(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) **World Intellectual Property Organization**
International Bureau

(43) **International Publication Date**
10 December 2020 (10.12.2020)

WIPO | PCT

(10) **International Publication Number**
WO 2020/244969 A1

(51) **International Patent Classification:**
C07D 213/75 (2006.01) *A01N 43/40* (2006.01)

(21) **International Application Number:**
PCT/EP2020/064576

(22) **International Filing Date:**
26 May 2020 (26.05.2020)

(25) **Filing Language:** English

(26) **Publication Language:** English

(30) **Priority Data:**
19178599.7 06 June 2019 (06.06.2019) EP

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(81) **Designated States** *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) **Designated States** *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

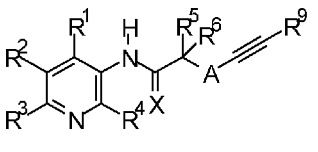
Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report (Art. 21(3))*

(54) Title: PYRIDINE DERIVATIVES AND THEIR USE AS FUNGICIDES



I

(57) **Abstract:** The present invention relates to the use of compounds of formula I (formula I) wherein the variables are defined as given in the description and claims. The invention further relates to the compounds I and composition for compounds of formula I.

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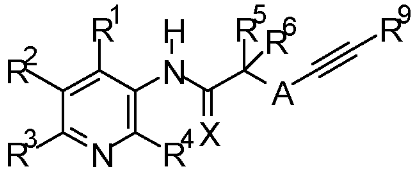
PYRIDINE DERIVATIVES AND THEIR USE AS FUNGICIDES

The present invention relates to the use of pyridine compounds and the N-oxides and the salts thereof as fungicides as well to new pyridine compounds. The invention also relates to the composition comprising at least one compound I, to the method for combating phytopathogenic fungi and to the ssed coated with at least one compound of the formula I.

In many cases, in particular at low application rates, the fungicidal activity of known compounds is unsatisfactory. Based on this, it was an objective of the present invention to provide compounds having improved activity and/or a broader activity spectrum against phytopathogenic fungi. Another object of the present invention is to provide fungicides with improved toxicological properties or with improved environmental fate properties. These and further objects are achieved by the use of pyridine carboxamides of formula (I), as defined below, and by their agriculturally suitable salts as well by the new pyridine carboxamides of formula (I).

Accordingly, the present invention relates to use of the compounds of formula I



I

wherein

X is O or S;

R^1 is in each case independently selected from hydrogen, halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl, C_3-C_6-cycloalkyl, wherein the acyclic and cyclic moieties of R^1 are unsubstituted or substituted by one to six groups R^{1a} which independently of one another are selected from:
halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl;
and wherein the groups R^{1a} are unsubstituted or substituted by one to six halogen or CN;

R^2 is in each case independently selected from halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl, C_3-C_6-cycloalkyl, wherein the acyclic and cyclic moieties of R^2 are unsubstituted or substituted by one to six groups R^{2a} which independently of one another are selected from:
halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl;
and wherein the groups R^{2a} are unsubstituted or substituted by one to six halogen or CN;

R^3 is in each case independently selected from halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl, C_3-C_6-cycloalkyl, wherein the acyclic and cyclic moieties of R^3 are unsubstituted or substituted by one to six groups R^{3a} which independently of one another are selected from:

halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl;
and wherein the groups R^{3a} are unsubstituted or substituted by one to six halogen or CN;

R^4 is in each case independently selected from hydrogen, halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl, C_3-C_6-cycloalkyl, wherein the acyclic and cyclic moieties of R^4 are unsubstituted or substituted by one to six groups R^{4a} which independently of one another are selected from:
halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl;
and wherein the groups R^{4a} are unsubstituted or substituted by one to six halogen or CN;

A is direct bond or $C(R^7R^8)$;

R^5, R^6, R^7, R^8
are in each case independently selected from hydrogen, halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl, C_3-C_6-cycloalkyl, O-C_3-C_6-cycloalkyl, CH_2-C_3-C_6-cycloalkyl, C_3-C_6-cycloalkenyl, O-C_3-C_6-cycloalkenyl, CH_2-C_3-C_6-cycloalkenyl, wherein the acyclic moieties of R^5, R^6, R^7, R^8 are unsubstituted or substituted by one to six groups R^{5a}, R^{6a}, R^{7a}, R^{8a} which independently of one another are selected from:
halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl, C_3-C_6-cycloalkyl, O-C_3-C_6-cycloalkyl, CH_2-C_3-C_6-cycloalkyl, C_3-C_6-cycloalkenyl, O-C_3-C_6-cycloalkenyl, CH_2-C_3-C_6-cycloalkenyl, =N-OR`;

R´ is in each case independently selected from H, C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkynyl, C_3-C_6-cycloalkyl, phenyl, -CH_2-phenyl, a five- or six-membered heteroaryl, or -CH_2-heteroaryl; wherein the heteroaryl contains 1, 2 or 3 heteroatoms selected from N, O and S; and wherein in each case one or two CH_2 groups of the carbo- or heterocycle may be replaced by a group independently selected from C(=O) and C(=S);

wherein the cyclic and acyclic moieties of R´ are unsubstituted or substituted by one to six groups $R^{R'}$ independently of one another are selected from:

halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, O-C_1-C_6-alkyl, =N-OR`;

R^9 is in each case independently selected from C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, C_3-C_6-cycloalkyl, C_3-C_6-cycloalkenyl, saturated or partially unsaturated bicyclic carbocycle, a five- or six-membered heterocycle, aryl, heteroaryl; wherein the heterocycle and heteroaryl contain 1, 2 or 3 heteroatoms selected from N, O and S; and wherein in each case one or two CH_2 groups of the carbo- or heterocycle may be replaced by a group independently selected from C(=O) and C(=S);

wherein R´ is as defined above;

wherein the cyclic and acyclic moieties of R^9 are unsubstituted or substituted by one to six groups R^{9a} independently of one another are selected from:

halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl, =N-OR`; and wherein the groups R^{9a} are unsubstituted or substituted by one to six halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, O-C_1-C_6-alkyl,~~;~~

wherein

wherein R^5, R^6, R^7 or R^8 can not all be H;

when A is $C(R^7R^8)$ R^9 can be also H;

and the N-oxides and the agriculturally acceptable salts thereof as fungicides.

