrima* + TX, *Candida reukaufii* + TX, *Candida saitoana* (Bio-Coat® + TX, Biocure®) + TX, *Candida sake* + TX, *Candida* spp. + TX, *Candida tenuis* + TX, *Cedecea dravisae* + TX, *Cellulomonas flavigena* + TX, *Chaetomium cochliodes* (Nova-Cide®) + TX, *Chaetomium globosum* (Nova-Cide®) + TX, *Chromobacterium subtsugae* strain PRAA4-1T (Grandevo®) + TX, *Cladosporium cladosporioides* + TX, *Cladosporium oxysporum* + TX, *Cladosporium chlorocephalum* + TX, *Cladosporium* spp. + TX, *Cladosporium tenuissimum* + TX, *Clonostachys rosea* (EndoFine®) + TX, *Colletotrichum acutatum* + TX, *Coniothyrium minitans* (Cotans WG®) + TX, *Coniothyrium* spp. + TX, *Cryptococcus albidus* (YIELDPLUS®) + TX, *Cryptococcus humicola* + TX, *Cryptococcus infirmo-minutus* + TX, *Cryptococcus laurentii* + TX, *Cryptophlebia leucotreta granulovirus* (Cryptex®) + TX, *Cupriavidus campinensis* + TX, *Cydia pomonella granulovirus* (CYD-X®) + TX, *Cydia pomonella granulovirus* (Madex® + TX, Madex Plus® + TX, Madex Max/ Carpovirusine®) + TX, *Cylindrobasidium laeve* (Stumpout®) + TX, *Cylindrocladium* + TX, *Debaryomyces hansenii* + TX, *Drechslera hawaiiensis* + TX, *Enterobacter cloacae* + TX, *Enterobacteriaceae* + TX, *Entomophthora virulenta* (Vektor®) + TX, *Epicoccum nigrum* + TX, *Epicoccum purpurascens* + TX, *Epicoccum* spp. + TX, *Filobasidium floriforme* + TX, *Fusarium acuminatum* + TX, *Fusarium chlamydosporum* + TX, *Fusarium oxysporum* (Fusaclean® / Biofox C®) + TX, *Fusarium proliferatum* + TX, *Fusarium* spp. + TX, *Galactomyces geotrichum* + TX, *Gliocladium catenulatum* (Primastop® + TX, Prestop®) + TX, *Gliocladium roseum* +

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- TX, *Gliocladium* spp. (SoilGard®) + TX, *Gliocladium virens* (Soilgard®) + TX, *Granulovirus* (Granupom®) + TX, *Halobacillus halophilus* + TX, *Halobacillus litoralis* + TX, *Halobacillus trueperi* + TX, *Halomonas* spp. + TX, *Halomonas subglaciescola* + TX, *Halovibrio variabilis* + TX, *Hanseniaspora uvarum* + TX, *Helicoverpa armigera nucleopolyhedrovirus* (Helicovex®) + TX, *Helicoverpa zea nuclear polyhedrosis virus* (Gemstar®) + TX, Isoflavone – formononetin (Myconate®) + TX, *Kloeckera apiculata* + TX, *Kloeckera* spp. + TX, *Lagenidium giganteum* (Laginex®) + TX, *Lecanicillium longisporum* (Vertiblast®) + TX, *Lecanicillium muscarium* (Vertikil®) + TX, *Lymantria Dispar nucleopolyhedrosis virus* (Disparvirus®) + TX, *Marinococcus halophilus* + TX, *Meira geulakonigii* + TX, *Metarhizium anisopliae* (Met52®) + TX, *Metarhizium anisopliae* (Destruxin WP®) + TX, *Metschnikowia fruticola* (Shemer®) + TX, *Metschnikowia pulcherrima* + TX, *Microdochium dimerum* (Antibot®) + TX, *Micromonospora coerulea* + TX, *Microsphaeropsis ochracea* + TX, *Muscodor albus* 620 (Muscudor®) + TX, *Muscodor roseus* strain A3-5 + TX, *Mycorrhizae* spp. (AMykor® + TX, Root Maximizer®) + TX, *Myrothecium verrucaria* strain AARC-0255 (DiTera®) + TX, BROS PLUS® + TX, *Ophiostoma piliferum* strain D97 (Sylvanex®) + TX, *Paecilomyces farinosus* + TX, *Paecilomyces fumosoroseus* (PFR-97® + TX, PreFeRaI®) + TX, *Paecilomyces linacinus* (Biostat WP®) + TX, *Paecilomyces lilacinus* strain 251 (MeloCon WG®) + TX, *Paenibacillus polymyxa* + TX, *Pantoea agglomerans* (BlightBan C9-1®) + TX, *Pantoea* spp. + TX, *Pasteuria* spp. (Econem®) + TX, *Pasteuria nishizawae* + TX, *Penicillium aurantiogriseum* + TX, *Penicillium billai* (Jumpstart® + TX, TagTeam®) + TX, *Penicillium brevicompactum* + TX, *Penicillium frequentans* + TX, *Penicillium griseofulvum* + TX, *Penicillium purpurogenum* + TX, *Penicillium* spp. + TX, *Penicillium viridicatum* + TX, *Phlebiopsis gigantea* (Rotstop®) + TX, phosphate solubilizing bacteria (Phosphomeal®) + TX, *Phytophthora cryptogea* + TX, *Phytophthora palmivora* (Devine®) + TX, *Pichia anomala* + TX, *Pichia guillemontii* + TX, *Pichia membranaefaciens* + TX, *Pichia onychis* + TX, *Pichia stipites* + TX, *Pseudomonas aeruginosa* + TX, *Pseudomonas aureofasciens* (Spot-Less Biofungicide®) + TX, *Pseudomonas cepacia* + TX, *Pseudomonas chlororaphis* (AtEze®) + TX, *Pseudomonas corrugate* + TX, *Pseudomonas fluorescens* strain A506 (BlightBan A506®) + TX, *Pseudomonas putida* + TX, *Pseudomonas reactans* + TX, *Pseudomonas* spp. + TX, *Pseudomonas syringae* (Bio-Save®) + TX, *Pseudomonas viridiflava* + TX, *Pseudomonas fluorescens* (Zequanox®) + TX, *Pseudozyma flocculosa* strain PF-A22 UL (Sporodex L®) + TX, *Puccinia canaliculata* + TX, *Puccinia thlaspeos* (Wood Warrior®) + TX, *Pythium paroecandrum* + TX, *Pythium oligandrum* (Polygandron® + TX, Polyversum®) + TX, *Pythium periplocum* + TX, *Rhanella aquatilis* + TX, *Rhanella* spp. + TX, *Rhizobia* (Dormal® + TX, Vault®) + TX, *Rhizoctonia* + TX, *Rhodococcus globerulus* strain AQ719 + TX, *Rhodosporidium diobovatum* + TX, *Rhodosporidium toruloides* + TX, *Rhodotorula* spp. + TX, *Rhodotorula glutinis* + TX, *Rhodotorula graminis* + TX, *Rhodotorula mucilagnosa* + TX, *Rhodotorula rubra* + TX, *Saccharomyces cerevisiae* + TX, *Salinococcus roseus* + TX, *Sclerotinia minor* + TX, *Sclerotinia minor* (SARRITOR®) + TX, *Scytalidium* spp. + TX, *Scytalidium uredinicola* + TX, *Spodoptera exigua nuclear polyhedrosis virus* (Spod-X® + TX, Spexit®) + TX, *Serratia marcescens* + TX, *Serratia plymuthica* + TX, *Serratia* spp. + TX, *Sordaria fimicola* + TX, *Spodoptera littoralis nucleopolyhedrovirus* (Littovir®) + TX, *Sporobolomyces roseus* + TX, *Stenotrophomonas maltophilia* + TX, *Streptomyces ahygroscopicus* +