The N-oxides may be prepared from the inventive compounds according to conventional oxidation methods, e. g. by treating compounds I with an organic peracid such as metachloroperbenzoic acid (cf. WO 03/64572 or J. Med. Chem. 38(11), 1892-903, 1995); or with inorganic oxidizing agents such as hydrogen peroxide (cf. J. Heterocyc. Chem. 18(7), 1305-8, 1981) or oxone (cf. J. Am. Chem. Soc. 123(25), 5962-5973, 2001). The oxidation may lead to pure mono-N-oxides or to a mixture of different N-oxides, which can be separated by conventional methods such as chromatography.

Agriculturally acceptable salts of the compounds of the formula I encompass especially the salts of those cations or the acid addition salts of those acids whose cations and anions, respectively, have no adverse effect on the fungicidal action of the compounds I. Suitable cations are thus in particular the ions of the alkali metals, preferably sodium and potassium, of the alkaline earth metals, preferably calcium, magnesium and barium, of the transition metals, preferably manganese, copper, zinc and iron, and also the ammonium ion which, if desired, may be substituted with one to four C_1-C_4-alkyl substituents and/or one phenyl or benzyl substituent, preferably diisopropylammonium, tetramethylammonium, tetrabutylammonium, trimethylbenzylammonium, furthermore phosphonium ions, sulfonium ions, preferably tri(C_1-C_4-alkyl)sulfonium, and sulfoxonium ions, preferably tri(C_1-C_4-alkyl)sulfoxonium.

Anions of acceptable acid addition salts are primarily chloride, bromide, fluoride, hydrogensulfate, sulfate, dihydrogenphosphate, hydrogenphosphate, phosphate, nitrate, bicarbonate, carbonate, hexafluorosilicate, hexafluorophosphate, benzoate, and the anions of C_1-C_4-alkanoic acids, preferably formate, acetate, propionate and butyrate. They can be formed by reacting a compound I with an acid of the corresponding anion, preferably of hydrochloric acid, hydrobromic acid, sulfuric acid, phosphoric acid or nitric acid.

Compounds of the formula I can exist as one or more stereoisomers. The various stereoisomers include enantiomers, diastereomers, atropisomers arising from restricted rotation about a single bond of asymmetric groups and geometric isomers. They also form part of the subject matter of the present invention. One skilled in the art will appreciate that one stereoisomer may be more active and/or may exhibit beneficial effects when enriched relative to the other stereoisomer(s) or when separated from the other stereoisomer(s). Additionally, the skilled artisan knows how to separate, enrich, and/or to selectively prepare said stereoisomers. The compounds of the invention may be present as a mixture of stereoisomers, e.g. a racemate, individual stereoisomers, or as an optically active form.

Compounds of the formula I can be present in different crystal modifications whose biological activity may differ. They also form part of the subject matter of the present invention.

In respect of the variables, the embodiments of the intermediates obtained during preparation of compounds I correspond to the embodiments of the compounds of formula I. The term “compounds I” refers to compounds of the formula I.

In the following, the intermediate compounds are further described. A skilled person will readily understand that the preferences for the substituents, also in particular the ones given in the tables below for the respective substituents, given herein in connection with compounds I apply for the intermediates accordingly. Thereby, the substituents in each case have independently of each other or more preferably in combination the meanings as defined herein.

If the synthesis yields mixtures of isomers, a separation is generally not necessarily required since in some cases the individual isomers can be interconverted during work-up for use or during application (e. g. under the action of light, acids or bases). Such conversions may also take place after use, e. g. in the treatment of plants in the treated plant, or in the harmful fungus to be controlled.

In the definitions of the variables given above, collective terms are used which are generally representative for the substituents in question. The term "C_n-C_m" indicates the number of carbon atoms possible in each case in the substituent or substituent moiety in question.

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

The term "C_1-C_6-alkyl" refers to a straight-chained or branched saturated hydrocarbon group having 1 to 6 carbon atoms, e.g. methyl, ethyl, propyl, 1-methylethyl, butyl, 1-methylpropyl, 2-methylpropyl, 1,1-dimethylethyl, pentyl, 1-methylbutyl, 2-methylbutyl, 3-methylbutyl, 2,2-dimethylpropyl, 1-ethylpropyl, 1,1-dimethylpropyl, 1,2-dimethylpropyl, hexyl, 1-methylpentyl, 2-methylpentyl, 3-methylpentyl, 4-methylpentyl, 1,1-dimethylbutyl, 1,2-dimethylbutyl, 1,3-dimethylbutyl, 2,2-dimethylbutyl, 2,3-dimethylbutyl, 3,3-dimethylbutyl, 1-ethylbutyl, 2-ethylbutyl, 1,1,2-trimethylpropyl, 1,2,2-trimethylpropyl, 1-ethyl-1-methylpropyl and 1-ethyl-2-methylpropyl. Likewise, the term "C_2-C_4-alkyl" refers to a straight-chained or branched alkyl group having 2 to 4 carbon atoms, such as ethyl, propyl (n-propyl), 1-methylethyl (iso-propoyl), butyl, 1-methylpropyl (sec.-butyl), 2-methylpropyl (iso-butyl), 1,1-dimethylethyl (tert.-butyl).