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- TX, *Streptomyces albaduncus* + TX, *Streptomyces exfoliates* + TX, *Streptomyces galbus* + TX, *Streptomyces griseoplanus* + TX, *Streptomyces griseoviridis* (Mycostop®) + TX, *Streptomyces lydicus* (Actinovate®) + TX, *Streptomyces lydicus* WYEC-108 (ActinoGrow®) + TX, *Streptomyces violaceus* + TX, *Tilletiopsis minor* + TX, *Tilletiopsis* spp. + TX, *Trichoderma asperellum* (T34 Biocontrol®) + TX,
- 5 *Trichoderma gamsii* (Tenet®) + TX, *Trichoderma atroviride* (Plantmate®) + TX, *Trichoderma hamatum* TH 382 + TX, *Trichoderma harzianum rifai* (Mycostar®) + TX, *Trichoderma harzianum* T-22 (Triatum-P®) + TX, PlantShield HC® + TX, RootShield® + TX, Triatum-G® + TX, *Trichoderma harzianum* T-39 (Trichodex®) + TX, *Trichoderma inhamatum* + TX, *Trichoderma koningii* + TX, *Trichoderma* spp. LC 52 (Sentinel®) + TX, *Trichoderma lignorum* + TX, *Trichoderma longibrachiatum* + TX, *Trichoderma polysporum* (Binab T®) + TX, *Trichoderma taxi* + TX, *Trichoderma virens* + TX, *Trichoderma virens* (formerly Gliocladium virens GL-21) (SoilGuard®) + TX, *Trichoderma viride* + TX, *Trichoderma viride* strain ICC 080 (Remedier®) + TX, *Trichosporon pullulans* + TX, *Trichosporon* spp. + TX, *Trichothecium* spp. + TX, *Trichothecium roseum* + TX, *Typhula phacorrhiza* strain 94670 + TX, *Typhula phacorrhiza* strain 94671 + TX, *Ulocladium atrum* + TX, *Ulocladium oudemansii* (Botry-Zen®)
- 10 + TX, *Ustilago maydis* + TX, various bacteria and supplementary micronutrients (Natural II®) + TX, various fungi (Millennium Microbes®) + TX, *Verticillium chlamydosporium* + TX, *Verticillium lecanii* (Mycotal® + TX, Vertalec®) + TX, Vip3Aa20 (VIPtera®) + TX, *Virgibacillus marismortui* + TX, *Xanthomonas campestris* pv. *Poae* (Camperico®) + TX, *Xenorhabdus bovienii* + TX, *Xenorhabdus nematophilus*; and
- 20 Plant extracts including: pine oil (Retenol®) + TX, azadirachtin (Plasma Neem Oil® + TX, AzaGuard® + TX, MeemAzal® + TX, Molt-X® + TX, Botanical IGR (Neemazad® + TX, Neemix®) + TX, canola oil (Lilly Miller Vegol®) + TX, *Chenopodium ambrosioides* near *ambrosioides* (Requiem®) + TX, *Chrysanthemum* extract (Crisant®) + TX, extract of neem oil (Trilogy®) + TX, essentials oils of *Labiatae* (Botania®) + TX, extracts of clove rosemary peppermint and thyme oil (Garden insect killer®)
- 25 + TX, Glycinebetaine (Greenstim®) + TX, garlic + TX, lemongrass oil (GreenMatch®) + TX, neem oil + TX, *Nepeta cataria* (Catnip oil) + TX, *Nepeta catarina* + TX, nicotine + TX, oregano oil (MossBuster®) + TX, *Pedaliaceae* oil (Nematon®) + TX, pyrethrum + TX, *Quillaja saponaria* (NemaQ®) + TX, *Reynoutria sachalinensis* (Regalia® + TX, Sakalia®) + TX, rotenone (Eco Roten®) + TX, *Rutaceae* plant extract (Soleo®) + TX, soybean oil (Ortho ecosense®) + TX, tea tree oil (Timorex Gold®) + TX,
- 30 thymus oil + TX, AGNIQUE® MMF + TX, BugOil® + TX, mixture of rosemary sesame peppermint thyme and cinnamon extracts (EF 300®) + TX, mixture of clove rosemary and peppermint extract (EF 400®) + TX, mixture of clove peppermint garlic oil and mint (Soil Shot®) + TX, kaolin (Screen®) + TX, storage glucan of brown algae (Laminarin®); and
- pheromones including: blackheaded fireworm pheromone (3M Sprayable Blackheaded Fireworm
- 35 Pheromone®) + TX, Codling Moth Pheromone (Paramount dispenser-(CM)/ Isomate C-Plus®) + TX, Grape Berry Moth Pheromone (3M MEC-GBM Sprayable Pheromone®) + TX, Leafroller pheromone (3M MEC – LR Sprayable Pheromone®) + TX, Muscamone (Snip7 Fly Bait® + TX, Starbar Premium Fly Bait®) + TX, Oriental Fruit Moth Pheromone (3M oriental fruit moth sprayable pheromone®) + TX,

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Peachtree Borer Pheromone (Isomate-P®) + TX, Tomato Pinworm Pheromone (3M Sprayable pheromone®) + TX, Entostat powder (extract from palm tree) (Exosex CM®) + TX, (E + TX,Z + TX,Z)-3 + TX,8 + TX,11 Tetradecatrienyl acetate + TX, (Z + TX,Z + TX,E)-7 + TX,11 + TX,13-Hexadecatrienal + TX, (E + TX,Z)-7 + TX,9-Dodecadien-1-yl acetate + TX, 2-Methyl-1-butanol + TX,
 5 Calcium acetate + TX, Scenturion® + TX, Biolure® + TX, Check-Mate® + TX, Lavandulyl senecioate; and