The term "C_1-C_6-halogenalkyl" refers to an alkyl group having 1 or 6 carbon atoms as defined above, wherein some or all of the hydrogen atoms in these groups may be replaced by halogen atoms as mentioned above. Examples are "C_1-C_2-halogenalkyl" groups such as chloromethyl, bromomethyl, dichloromethyl, trichloromethyl, fluoromethyl, difluoromethyl, trifluoromethyl, chlorofluoromethyl, dichlorofluoromethyl, chlorodifluoromethyl, 1-chloroethyl, 1-bromoethyl, 1-fluoroethyl, 2-fluoroethyl, 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 or pentafluoroethyl.

The term "C_1-C_6-alkoxy" refers to a straight-chain or branched alkyl group having 1 to 6 carbon atoms which is bonded via an oxygen, at any position in the alkyl group. Examples are "C_1-C_4-alkoxy" groups, such as methoxy, ethoxy, n-propoxy, 1-methylethoxy, butoxy, 1-methyl¬propoxy, 2-methylpropoxy or 1,1-dimethylethoxy.

The term "C_1-C_6-halogenalkoxy" refers to a C_1-C_6-alkoxy radical as defined above, wherein some or all of the hydrogen atoms in these groups may be replaced by halogen atoms as mentioned above. Examples are "C_1-C_4-halogenalkoxy" groups, such as OCH_2F, $OCHF_2$, OCF_3, OCH_2Cl, $OCHCl_2$, $OCCl_3$, chlorofluoromethoxy, dichlorofluoromethoxy, chlorodifluoromethoxy, 2-fluoroethoxy, 2-chlorothoxy, 2-bromoethoxy, 2-iodoethoxy, 2,2-difluoroethoxy, 2,2,2-trifluoroethoxy, 2-chloro-2-fluoroethoxy, 2-chloro-2,2-difluoroethoxy, 2,2-dichloro-2-fluoroethoxy, 2,2,2-trichloroethoxy, OC_2F_5, 2-fluoropropoxy, 3-fluoropropoxy, 2,2-difluoropropoxy, 2,3-difluoro¬propoxy, 2 chloropropoxy, 3-chloropropoxy, 2,3-dichloropropoxy, 2-bromopropoxy, 3 bromopropoxy, 3,3,3-trifluoropropoxy, 3,3,3-trichloropropoxy, $OCH_2-C_2F_5$, $OCF_2-C_2F_5$, 1-fluoromethyl-2-fluoroethoxy, 1-chloromethyl-2-chloroethoxy, 1-bromomethyl-2-bromoethoxy, 4-fluorobutoxy, 4-chlorobutoxy, 4-bromobutoxy or nonafluorobutoxy.

The term "C_2-C_6-alkenyl" refers to a straight-chain or branched unsaturated hydrocarbon radical having 2 to 6 carbon atoms and a double bond in any position. Examples are "C_2-C_4-alkenyl" groups, such as ethenyl, 1-propenyl, 2-propenyl (allyl), 1-methylethenyl, 1-butenyl, 2-butenyl, 3-butenyl, 1-methyl-1-propenyl, 2-methyl-1-propenyl, 1-methyl-2-propenyl, 2-methyl-2-propenyl.

The term "C_2-C_6-halogenalkenyl" refers to an alkyl group having 2 or 6 carbon atoms as defined above, wherein some or all of the hydrogen atoms in these groups may be replaced by halogen atoms as mentioned above.

The term "C_2-C_6-alkenyloxy" refers to a straight-chain or branched alkenyl group having 2 to 6 carbon atoms which is bonded via an oxygen, at any position in the alkenyl group. Examples are "C_2-C_4-alkenyloxy" groups.

The term "C_2-C_6-alkynyl" refers to a straight-chain or branched unsaturated hydrocarbon radical having 2 to 6 carbon atoms and containing at least one triple bond. Examples are "C_2-C_4-alkynyl" groups, such as ethynyl, prop-1-ynyl, prop-2-ynyl (propargyl), but-1-ynyl, but-2-ynyl, but-3-ynyl, 1-methyl-prop-2-ynyl.

The term "C_2-C_6-halogenalkynyl" refers to an alkyl group having 2 or 6 carbon atoms as defined above, wherein some or all of the hydrogen atoms in these groups may be replaced by halogen atoms as mentioned above.

The term "C_2-C_6-alkynyloxy" refers to a straight-chain or branched alkynyl group having 2 to 6 carbon atoms which is bonded via an oxygen, at any position in the alkynyl group. Examples are "C_2-C_4-alkynyloxy" groups.

The term "C_3-C_6-cycloalkyl" refers to monocyclic saturated hydrocarbon radicals having 3 to 6 carbon ring members, such as cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl. Accordingly, a saturated three-, four-, five-, six-, seven-, eight-, nine or ten-membered carbocyclyl or carbocycle is a "C_3-C_{10}-cycloalkyl".