Macrobials including: *Aphelinus abdominalis* + TX, *Aphidius ervi* (Aphelinus-System®) + TX, *Acerophagus papaya* + TX, *Adalia bipunctata* (Adalia-System®) + TX, *Adalia bipunctata* (Adaline®) + TX, *Adalia bipunctata* (Aphidalia®) + TX, *Ageniaspis citricola* + TX, *Ageniaspis fuscicollis* + TX,
 10 *Amblyseius andersoni* (Anderline® + TX, Andersoni-System®) + TX, *Amblyseius californicus* (Amblyline® + TX, Spical®) + TX, *Amblyseius cucumeris* (Thripex® + TX, Bugline cucumeris®) + TX, *Amblyseius fallacis* (Fallacis®) + TX, *Amblyseius swirskii* (Bugline swirskii® + TX, Swirskii-Mite®) + TX, *Amblyseius womersleyi* (WomerMite®) + TX, *Amitus hesperidum* + TX, *Anagrus atomus* + TX, *Anagrus fusciventris* + TX, *Anagrus kamali* + TX, *Anagrus loecki* + TX, *Anagrus pseudococci*
 15 (Citripar®) + TX, *Anicetus benefices* + TX, *Anisopteromalus calandrae* + TX, *Anthocoris nemoralis* (Anthocoris-System®) + TX, *Aphelinus abdominalis* (Apheline® + TX, Aphiline®) + TX, *Aphelinus asychis* + TX, *Aphidius colemani* (Ahipar®) + TX, *Aphidius ervi* (Ervipar®) + TX, *Aphidius gifuensis* + TX, *Aphidius matricariae* (Ahipar-M®) + TX, *Aphidoletes aphidimyza* (Aphidend®) + TX, *Aphidoletes aphidimyza* (Aphidoline®) + TX, *Aphytis lingnanensis* + TX, *Aphytis melinus* + TX, *Aprostocetus*
 20 *hagenowii* + TX, *Atheta coriaria* (Staphyline®) + TX, *Bombus* spp. + TX, *Bombus terrestris* (Natupol Beehive®) + TX, *Bombus terrestris* (Beeline® + TX, Tripol®) + TX, *Cephalonomia stephanoderis* + TX, *Chilocorus nigritus* + TX, *Chrysoperla carnea* (Chrysoline®) + TX, *Chrysoperla carnea* (Chrysopa®) + TX, *Chrysoperla rufilabris* + TX, *Cirrospilus ingenuus* + TX, *Cirrospilus quadristriatus* + TX, *Citrostichus phyllocnistoides* + TX, *Closterocerus chamaeleon* + TX, *Closterocerus* spp. + TX,
 25 *Coccidoxenoides perminutus* (Planopar®) + TX, *Coccophagus cowperi* + TX, *Coccophagus lycimnia* + TX, *Cotesia flavipes* + TX, *Cotesia plutellae* + TX, *Cryptolaemus montrouzieri* (Cryptobug® + TX, Cryptoline®) + TX, *Cybocephalus nipponicus* + TX, *Dacnusa sibirica* + TX, *Dacnusa sibirica* (Minusa®) + TX, *Diglyphus isaea* (Diminex®) + TX, *Delphastus catalinae* (Delphastus®) + TX, *Delphastus pusillus* + TX, *Diachasmimorpha krausii* + TX, *Diachasmimorpha longicaudata* + TX,
 30 *Diaparsis jucunda* + TX, *Diaphorencyrtus aligarhensis* + TX, *Diglyphus isaea* + TX, *Diglyphus isaea* (Miglyphus® + TX, Digline®) + TX, *Dacnusa sibirica* (DacDigline® + TX, Minex®) + TX, *Diversinervus* spp. + TX, *Encarsia citrina* + TX, *Encarsia formosa* (Encarsia max® + TX, Encarline® + TX, En-Strip®) + TX, *Eretmoceris eremicus* (Enermix®) + TX, *Encarsia guadeloupae* + TX, *Encarsia haitiensis* + TX, *Episyrphus balteatus* (Syrphidend®) + TX, *Eretmoceris siphonini* + TX, *Eretmoceris*
 35 *californicus* + TX, *Eretmoceris eremicus* (Ercal® + TX, Eretline e®) + TX, *Eretmoceris eremicus* (Bemimix®) + TX, *Eretmoceris hayati* + TX, *Eretmoceris mundus* (Bemipar® + TX, Eretline m®) + TX, *Eretmoceris siphonini* + TX, *Exochomus quadripustulatus* + TX, *Feltiella acarisuga* (Spidend®) + TX, *Feltiella acarisuga* (Feltiline®) + TX, *Fopius arisanus* + TX, *Fopius ceratitivorius* + TX, Formononetin (Wirless Beehome®) + TX, *Franklinothrips vespiformis* (Vespop®) + TX, *Galendromus*

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- occidentalis* + TX, *Goniozus legneri* + TX, *Habrobracon hebetor* + TX, *Harmonia axyridis* (HarmoBeetle®) + TX, *Heterorhabditis* spp. (Lawn Patrol®) + TX, *Heterorhabditis bacteriophora* (NemaShield HB®) + TX, *Nemaseek*® + TX, *Terranem-Nam*® + TX, *Terranem*® + TX, *Larvanem*® + TX, *B-Green*® + TX, *NemAttack*® + TX, *Nematop*® + TX, *Heterorhabditis megidis* (Nemasys H®) + TX, *BioNem H*® + TX, *Exhibitline hm*® + TX, *Larvanem-M*® + TX, *Hippodamia convergens* + TX, *Hypoaspis aculeifer* (Aculeifer-System®) + TX, *Entomite-A*® + TX, *Hypoaspis miles* (Hypoline m®) + TX, *Entomite-M*® + TX, *Lbalia leucospoides* + TX, *Lecanoideus floccissimus* + TX, *Lemophagus errabundus* + TX, *Leptomastidea abnormis* + TX, *Leptomastix dactylopii* (Leptopar®) + TX, *Leptomastix epona* + TX, *Lindorus lophanthae* + TX, *Lipolexis oregmae* + TX, *Lucilia caesar* (NatuFly®) + TX, *Lysiphlebus testaceipes* + TX, *Macrolophus caliginosus* (Mirical-N®) + TX, *Macroline c*® + TX, *Mirical*® + TX, *Mesoseiulus longipes* + TX, *Metaphycus flavus* + TX, *Metaphycus lounsburyi* + TX, *Micromus angulatus* (Milacewing®) + TX, *Microterys flavus* + TX, *Muscidifurax raptorellus* and *Spalangia cameroni* (Biopar®) + TX, *Neodryinus typhlocybae* + TX, *Neoseiulus californicus* + TX, *Neoseiulus cucumeris* (THRYPEX®) + TX, *Neoseiulus fallacis* + TX, *Nesideocoris tenuis* (NesidioBug®) + TX, *Nesibug*® + TX, *Ophyra aenescens* (Biofly®) + TX, *Orius insidiosus* (Thripor-l®) + TX, *Oriline i*® + TX, *Orius laevigatus* (Thripor-L®) + TX, *Oriline l*® + TX, *Orius majusculus* (Oriline m®) + TX, *Orius strigicollis* (Thripor-S®) + TX, *Pauesia juniperorum* + TX, *Pediobius foveolatus* + TX, *Phasmarhabditis hermaphrodita* (Nemaslug®) + TX, *Phymastichus coffea* + TX, *Phytoseiulus macropilus* + TX, *Phytoseiulus persimilis* (Spidex®) + TX, *Phytoline p*® + TX, *Podisus maculiventris* (Podisus®) + TX, *Pseudacteon curvatus* + TX, *Pseudacteon obtusus* + TX, *Pseudacteon tricuspis* + TX, *Pseudaphycus maculipennis* + TX, *Pseudleptomastix mexicana* + TX, *Psyllaephagus pilosus* + TX, *Psytalia concolor* (complex) + TX, *Quadrastichus* spp. + TX, *Rhyzobius lophanthae* + TX, *Rodolia cardinalis* + TX, *Rumina decollate* + TX, *Semiellacher petiolatus* + TX, *Sitobion avenae* (Ervibank®) + TX, *Steinernema carpocapsae* (Nematac C®) + TX, *Millenium*® + TX, *BioNem C*® + TX, *NemAttack*® + TX, *Nemastar*® + TX, *Capsanem*® + TX, *Steinernema feltiae* (NemaShield®) + TX, *Nemasys F*® + TX, *BioNem F*® + TX, *Steinernema-System*® + TX, *NemAttack*® + TX, *Nemaplus*® + TX, *Exhibitline sf*® + TX, *Scia-rid*® + TX, *Entonem*® + TX, *Steinernema kraussei* (Nemasys L®) + TX, *BioNem L*® + TX, *Exhibitline srb*® + TX, *Steinernema riobrave* (BioVector®) + TX, *BioVektor*® + TX, *Steinernema scapterisci* (Nematac S®) + TX, *Steinernema* spp. + TX, *Steinernematid* spp. (Guardian Nematodes®) + TX, *Stethorus punctillum* (Stethorus®) + TX, *Tamarixia radiata* + TX, *Tetrastichus setifer* + TX, *Thripobius semiluteus* + TX, *Torymus sinensis* + TX, *Trichogramma brassicae* (Tricholine b®) + TX, *Trichogramma brassicae* (Tricho-Strip®) + TX, *Trichogramma evanescens* + TX, *Trichogramma minutum* + TX, *Trichogramma ostrinae* + TX, *Trichogramma platneri* + TX, *Trichogramma pretiosum* + TX, *Xanthopimpla stemmator*; and
- other biologicals including: abscisic acid + TX, *bioSea*® + TX, *Chondrostereum purpureum* (Chontrol Paste®) + TX, *Colletotrichum gloeosporioides* (Collego®) + TX, *Copper Octanoate* (Cueva®) + TX, *Delta traps* (Trapline d®) + TX, *Erwinia amylovora* (Harpin) (ProAct® + TX, *Ni-HIBIT Gold CST*®) + TX, *Ferri-phosphate* (Ferramol®) + TX, *Funnel traps* (Trapline y®) + TX, *Gallex*® + TX, *Grower's Secret*® + TX, *Homo-brassonolide* + TX, *Iron Phosphate* (Lilly Miller Worry Free Ferramol Slug & Snail

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Bait®) + TX, MCP hail trap (Trapline f®) + TX, *Microctonus hyperodae* + TX, *Mycoleptodiscus terrestris* (Des-X®) + TX, BioGain® + TX, Aminomite® + TX, Zenox® + TX, Pheromone trap (Thripline ams®) + TX, potassium bicarbonate (MilStop®) + TX, potassium salts of fatty acids (Sanova®) + TX, potassium silicate solution (Sil-Matrix®) + TX, potassium iodide + potassiumthiocyanate (Enzicur®) + TX, SuffOil-X® + TX, Spider venom + TX, *Nosema locustae* (Semaspore Organic Grasshopper Control®) + TX, Sticky traps (Trapline YF® + TX, Rebell Amarillo®) + TX and Traps (Takitrapline y + b®) + TX,

or a biologically active compound or agent selected from: Brofluthrin + TX, Diflovidazine + TX, Flometoquin + TX, Fluhexafon + TX, *Plutella xylostella* Granulosis virus + TX, *Cydia pomonella* Granulosis virus + TX, Imicyafos + TX, *Heliothis virescens* Nucleopolyhedrovirus + TX, *Heliothis punctigera* Nucleopolyhedrovirus + TX, *Helicoverpa zea* Nucleopolyhedrovirus + TX, *Spodoptera frugiperda* Nucleopolyhedrovirus + TX, *Plutella xylostella* Nucleopolyhedrovirus + TX, p-cymene + TX, Pyflubumide + TX, Pyrafluprole + TX, QRD 420 + TX, QRD 452 + TX, QRD 460 + TX, Terpenoid blends + TX, Terpenoids + TX, Tetraniliprole + TX, and α -terpinene + TX;

or an active substance referenced by a code + TX, such as code AE 1887196 (BSC-BX60309) + TX, code NNI-0745 GR + TX, code IKI-3106 + TX, code JT-L001 + TX, code ZNQ-08056 + TX, code IPPA152201 + TX, code HNPC-A9908 (CAS: [660411-21-2]) + TX, code HNPC-A2005 (CAS: [860028-12-2]) + TX, code JS118 + TX, code ZJ0967 + TX, code ZJ2242 + TX, code JS7119 (CAS: [929545-74-4]) + TX, code SN-1172 + TX, code HNPC-A9835 + TX, code HNPC-A9955 + TX, code HNPC-A3061 + TX, code Chuanhua 89-1 + TX, code IPP-10 + TX, code ZJ3265 + TX, code JS9117 + TX, code ZJ3757 + TX, code ZJ4042 + TX, code ZJ4014 + TX, code ITM-121 + TX, code DPX-RAB55 (DKI-2301) + TX, code NA-89 + TX, code MIE-1209 + TX, code MCI-8007 + TX, code BCS-CL73507 + TX, code S-1871 + TX, code DPX-RDS63 + TX,

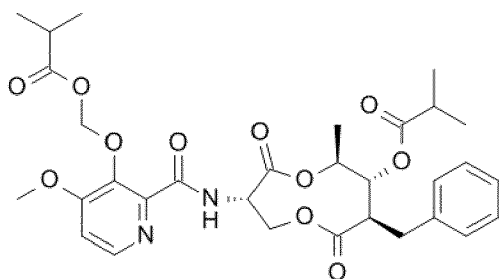
or a biologically active compound selected from Quinofumelin + TX, mefentrifluconazol + TX, fenpicoxamid + TX, fluindapyr + TX, inpyrfluxam + TX or indiflumetpyr + TX, isoflucypram + TX, pyrapropoyne + TX, florylpicoxamid + TX, metyltetraprole + TX, ipflufenquin + TX, pyridachlometyl + TX or chlpyridiflu + TX, tetrachlorantraniliprole + TX, tetrachloraniliprole + TX, Tyclopyrazoflor + TX, flupyrimin + TX or pyrfluramide + TX, benzpyrimoxan + TX, Benzosufyl + TX or oxazosulfyl + TX, etpyrafen + TX, acynonapyr + TX or pyrinonafen + TX, oxotrione + TX, bixlozone + TX or clofendizone + TX or dicloroxizone + TX, cyclopyranil + TX or pyrazocyclonil + TX or cyclopyrazonil + TX, alpha-bromadiolone + TX, code AKD-1193 + TX, Oxathiapirolin + TX, Fluopyram + TX, Penflufen + TX, Fluoxopyrosad + TX, fluoxapirolin + TX, dimpropyridaz + TX, tetflupyrolimet + TX, beflubutamid-M + TX, isocycloseram + TX, Flupyradifurone + TX, tetflupyrolimet + TX, N-[(1,2 cis)-2-[2-fluoro-4-(trifluoromethyl)phenyl]cyclobutyl]-3-(trifluoromethyl)pyrazine-2-carboxamide + TX, 2-(trifluoromethyl)-N-[(2,3 cis)-2-(2,4,6-trifluorophenyl)oxetan-3-yl]benzamide + TX, 2,6-difluoro-N-[(2,3 cis)-2-(2,4,6-trifluorophenyl)oxetan-3-yl]benzamide + TX, N-[(1,2 cis)-2-(2,4-dichlorophenyl)cyclobutyl]-2-(trifluoromethyl)benzamide + TX, N-[(1,2 cis)-2-(2,4-dichlorophenyl)cyclobutyl]-2-(trifluoromethyl)pyridine-3-carboxamide + TX, N-[(1,2 cis)-2-(2,4-difluorophenyl)cyclobutyl]-2-

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- (trifluoromethyl)benzamide + TX, N-[(5-chloro-2-isopropyl-phenyl)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-[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 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 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, 2-(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]-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) + 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 procedures described

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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 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,E)-5-[1-(4-chlorophenyl)pyrazol-3-yl]oxy-2-methoxyimino-N,3-dimethyl-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,



(fencicoxamid [517875-34-2] (as described in WO

2003/035617)) + TX, (1S)-2,2-bis(4-fluorophenyl)-1-methylethyl N-[[3-(acetyloxy)-4-methoxy-2-pyridyl]carbonyl]-L-alaninate [1961312-55-9] + TX; (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 spiropidion [1229023-00-0] + 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

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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
5 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>.