The term "C_3-C_6-cycloalkenyl" refers to a monocyclic partially unsaturated 3-, 4- 5- or 6-membered carbocycle having 3 to 6 carbon ring members and at least one double bond, such as cyclopentenyl, cyclopentadienyl, cyclohexadienyl. Accordingly, a partially unsaturated three-, four-, five-, six-, seven-, eight-, nine or ten-membered carbocyclyl or carbocycle is a "C_3-C_{10}-cycloalkenyl".

The term "C_3-C_8-cycloalkyl-C_1-C_4-alkyl" refers to alkyl having 1 to 4 carbon atoms (as defined above), whereAccording to one hydrogen atom of the alkyl radical is replaced by a cycloalkyl radical having 3 to 8 carbon atoms (as defined above).

The term “saturated or partially unsaturated three-, four-, five-, six-, seven-, eight-, nine or ten-membered heterocyclyl or heterocycle, wherein the heterocyclyl or heterocycle contains 1, 2, 3 or 4 heteroatoms selected from N, O and S” is to be understood as meaning both saturated and partially unsaturated heterocycles, wherein the ring member atoms of the heterocycle include besides carbon atoms 1, 2, 3 or 4 heteroatoms independently selected from the group of O, N and S. For example:

a 3- or 4-membered saturated heterocycle which contains 1 or 2 heteroatoms from the group consisting of O, N and S as ring members such as oxirane, aziridine, thiirane, oxetane, azetidine, thiethane, [1,2]dioxetane, [1,2]dithietane, [1,2]diazetidine; and

a 5- or 6-membered saturated or partially unsaturated heterocycle which contains 1, 2 or 3 heteroatoms from the group consisting of O, N and S as ring members such as 2-tetrahydrofuranyl, 3-tetrahydrofuranyl, 2-tetrahydrothienyl, 3-tetrahydrothienyl, 2-pyrrolidinyl, 3-pyrrolidinyl, 3-isoxazolidinyl, 4-isoxazolidinyl, 5-isoxazolidinyl, 3-isothiazolidinyl, 4-isothiazolidinyl, 5-isothiazolidinyl, 3-pyrazolidinyl, 4-pyrazolidinyl, 5-pyrazolidinyl, 2-oxazolidinyl, 4-oxazolidinyl, 5-oxazolidinyl, 2-thiazolidinyl, 4-thiazolidinyl, 5-thiazolidinyl, 2-imidazolidinyl, 4-imidazolidinyl, 1,2,4-oxadiazolidin-3-yl, 1,2,4-oxadiazolidin-5-yl, 1,2,4-thiadiazolidin-3-yl, 1,2,4-thiadiazolidin-5-yl, 1,2,4-triazolidin-3-yl, 1,3,4-oxadiazolidin-2-yl, 1,3,4-thiadiazolidin-2-yl, 1,3,4-triazolidin-2-yl, 2,3-dihydrofur-2-yl, 2,3-dihydrofur-3-yl, 2,4-dihydrofur-2-yl, 2,4-dihydrofur-3-yl, 2,3-dihydrothien-2-yl, 2,3-dihydrothien-3-yl, 2,4-dihydrothien-2-yl, 2,4-dihydrothien-3-yl, 2-pyrrolin-2-yl, 2-pyrrolin-3-yl, 3-pyrrolin-2-yl, 3-pyrrolin-3-yl, 2-isoxazolin-3-yl, 3-isoxazolin-3-yl, 4-isoxazolin-3-yl, 2-isoxazolin-4-yl, 3-isoxazolin-4-yl, 4-isoxazolin-4-yl, 2-isoxazolin-5-yl, 3-isoxazolin-5-yl, 4-isoxazolin-5-yl, 2-isothiazolin-3-yl, 3-isothiazolin-3-yl, 4-isothiazolin-3-yl, 2-isothiazolin-4-yl, 3-isothiazolin-4-yl, 4-isothiazolin-4-yl, 2-isothiazolin-5-yl, 3-isothiazolin-5-yl, 4-isothiazolin-5-yl, 2,3-dihydropyrazol-1-yl, 2,3-dihydropyrazol-2-yl, 2,3-dihydropyrazol-3-yl, 2,3-dihydropyrazol-4-yl, 2,3-dihydropyrazol-5-yl, 3,4-dihydropyrazol-1-yl, 3,4-dihydropyrazol-3-yl, 3,4-dihydropyrazol-4-yl, 3,4-dihydropyrazol-5-yl, 4,5-dihydropyrazol-1-yl, 4,5-dihydropyrazol-3-yl, 4,5-dihydropyrazol-4-yl, 4,5-dihydropyrazol-5-yl, 2,3-dihydrooxazol-2-yl, 2,3-dihydrooxazol-3-yl, 2,3-dihydrooxazol-4-yl, 2,3-dihydrooxazol-5-yl, 3,4-dihydrooxazol-2-yl, 3,4-dihydrooxazol-3-yl, 3,4-dihydrooxazol-4-yl, 3,4-dihydrooxazol-5-yl, 3,4-dihydrooxazol-2-yl, 3,4-dihydrooxazol-3-yl, 3,4-dihydrooxazol-4-yl, 2-piperidinyl, 3-piperidinyl, 4-piperidinyl, 1,3–dioxan–5–yl, 2-tetrahydropyranyl, 4-tetrahydropyranyl, 2-tetrahydrothienyl, 3-hexahydropyridazinyl, 4-hexahydropyridazinyl, 2-hexahydropyrimidinyl, 4-hexahydropyrimidinyl, 5-hexahydropyrimidinyl, 2-piperazinyl, 1,3,5-hexahydrotriazin-2-yl and 1,2,4-hexahydrotriazin-3-yl and also the corresponding –ylidene radicals; and

a 7-membered saturated or partially unsaturated heterocycle such as tetra- and hexahydroazepinyl, such as 2,3,4,5-tetrahydro[1H]azepin-1-,-2-,-3-,-4-,-5-,-6- or-7-yl, 3,4,5,6-tetrahydro[2H]azepin-2-,-3-,-4-,-5-,-6- or-7-yl, 2,3,4,7-tetrahydro[1H]azepin-1-,-2-,-3-,-4-,-5-,-6-or-7-yl, 2,3,6,7-tetrahydro[1H]azepin-1-,-2-,-3-,-4-,-5-,-6- or-7-yl, hexahydroazepin-1-,-2-,-3- or-4-yl, tetra- and hexahydrooxepinyl such as 2,3,4,5-tetrahydro[1H]oxepin-2-,-3-,-4-,-5-,-6- or-7-yl, 2,3,4,7-tetrahydro[1H]oxepin-2-,-3-,-4-,-5-,-6- or-7-yl, 2,3,6,7-tetrahydro[1H]oxepin-2-, -3-,-4-,-5-,-6- or-7-yl, hexahydroazepin-1-,-2-,-3- or-4-yl, tetra- and hexahydro-1,3-diazepinyl, tetra- and hexahydro-1,4-diazepinyl, tetra- and hexahydro-1,3-oxazepinyl, tetra- and hexahydro-1,4-oxazepinyl, tetra- and hexahydro-1,3-dioxepinyl, tetra- and hexahydro-1,4-dioxepinyl and the corresponding -ylidene radicals.

The term “substituted” refers to substitued with 1, 2, 3 or up to the maximum possible number of substituents.

The term “5-or 6-membered heteroaryl” or “5-or 6-membered heteroaromatic” refers to aromatic ring systems incuding besides carbon atoms, 1, 2, 3 or 4 heteroatoms independently selected from the group consisting of N, O and S, for example, a 5-membered heteroaryl such as pyrrol-1-yl, pyrrol-2-yl, pyrrol-3-yl, thien-2-yl, thien-3-yl, furan-2-yl, furan-3-yl, pyrazol-1-yl, pyrazol-3-yl, pyrazol-4-yl, pyrazol-5-yl, imidazol-1-yl, imidazol-2-yl, imidazol-4-yl, imidazol-5-yl, oxazol-2-yl, oxazol-4-yl, oxazol-5-yl, isoxazol-3-yl, isoxazol-4-yl, isoxazol-5-yl, thiazol-2-yl, thiazol-4-yl, thiazol-5-yl, isothiazol-3-yl, isothiazol-4-yl, isothiazol-5-yl, 1,2,4-triazolyl-1-yl, 1,2,4-triazol-3-yl 1,2,4-triazol-5-yl, 1,2,4-oxadiazol-3-yl, 1,2,4-oxadiazol-5-yl and 1,2,4-thiadiazol-3-yl, 1,2,4-thiadiazol-5-yl; or

a 6-membered heteroaryl, such as pyridin-2-yl, pyridin-3-yl, pyridin-4-yl, pyridazin-3-yl, pyridazin-4-yl, pyrimidin-2-yl, pyrimidin-4-yl, pyrimidin-5-yl, pyrazin-2-yl and 1,3,5-triazin-2-yl and 1,2,4-triazin-3-yl.

In the following, particular embodiments of the inventive compounds are described. Therein, specific meanings of the respective substituents are further detailled, wherein the meanings are in each case on their own but also in any combination with one another, particular embodiments of the present invention.

Furthermore, in respect of the variables, generally, the embodiments of the compounds I also apply to the intermediates.

According to one embodiment of formula I, R^1 is H, halogen, C_1-C_6-alkyl or C_1-C_6-halogenalkyl, in particular H, F, Cl, CH_3, C_2H_5, CF_3 more specifically H, CH_3, F or Cl most preferred H, F or Cl, especially R^1 is hydrogen.

Particularly preferred embodiments of R^1 according to the invention are in Table P1 below, wherein each line of lines P1-1 to P1-13 corresponds to one particular embodiment of the invention. Thereby, for every R^1 that is present in the inventive compounds, these specific embodiments and preferences apply independently of the meaning of any other R^1 that may be present in the ring:

Table P1:

No.	R^1
P1-1	H
P1-2	Cl
P1-3	F
P1-4	Br
P1-5	CN
P1-6	CH_3
P1-7	CH_2CH_3
P1-8	CF_3
P1-9	CHF_2
P1-10	OCH_3
P1-11	OCH_2CH_3
P1-12	OCF_3
P1-13	$OCHF_2$

According to one embodiment of formula I, R^2 is selected from the group consisting of C_1-C_6-alkyl, C_1-C_6-halogenalkyl, O-C_1-C_6-alkyl, C_3-C_6-cycloalkyl, in particular CH_3, C_2H_5, CF_3, CH_2F, CHF_2, OCH_3, OC_2H_5, O-C_3H_7, O-C_4H_9, cyclopropyl, cyclobutyl, more specifically CH_3, CH_2F, CF_2H, CF_3, OCH_3, OC_2H_5, most preferred OCH_3, CH_3.

According to still another embodiment of formula I, R^2 is halogen, in particular F, Cl, Br or I, more specifically F, Cl or Br, in particular F or Cl.

According to still another embodiment of formula I, R^2 is F.

According to still another embodiment of formula I, R^2 is Cl.

According to still another embodiment of formula I, R^2 is Br.

According to still another embodiment of formula I, R^2 is C_1-C_6-alkyl, in particular C_1-C_4-alkyl, such as CH_3. or C_2H_5, in particular CH_3 or CH_2CH_3.