- 10 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
15 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 Tables Z-1 to Z-240, Za-1 – Za-60, Zb-1 – Zb-30 and Table P with active ingredients described above comprises a compound
20 selected from Tables Z-1 to Z-240, Za-1 – Za-60, Zb-1 – Zb-30 and Table P and an active ingredient as described above 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
25 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
30 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 Tables Z-1 to Z-240, Za-1 – Za-60,
35 Zb-1 – Zb-30 and Table P 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

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I selected from Tables Z-1 to Z-240, Za-1 – Za-60, Zb-1 – Zb-30 and Table P and the active ingredients as described above is not essential for working the present invention.

The compositions according to the invention can also comprise further solid or liquid auxiliaries, such as stabilizers, for example unepoxidized or epoxidized vegetable oils (for example epoxidized coconut oil, rapeseed oil or soya oil), antifoams, for example silicone oil, preservatives, viscosity regulators, binders and/or tackifiers, fertilizers or other active ingredients for achieving specific effects, for example bactericides, fungicides, nematocides, plant activators, molluscicides or herbicides.

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

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

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

The compounds of the invention and compositions thereof are also be suitable for the protection of plant propagation material, for example seeds, such as fruit, tubers or kernels, or nursery plants, against pests of the abovementioned type. The propagation material can be treated with the compound prior to planting, for example seed can be treated prior to sowing. Alternatively, the compound can be applied to seed kernels (coating), either by soaking the kernels in a liquid composition or by applying a layer of a solid composition. It is also possible to apply the compositions when the propagation material is planted to the site of application, for example into the seed furrow

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during drilling. These treatment methods for plant propagation material and the plant propagation material thus treated are further subjects of the invention. Typical treatment rates would depend on the plant and pest/fungi to be controlled and are generally between 1 to 200 grams per 100 kg of seeds, preferably between 5 to 150 grams per 100 kg of seeds, such as between 10 to 100 grams per 100 kg of seeds.

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

The present invention also comprises seeds coated or treated with or containing a compound of formula I. The term "coated or treated with and/or containing" generally signifies that the active ingredient is for the most part on the surface of the seed at the time of application, although a greater or lesser part of the ingredient may penetrate into the seed material, depending on the method of application. When the said seed product is (re)planted, it may absorb the active ingredient. In an embodiment, the present invention makes available a plant propagation material adhered thereto with a compound of formula I including those selected from Z-1 to Z-240, Za-1 – Za-60, Zb-1 – Zb-30 and Table P. Further, it is hereby made available, a composition comprising a plant propagation material treated with a compound of formula I including those selected from Tables Z-1 to Z-240, Za-1 – Za-60, Zb-1 – Zb-30 and Table P.

Seed treatment comprises all suitable seed treatment techniques known in the art, such as seed dressing, seed coating, seed dusting, seed soaking and seed pelleting. The seed treatment application of the compound formula I (including those selected from Tables Z-1 to Z-240, Za-1 – Za-60, Zb-1 – Zb-30 and Table P) can be carried out by any known methods, such as spraying or by dusting the seeds before sowing or during the sowing/planting of the seeds.

Biological Examples

Biological Example B1: Activity against *Bemisia tabaci* (Cotton whitefly)

Cotton leaf discs were placed on agar in 24-well microtiter plates and sprayed with aqueous test solutions prepared from 10'000 ppm DMSO stock solutions. After drying the leaf discs were infested with adult white flies. The samples were checked for mortality 6 days after incubation. The following compounds resulted in at least 80% mortality at an application rate of 200 ppm: P7, and P10.

Biological Example B2: Activity against *Diabrotica balteata* (Corn root worm)

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Maize sprouts placed onto an agar layer in 24-well microtiter plates were treated with aqueous test solutions prepared from 10'000 ppm DMSO stock solutions by spraying. After drying, the plates were infested with L2 larvae (6 to 10 per well). The samples were assessed for mortality and growth inhibition in comparison to untreated samples 4 days after infestation.

- 5 The following compounds gave an effect of at least 80% in at least one of the two categories (mortality or growth inhibition) at an application rate of 200 ppm: P1, P5, P6, P7, P8, P9, and P10.

Biological Example B3: Activity against *Euschistus heros* (Neotropical Brown Stink Bug)

- 10 Soybean leaves on agar in 24-well microtiter plates were sprayed with aqueous test solutions prepared from 10'000 ppm DMSO stock solutions. After drying the leaves were infested with N2 nymphs. The samples were assessed for mortality and growth inhibition in comparison to untreated samples 5 days after infestation.

The following compounds gave an effect of at least 80% in at least one of the two categories (mortality or growth inhibition) at an application rate of 200 ppm: P5, P9, and P10.

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Biological Example B4: Activity against *Plutella xylostella* (Diamond back moth)

- 20 24-well microtiter plates with artificial diet were treated with aqueous test solutions prepared from 10'000 ppm DMSO stock solutions by pipetting. After drying, *Plutella* eggs were pipetted through a plastic stencil onto a gel blotting paper and the plate was closed with it. The samples were assessed for mortality and growth inhibition in comparison to untreated samples 8 days after infestation.

The following compounds gave an effect of at least 80% in at least one of the two categories (mortality or growth inhibition) at an application rate of 200 ppm: P1, P4, P5, P6, and P7.

Biological Example B5: Activity against *Plutella xylostella* (Diamond back moth)

- 25 24-well microtiter plates with artificial diet were treated with aqueous test solutions prepared from 10'000 ppm DMSO stock solutions by pipetting. After drying, the plates were infested with L2 larvae (10 to 15 per well). The samples were assessed for mortality and growth inhibition in comparison to untreated samples 5 days after infestation.

- 30 The following compounds gave an effect of at least 80% in at least one of the two categories (mortality or growth inhibition) at an application rate of 200 ppm: P9, and P10.

Biological Example B6: Activity against *Myzus persicae* (Green peach aphid)

- 35 Sunflower leaf discs were placed onto agar in a 24-well microtiter plate and sprayed with aqueous test solutions prepared from 10'000 ppm DMSO stock solutions. After drying, the leaf discs were infested with an aphid population of mixed ages. The samples were assessed for mortality 6 days after infestation.

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The following compounds resulted in at least 80% mortality at an application rate of 200 ppm: P1, P7, P8, P9, and P10.

Biological Example B7: Activity against *Myzus persicae* (Green peach aphid)

5 Roots of pea seedlings infested with an aphid population of mixed ages were placed directly into aqueous test solutions prepared from 10'000 DMSO stock solutions. The samples were assessed for mortality 6 days after placing seedlings into test solutions.

The following compounds resulted in at least 80% mortality at a test rate of 24 ppm: P4, P5, P7, P8, P9, and P10.

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Biological Example B8: Activity against *Plutella xylostella* (Diamond back moth)

24-well microtiter plates with artificial diet were treated with aqueous test solutions prepared from 10'000 ppm DMSO stock solutions by pipetting. After drying, the plates were infested with L2 larvae (10 to 15 per well). The samples were assessed for mortality and growth inhibition in comparison to
15 untreated samples 5 days after infestation.

The following compounds gave an effect of at least 80% in at least one of the two categories (mortality or growth inhibition) at an application rate of 200 ppm: P9, and P10.