According to still another embodiment of formula I, R^2 is C_1-C_6-halogenalkyl, in particular C_1-C_4-halogenalkyl, such as CF_3, CCl_3, FCH_2, $ClCH_2$, F_2CH, Cl_2CH, CF_3CH_2, CCl_3CH_2 or CF_2CHF_2.

According to still a further embodiment of formula I, R^2 is C_2-C_6-alkenyl, in particular C_2-C_4-alkenyl, such as $CH=CH_2$, $C(CH_3)=CH_2$, $CH_2CH=CH_2$.

According to a further specific embodiment of formula I, R^2 is C_2-C_6-halogenalkenyl, in particular C_2-C_4-halogenalkenyl, more specifically C_2-C_3-halogenalkenyl such as $CH=CHF$, $CH=CHCl$, $CH=CF_2$, $CH=CCl_2$, $CH_2CH=CHF$, $CH_2CH=CHCl$, $CH_2CH=CF_2$, $CH_2CH=CCl_2$, $CF_2CH=CF_2$, $CCl_2CH=CCl_2$, $CF_2CF=CF_2$, $CCl_2CCl=CCl_2$.

According to still a further embodiment of formula I, R^2 is C_2-C_6-alkynyl or C_2-C_6-halogenalkynyl, in particular C_2-C_4-alkynyl or C_2-C_4-halogenalkynyl, such as $C\equiv CH$, $CH_2C\equiv CH$, $C\equiv CCl$, $CH_2C\equiv CCl$, or $CCl_2C\equiv CCl$.

According to a further specific embodiment of formula I, R^2 is O-C_1-C_6-alkyl, in particular C_1-C_4-alkyl, more specifically C_1-C_2-alkoxy. R^2 is such as OCH_3 or OCH_2CH_3.

According to a further specific embodiment of formula I, R^2 is O-C_1-C_6-alkyl,

According to a further specific embodiment of formula I, R^2 is O-C_2-C_6-alkenyl in particular C_2-C_4-alkenyl, more specifically C_2-C_3-alkenyl. R^2 is such as $OCH=CH_2$, $OCH_2CH=CH_2$.

According to a further specific embodiment of formula I, R^2 is O-C_2-C_6-alkynyl, in particular C_2-C_6-alkynyl, in particular C_2-C_4-alkynyl, more specifically C_2-C_3-alkynyl. R^2 is such as O-CH_2-$C\equiv CH$.

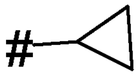
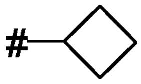
According to a further specific embodiment of formula I, R^2 is O-C_1-C_6-halogenalkyl, in particular OCF_3, $OCCl_3$, $OFCH_2$, $OClCH_2$, OF_2CH, OCl_2CH, OCF_3CH_2, $OCCl_3CH_2$ or OCF_2CHF_2, more specifically OCF_3, OF_2CH, $OFCH_2$.

According to still another embodiment of formula I, R^2 is C_3-C_6-cycloalkyl, in particular cyclopropyl or cyclobutyl.

According to still another embodiment of formula I, R^2 is C_3-C_6-halogencycloalkyl. In a special embodiment R^2 is fully or partially halogenated cyclopropyl, such as 1-F-cyclopropyl, 1-Cl-cyclopropyl, 2,2-F_2-cyclopropyl, 2,2-Cl_2-cyclopropyl .

Particularly preferred embodiments of R^2 according to the invention are in Table P2 below, wherein each line of lines P2-1 to P2-21 corresponds to one particular embodiment of the invention, wherein P2-1 to P2-21 are also in any combination with one another a preferred embodiment of the present invention. The connection point to the carbon atom, to which R^2 is bound is marked with “#” in the drawings.

Table P2:

No.	R^2
P2-1	CH_3
P2-2	CH_2F
P2-3	CHF_2
P2-4	CF_3
P2-5	C_2H_5
P2-6	$CH(CH_3)_2$
P2-7	$CH_2CH_2CH_3$
P2-8	$CH{=}CH_2$
P2-9	$CH_2CH{=}CH_2$
P2-10	$C\equiv CH$
P2-11	$CH_2C\equiv CH$
P2-12	OCF_3
P2-13	OCH_3
P2-14	$OCHF_2$
P2-15	OC_2H_5
P2-16	CN
P2-17	F
P2-18	Cl
P2-19	Br
P2-20	
P2-21	

According to one embodiment of formula I, R^3 is selected from the group consisting of C_1-C_6-alkyl, C_1-C_6-halogenalkyl, O-C_1-C_6-alkyl, C_3-C_6-cycloalkyl, in particular CH_3, C_2H_5, CF_3, CH_2F, CHF_2, OCH_3, OC_2H_5, O-C_3H_7, O-C_4H_9, cyclopropyl, cyclobutyl, more specifically CH_3, CH_2F, CF_2H, CF_3, cyclopropyl, cyclobutyl, most preferred CH_3, CF_2H, CF_3.

According to still another embodiment of formula I, R^3 is halogen, in particular F, Cl, Br or I, more specifically F, Cl or Br, in particular F or Cl.

According to still another embodiment of formula I, R^3 is F.

According to still another embodiment of formula I, R^3 is Cl.

According to still another embodiment of formula I, R^3 is Br.

According to still another embodiment of formula I, R^3 is C_1-C_6-alkyl, in particular C_1-C_4-alkyl, such as CH_3 or C_2H_5, in particular CH_3 or CH_2CH_3.