Biological Example B9: Activity against *Spodoptera littoralis* (Egyptian cotton leaf worm)

20 Cotton leaf discs were placed onto agar in 24-well microtiter plates and sprayed with aqueous test solutions prepared from 10'000 ppm DMSO stock solutions. After drying the leaf discs were infested with five L1 larvae. The samples were assessed for mortality, anti-feeding effect, and growth inhibition in comparison to untreated samples 3 days after infestation. Control of *Spodoptera littoralis* by a test sample is given when at least one of the categories mortality, anti-feedant effect, and growth inhibition
25 is higher than the untreated sample.

The following compounds resulted in at least 80% control at an application rate of 200 ppm: P1, P5, P6, P7, and P10.

Biological Example B10: Activity against *Tetranychus urticae* (Two-spotted spider mite)

30 Bean leaf discs on agar in 24-well microtiter plates were sprayed with aqueous test solutions prepared from 10'000 ppm DMSO stock solutions. After drying the leaf discs were infested with a mite population of mixed ages. The samples were assessed for mortality on mixed population (mobile stages) 8 days after infestation.

The following compounds resulted in at least 80% mortality at an application rate of 200 ppm: P2.

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Biological Example B11: Activity against *Heterodera schachtii* (Juvenile mobility in vitro profiling in 96 well plate)

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Test solutions are prepared from 10'000 ppm DMSO stock solutions with a TECAN robot to achieve 20 µL of 500, 100, 50, 25, 12.5 and 6.25 ppm. For each concentration three replicates are produced. Per well, 80 µL nematode solution is added containing 100 to 150 freshly harvested second stage juveniles of *Heterodera schachtii*. The plates are covered and stored at room temperature in the dark and incubated for 48 h. Mobility of the exposed juveniles in a treated well is measured using an imaging tool and compared to an average of 12 untreated replicates.

The following compounds achieved at least 60% control at 100 ppm after 48 h: P7.

Biological Example B12: Activity against *Nilaparvata lugens* (Brown plant hopper)

Rice plants were treated with the diluted test solutions in a spray chamber. After drying plants were infested with ~20 N3 nymphs. 7 days after the treatment samples were assessed for mortality and growth regulation.

The following compounds gave an effect of at least 80% in at least one of the two categories (mortality or growth inhibition) at an application rate of 50 ppm: P7, P10.

Biological Example B13: Activity against *Nilaparvata lugens* (Brown plant hopper)

Rice plants were treated with the diluted test solutions in a spray chamber. After drying plants were infested with ~20 N3 nymphs. 7 days after treatment adults were removed and 15 days after the treatment samples were assessed for effect on F1 generation.

The following compounds gave an effect of at least 80% at an application rate of 50 ppm: P10.

Biological Example B14: Activity against *Nilaparvata lugens* (Brown plant hopper)

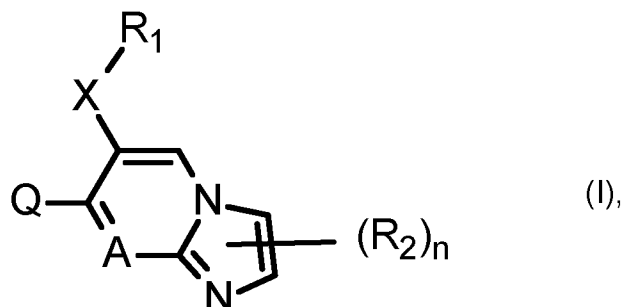
Rice plants cultivated in a nutritive solution were treated with the diluted test solutions into nourishing cultivation system. 1 day after application plants were infested with ~20 N3 nymphs. 7 days after infestation samples were assessed for mortality and growth regulation.

The following compounds gave an effect of at least 80% in at least one of the two categories (mortality or growth inhibition) at an application rate of 12.5 ppm: P7, P10.

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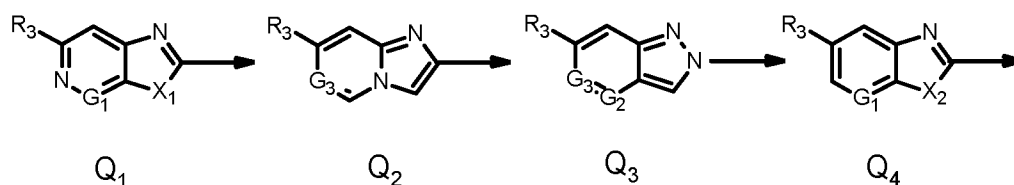
CLAIMS:

1. A compound of formula (I)



wherein

- 5 A is CH or N;
 X is S, SO or SO₂;
 R₁ is C₁-C₄alkyl, or C₃-C₆cycloalkyl-C₁-C₄alkyl;
 R₂ is C₁-C₆alkyl, C₁-C₆haloalkyl, C₃-C₆cycloalkyl, C₃-C₆cycloalkyl substituted with cyano, C₁-C₆cyanoalkyl, C₁-C₄alkoxyC₁-C₄alkyl, halogen, cyano, C₁-C₄haloalkoxy, C₁-C₄alkoxy, aminocarbonyl,
 10 C₁-C₄alkoxycarbonyl, C₁-C₄alkylsulfanyl, C₁-C₄alkylsulfinyl, and C₁-C₄alkylsulfonyl, C₁-C₄haloalkylsulfanyl, C₁-C₄haloalkylsulfinyl, and C₁-C₄haloalkylsulfonyl;
 n is 0, 1 or 2;
 Q is a radical selected from the group consisting of formula Q₁ to Q₄



wherein the arrow denotes the point of attachment to the ring incorporating the radical A;

and wherein

- X₁ is O or NR₄, wherein R₄ is C₁-C₄alkyl;
 X₂ is O or NR₅, wherein R₅ is C₁-C₄alkyl
 20 R₃ is halogen, C₁-C₆haloalkyl, C₁-C₄haloalkylsulfanyl, C₁-C₄haloalkylsulfinyl, C₁-C₄haloalkylsulfonyl or C₁-C₆haloalkoxy;
 G₁ is N or CH;
 G₂ and G₃ are, independently from each other, N or CH; or
 an agrochemically acceptable salt, stereoisomer, enantiomer, tautomer or N-oxide of a compound of
 25 formula I.

2. A compound according to claim 1, wherein

A is CH or N;

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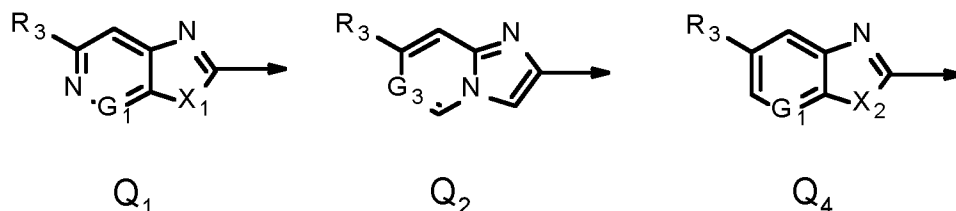
X is S, SO or SO₂;

R₁ is C₁-C₃alkyl or C₃-C₈cycloalkyl-C₁-C₂alkyl;

R₂ is C₁-C₄alkyl, C₁-C₄haloalkyl, C₃-C₄cycloalkyl, C₃-C₄cycloalkyl substituted with cyano, C₁-C₂cyanoalkyl, C₁-C₃alkoxyC₁-C₂alkyl, fluoro, chloro, bromo, cyano, C₁-C₃haloalkoxy, C₁-C₄alkoxy, aminocarbonyl, C₁-C₂alkoxycarbonyl, C₁-C₂alkylsulfanyl, C₁-C₂alkylsulfinyl, C₁-C₂alkylsulfonyl, C₁-C₂haloalkylsulfanyl, C₁-C₂haloalkylsulfinyl or C₁-C₂haloalkylsulfonyl;

n is 0 or 1; and

Q is a radical selected from the group consisting of formula Q₁, Q₂ or Q₄



wherein the arrow denotes the point of attachment to the ring incorporating the radical A; and wherein

X₁ is NR₄, wherein R₄ is C₁-C₂alkyl;

X₂ is O or NR₅, wherein R₅ is C₁-C₂alkyl

R₃ is fluoro, chloro, bromo, C₁-C₂haloalkyl, C₁-C₂haloalkylsulfanyl, C₁-C₂haloalkylsulfinyl, C₁-C₂haloalkylsulfonyl or C₁-C₂haloalkoxy;

G₁ is N or CH; and

G₃ is N or CH.

3. A compound according to claim 1, wherein

A is CH or N;

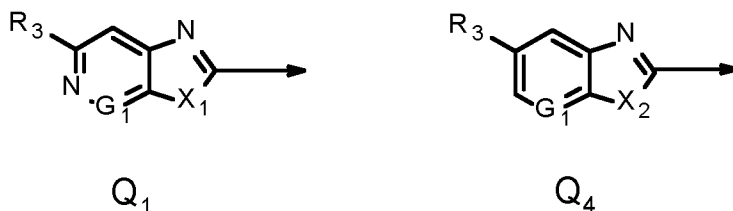
X is S, SO or SO₂;

R₁ is ethyl, propyl, isopropyl or cyclopropylmethyl;

R₂ is C₁-C₃alkyl, C₁-C₂haloalkyl, cyclopropyl, cyclopropyl substituted with cyano, cyanomethyl, methoxymethyl, ethoxymethyl, methoxyethyl, ethoxyethyl, fluoro, chloro, bromo, cyano, C₁-C₂haloalkoxy, C₁-C₃alkoxy, aminocarbonyl, methoxycarbonyl, C₁-C₂alkylsulfanyl, C₁-C₂alkylsulfinyl, C₁-C₂alkylsulfonyl, C₁-C₂haloalkylsulfanyl, C₁-C₂haloalkylsulfinyl or C₁-C₂haloalkylsulfonyl;

n is 0 or 1; and

Q is a radical selected from the group consisting of formula Q₁ or Q₄



wherein the arrow denotes the point of attachment to the ring incorporating the radical A;

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and wherein

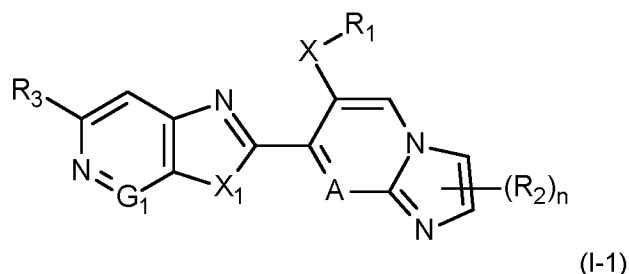
X₁ is NCH₃;

X₂ is NCH₃;

R₃ is bromo, trifluoromethyl, pentafluoroethyl, 1,1-difluoroethyl, difluoromethyl, difluorochloromethyl, trifluoromethylsulfanyl, trifluoromethylsulfinyl, trifluoromethylsulfonyl, difluoromethylsulfanyl, difluoromethylsulfinyl, difluoromethylsulfonyl, difluoromethoxy, difluorobromomethoxy or trifluoromethoxy; and

G₁ is N or CH.

4. A compound of formula I according to claim 1, represented by the compounds of formula I-1



wherein A, X, R₁, R₂, R₃, n, X₁ and G₁ are as defined under formula I in claim 1.

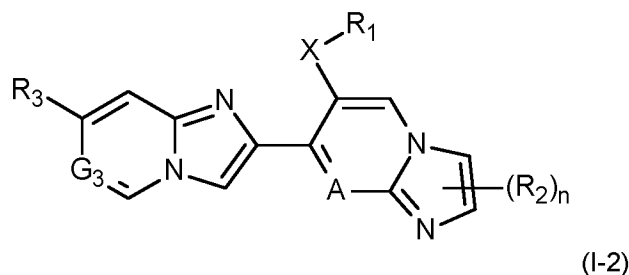
5. A compound according to claim 4, wherein

A is CH or N; X is S, SO or SO₂; R₁ is C₁-C₄alkyl; R₂ is C₁-C₄haloalkyl, halogen, cyano, aminocarbonyl, or C₁-C₂alkoxycarbonyl; R₃ is C₁-C₄haloalkyl, C₁-C₄haloalkylsulfanyl, C₁-C₄haloalkylsulfinyl, or C₁-C₄haloalkylsulfonyl; n is 0 or 1; X₁ is O or NCH₃; and G₁ is N or CH.

6. A compound according to claim 4, wherein

A is CH or N; X is S or SO₂; R₁ is C₁-C₃alkyl; R₂ is C₁-C₂fluoroalkyl, halogen, cyano, aminocarbonyl, or methoxycarbonyl; R₃ is C₁-C₂fluoroalkyl, C₁-C₂fluoroalkylsulfanyl, C₁-C₂fluoroalkylsulfinyl, or C₁-C₂fluoroalkylsulfonyl; n is 0 or 1; X₁ is O or NCH₃; and G₁ is N or CH.

7. A compound of formula I according to claim 1, represented by the compounds of formula I-2



wherein A, X, R₁, R₂, R₃, n and G₃ are as defined under formula I in claim 1.

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8. A compound according to claim 7, wherein

A is CH or N; X is S, SO or SO₂; R₁ is C₁-C₄alkyl; R₂ is C₁-C₄haloalkyl, halogen or cyano; R₃ is C₁-C₄haloalkyl, C₁-C₄haloalkylsulfanyl, C₁-C₄haloalkylsulfinyl, or C₁-C₄haloalkylsulfonyl; n is 0 or 1; and G₃ is N or CH.

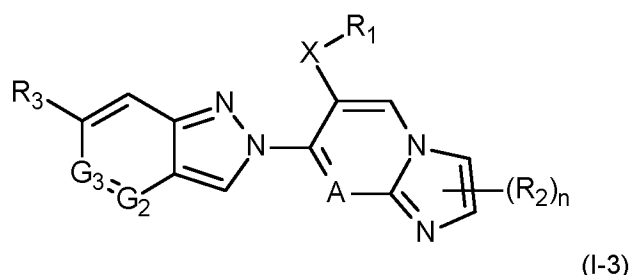
5

9. A compound according to claim 7, wherein

A is CH or N; X is S, SO or SO₂; R₁ is C₁-C₃alkyl; R₂ is C₁-C₂haloalkyl, halogen or cyano; R₃ is C₁-C₂haloalkyl, C₁-C₂haloalkylsulfanyl, C₁-C₂haloalkylsulfinyl, or C₁-C₂haloalkylsulfonyl; n is 0 or 1; and G₃ is N or CH.

10

10. A compound of formula I according to claim 1, represented by the compounds of formula I-3



wherein A, X, R₁, R₂, R₃, n, G₂ and G₃ are as defined under formula I in claim 1.

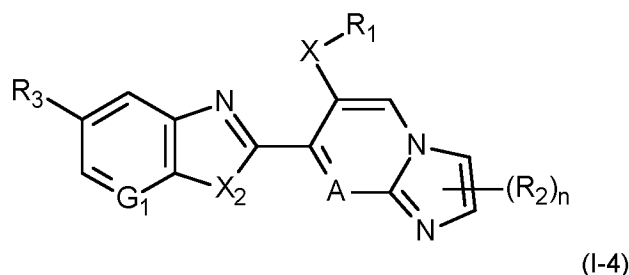
15 11. A compound according to claim 10, wherein

A is CH or N; X is S, SO or SO₂; R₁ is C₁-C₄alkyl; R₂ is C₁-C₄haloalkyl, halogen or cyano; R₃ is C₁-C₄haloalkyl, C₁-C₄haloalkylsulfanyl, C₁-C₄haloalkylsulfinyl, or C₁-C₄haloalkylsulfonyl; n is 0 or 1; G₂ is N and G₃ is CH.

20 12. A compound according to claim 10, wherein

In another preferred group of compounds of formula I-3, A is CH or N; X is S, SO or SO₂; R₁ is C₁-C₃alkyl; R₂ is C₁-C₄haloalkyl, halogen or cyano; R₃ is C₁-C₄haloalkyl, C₁-C₄haloalkylsulfanyl, C₁-C₄haloalkylsulfinyl, or C₁-C₄haloalkylsulfonyl; n is 0 or 1; G₂ is CH and G₃ is N.

25 13. A compound of formula I according to claim 1, represented by the compounds of formula I-4



wherein A, X, R₁, R₂, R₃, n, X₂ and G₁ are as defined under formula I in claim 1.

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14. A compound according to claim 13, wherein

A is CH or N; X is S, SO or SO₂; R₁ is C₁-C₄alkyl; R₂ is C₁-C₄haloalkyl, halogen, cyano; R₃ is C₁-C₄haloalkyl, C₁-C₄haloalkylsulfanyl, C₁-C₄haloalkylsulfinyl, or C₁-C₄haloalkylsulfonyl; n is 0 or 1; X₂ is O or NCH₃; and G₁ is N or CH.

15. A compound according to claim 13, wherein

A is CH or N; X is S or SO₂; R₁ is C₁-C₃alkyl; R₂ is C₁-C₂fluoroalkyl, halogen, cyano, aminocarbonyl, or methoxycarbonyl; R₃ is C₁-C₂fluoroalkyl, C₁-C₂fluoroalkylsulfanyl, C₁-C₂fluoroalkylsulfinyl, or C₁-C₂fluoroalkylsulfonyl; n is 0 or 1; X₂ is O or NCH₃; and G₁ is N or CH.

16. A compound according to claim 13, wherein G₁ is CH, X₂ is NMe and A is CH.

17. A compound of formula I according to claim 1, selected from the group consisting of:

2-[6-ethylsulfonyl-2-(trifluoromethyl)imidazo[1,2-a]pyridin-7-yl]-1-methyl-5-(trifluoromethyl)benzimidazole (compound P1);

6-ethylsulfonyl-7-[3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridin-2-yl]imidazo[1,2-a]pyridine-2-carbonitrile (compound P2);

2-[6-ethylsulfonyl-2-(trifluoromethyl)imidazo[1,2-a]pyridin-7-yl]-5-(trifluoromethyl)-1,3-benzoxazole (compound P3);

6-[6-ethylsulfonyl-2-(trifluoromethyl)imidazo[1,2-a]pyridin-7-yl]-7-methyl-3-(trifluoromethyl)imidazo[4,5-c]pyridazine (compound P4);

2-(3-bromo-6-ethylsulfonyl-imidazo[1,2-a]pyridin-7-yl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine (compound P5);

2-[6-ethylsulfonyl-2-(1,1,2,2,2-pentafluoroethyl)imidazo[1,2-a]pyridin-7-yl]-3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridine (compound P6);

2-[6-ethylsulfonyl-2-(trifluoromethyl)imidazo[1,2-a]pyridin-7-yl]-3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridine (compound P7);

2-(6-ethylsulfonylimidazo[1,2-a]pyridin-7-yl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine (compound P8);

2-[6-ethylsulfonyl-2-(1,1,2,2,2-pentafluoroethyl)imidazo[1,2-a]pyridin-7-yl]-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine (compound P9);

2-[6-ethylsulfonyl-2-(trifluoromethyl)imidazo[1,2-a]pyridin-7-yl]-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine (compound P10);

methyl 6-ethylsulfonyl-7-[3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridin-2-yl]imidazo[1,2-a]pyridine-2-carboxylate (compound P11); and

6-ethylsulfonyl-7-[3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridin-2-yl]imidazo[1,2-a]pyridine-2-carboxamide (compound P12).

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18. A pesticidal composition, which comprises at least one compound of formula I as defined in any of claims 1 – 17 or, where appropriate, a tautomer thereof, in each case in free form or in agrochemically utilizable salt form, as active ingredient and at least one auxiliary.

5 19. A method for controlling pests, which comprises applying to a pest, to a locus of a pest, or to a plant susceptible to attack by a pest, a pesticidally effective amount of a compound of formula I as defined in any of claims 1 – 17 or a composition according to claim 18.

10 20. A method for the protection of plant propagation material from the attack by pests, which comprises treating the propagation material or the site, where the propagation material is planted, with a composition according to claim 18.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/086976

A. CLASSIFICATION OF SUBJECT MATTER INV. C07D471/04 A01N43/90 C07D487/04 C07D519/00 ADD.																	
According to International Patent Classification (IPC) or to both national classification and IPC																	
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) C07D A01N Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data																	
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>WO 2016/107742 A1 (SYNGENTA PARTICIPATIONS AG [CH]) 7 July 2016 (2016-07-07) cited in the application abstract; examples B1-B8; compounds P1-P4 -----</td> <td>1-20</td> </tr> <tr> <td>A</td> <td>WO 2018/052136 A1 (NISSAN CHEMICAL IND LTD [JP]) 22 March 2018 (2018-03-22) cited in the application abstract -----</td> <td>1-20</td> </tr> <tr> <td>A</td> <td>WO 2017/001314 A1 (SYNGENTA PARTICIPATIONS AG [CH]) 5 January 2017 (2017-01-05) abstract; claims 1-10 -----</td> <td>1-20</td> </tr> <tr> <td>X,P</td> <td>JP 2019 112398 A (NIPPON SODA CO) 11 July 2019 (2019-07-11) cited in the application abstract; compound 4 ----- -/-</td> <td>1,17</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	A	WO 2016/107742 A1 (SYNGENTA PARTICIPATIONS AG [CH]) 7 July 2016 (2016-07-07) cited in the application abstract; examples B1-B8; compounds P1-P4 -----	1-20	A	WO 2018/052136 A1 (NISSAN CHEMICAL IND LTD [JP]) 22 March 2018 (2018-03-22) cited in the application abstract -----	1-20	A	WO 2017/001314 A1 (SYNGENTA PARTICIPATIONS AG [CH]) 5 January 2017 (2017-01-05) abstract; claims 1-10 -----	1-20	X,P	JP 2019 112398 A (NIPPON SODA CO) 11 July 2019 (2019-07-11) cited in the application abstract; compound 4 ----- -/-	1,17
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☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.																	
* Special categories of cited documents : <table border="0"> <tr> <td> "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent 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 </td> <td> "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 </td> </tr> </table>			"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent 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													
"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent 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															
28 February 2020		10/03/2020															
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Goss, Ilaria															

INTERNATIONAL SEARCH REPORT

International application No
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