According to still another embodiment of formula I, R^3 is C_1-C_6-halogenalkyl, in particular C_1-C_4-halogenalkyl, such as CF_3, CCl_3, FCH_2, $ClCH_2$, F_2CH, Cl_2CH, CF_3CH_2, CCl_3CH_2 or CF_2CHF_2.

According to still a further embodiment of formula I, R^3 is C_2-C_6-alkenyl, in particular C_2-C_4-alkenyl, such as $CH{=}CH_2$, $C(CH_3){=}CH_2$, $CH_2CH{=}CH_2$.

According to a further specific embodiment of formula I, R^3 is C_2-C_6-halogenalkenyl, in particular C_2-C_4-halogenalkenyl, more specifically C_2-C_3-halogenalkenyl such as $CH{=}CHF$, $CH{=}CHCl$, $CH{=}CF_2$, $CH{=}CCl_2$, $CH_2CH{=}CHF$, $CH_2CH{=}CHCl$, $CH_2CH{=}CF_2$, $CH_2CH{=}CCl_2$, $CF_2CH{=}CF_2$, $CCl_2CH{=}CCl_2$, $CF_2CF{=}CF_2$, $CCl_2CCl{=}CCl_2$.

According to still a further embodiment of formula I, R^3 is C_2-C_6-alkynyl or C_2-C_6-halogenalkynyl, in particular C_2-C_4-alkynyl or C_2-C_4-halogenalkynyl, such as $C\equiv CH$, $CH_2C\equiv CH$, $C\equiv CCl$, $CH_2C\equiv CCl$, or $CCl_2C\equiv CCl$.

According to a further specific embodiment of formula I, R^3 is O-C_1-C_6-alkyl, in particular C_1-C_4-alkyl, more specifically C_1-C_2-alkoxy. R^3 is such as OCH_3 or OCH_2CH_3.

According to a further specific embodiment of formula I, R^3 is O-C_2-C_6-alkenyl in particular C_2-C_4-alkenyl, more specifically C_2-C_3-alkenyl. R^3 is such as $OCH=CH_2$, $OCH_2CH=CH_2$.

According to a further specific embodiment of formula I, R^3 is O-C_2-C_6-alkynyl, in particular C_2-C_6-alkynyl, in particular C_2-C_4-alkynyl, more specifically C_2-C_3-alkynyl. R^3 is such as O-CH_2-$C\equiv CH$.

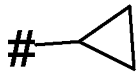
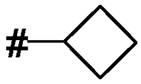
According to a further specific embodiment of formula I, R^3 is O-C_1-C_6-halogenalkyl, in particular OCF_3, $OCCl_3$, $OFCH_2$, $OClCH_2$, OF_2CH, OCl_2CH, OCF_3CH_2, $OCCl_3CH_2$ or OCF_2CHF_2, more specifically OCF_3, OF_2CH, $OFCH_2$.

According to still another embodiment of formula I, R^3 is C_3-C_6-cycloalkyl, in particular cyclopropyl, cyclobutyl.

According to still another embodiment of formula I, R^3 is C_3-C_6-halogencycloalkyl. In a special embodiment R^3 is fully or partially halogenated cyclopropyl, such as 1-F-cyclopropyl, 1-Cl-cyclopropyl, 2,2-F_2-cyclopropyl, 2,2-Cl_2-cyclopropyl .

Particularly preferred embodiments of R^3 according to the invention are in Table P3 below, wherein each line of lines P3-1 to P3-21 corresponds to one particular embodiment of the invention, wherein P3-1 to P3-21 are also in any combination with one another a preferred embodiment of the present invention. The connection point to the carbon atom, to which R^3 is bound is marked with “#” in the drawings.

Table P3:

No.	R^3
P3-1	CH_3
P3-2	CH_2F
P3-3	CHF_2
P3-4	CF_3
P3-5	C_2H_5
P3-6	$CH(CH_3)_2$
P3-7	$CH_2CH_2CH_3$
P3-8	$CH=CH_2$
P3-9	$CH_2CH=CH_2$
P3-10	$C\equiv CH$
P3-11	$CH_2C\equiv CH$
P3-12	$OCHF_3$
P3-13	OCH_3
P3-14	$OCHF_2$
P3-15	OC_2H_5
P3-16	CN
P3-17	F
P3-18	Cl
P3-19	Br
P3-20	
P3-21	

According to one embodiment of formula I, R^4 is H, halogen, C_1-C_6-alkyl or C_1-C_6-halogenalkyl, in particular H, F, Cl, CH_3, C_2H_5, CF_3 more specifically H, CH_3, F or Cl most preferred H, F or Cl, especially R^4 is hydrogen.

Particularly preferred embodiments of R^4 according to the invention are in Table P4 below, wherein each line of lines P4-1 to P4-10 corresponds to one particular embodiment of the invention. Thereby, for every R^4 that is present in the inventive compounds, these specific embodiments and preferences apply independently of the meaning of any other R^4 that may be present in the ring:

Table P4:

No.	R^4
P4-1	H
P4-2	Cl
P4-3	F
P4-4	Br
P4-5	CN
P4-6	CH_3
P4-7	CH_2CH_3
P4-8	CF_3
P4-9	CHF_2
P4-10	OCH_3

R^5, R^6, R^7, R^8

are in each case independently selected from hydrogen, halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl, C_3-C_6-cycloalkyl, O-C_3-C_6-cycloalkyl, CH_2-C_3-C_6-cycloalkyl, C_3-C_6-cycloalkenyl, O-C_3-C_6-cycloalkenyl, CH_2-C_3-C_6-cycloalkenyl, wherein the acyclic moieties of R^5, R^6, R^7, R^8 are unsubstituted or substituted by one to six groups R^{5a}, R^{6a}, R^{7a}, R^{8a} which independently of one another are selected from: halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl, C_3-C_6-cycloalkyl, O-C_3-C_6-cycloalkyl, CH_2-C_3-C_6-cycloalkyl, C_3-C_6-cycloalkenyl, O-C_3-C_6-cycloalkenyl, CH_2-C_3-C_6-cycloalkenyl, =N-OR´;

and wherein the groups R^{5a}, R^{6a}, R^{7a}, R^{8a} are unsubstituted or substituted by one to six halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, O-C_1-C_6-alkyl, =N-OR´;

or two moieties: R^5 and R^6 or R^7 and R^8 form together with the C atoms to which they are bound a group C=N-OR´; wherein

R´ is in each case independently selected from H, C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkynyl, C_3-C_6-cycloalkyl, phenyl, -CH_2-phenyl, a five- or six-membered heteroaryl, or CH_2-heteroaryl; wherein the heteroaryl contains 1, 2 or 3 heteroatoms selected from N, O and S; and wherein in each case one or two CH_2 groups of the carbo- or heterocycle may be replaced by a group independently selected from C(=O) and C(=S);

wherein the acyclic moieties of R´ are unsubstituted or substituted by one to six groups $R^{R´}$ independently of one another are selected from:

halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, , O-C_1-C_6-alkyl, =N-OR´.

According to one embodiment of formula I, R^5, R^6, R^7, R^8 are in each case independently selected from H, halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, O-C_1-C_6-alkyl, C_3-C_6-cycloalkyl, O-C_3-C_6-cycloalkyl, CH_2-C_3-C_6-cycloalkyl, C_3-C_6-cycloalkenyl, O-C_3-C_6-cycloalkenyl, CH_2-C_3-C_6-cycloalkenyl.

According to one further preferred embodiment of formula I, R^5 is preferably H, C_1-C_6-alkyl or C_1-C_6-alkyl-O-C_1-C_6-alkyl, more preferably H, CH_3, CH_2OCH_3.
According to one further preferred embodiment of formula I, R^5 is preferably H, CN, halogen, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, O-C_1-C_6-alkyl, C_3-C_6-cycloalkyl, O-C_3-C_6-cycloalkyl, CH_2-C_3-C_6-cycloalkyl, C_3-C_6-cycloalkenyl, O-C_3-C_6-cycloalkenyl, CH_2-C_3-C_6-cycloalkenyl or more preferably H, CH_3, C_2H_5, CN, F, Cl, CF_3, CH_2-CF_3, OCH_3, CH_2-$CH=CH_2$, cyclopropyl, CH_2-cyclopropyl or more preferably H, CH_3, C_2H_5, CN, F, Cl, OCH_3.

According to one further preferred embodiment of formula I, R^6 is preferably C_1-C_6-alkyl, C_1-C_4-halogenalkyl, C_2-C_4-alkenyl, O-C_1-C_6-alkyl, C_2-C_4-halogenalkenyl, cyclopropyl, CH_2-cyclopropyl.
According to one further preferred embodiment of formula I, R^7 is preferably H or C_1-C_6-alkyl, more preferably H and CH_3.
According to one further preferred embodiment of formula I, R^8 is preferably H or C_1-C_6-alkyl, more preferably H and CH_3.

According to one embodiment of formula I, R^5, R^6, R^7, R^8 are in each case independently H.

According to still another embodiment of formula I, R^5, R^6, R^7, R^8 are in each case independently halogen, preferably F or Cl, most preferably F.

According to one embodiment of formula I, R^5, R^6, R^7, R^8 are in each case independently CN.

According to still another embodiment of formula I, R^5, R^6, R^7, R^8 are in each case independently C_1-C_6-alkyl, such as CH_3, C_2H_5, n-propyl, i-propyl, n-butyl, i-butyl, tert-butyl, n-pentyl, i-pentyl or CH_2-$C(CH_3)_3$. Most preferably is CH_3, C_2H_5, n-propyl, i-butyl, tert-butyl or CH_2-$C(CH_3)_3$.

According to still another embodiment of formula I, R^5, R^6, R^7, R^8 are in each case independently C_1-C_6-halogenalkyl, in particular C_1-C_4-halogenalkyl, such as CF_3, CCl_3, FCH_2, $ClCH_2$, F_2CH, Cl_2CH, CF_3CH_2, CCl_3CH_2 or CF_2CHF_2.

According to still a further embodiment of formula I, R^5, R^6, R^7, R^8 are in each case independently C_2-C_6-alkenyl, in particular C_2-C_4-alkenyl, such as $C(CH_3)=CH_2$, $CH_2CH=CH_2$, $CH_2CH=C(CH_3)_2$, CH_2-CH_2-$CH=CH_2$.

According to a further specific embodiment of formula I, R^5, R^6, R^7, R^8 are in each case independently C_2-C_6-halogenalkenyl, in particular C_2-C_4-halogenalkenyl, more specifically C_2-C_3-halogenalkenyl such as $CH=CHF$, $CH=CHCl$, $CH=CF_2$, $CH=CCl_2$, $CH_2CH=CHF$, $CH_2CH=CHCl$, $CH_2CH=CF_2$, $CH_2CH=CCl_2$, $CF_2CH=CF_2$, $CCl_2CH=CCl_2$, $CF_2CF=CF_2$, $CCl_2CCl=CCl_2$, $CH(Cl)$-$CH=CH_2$, $CH_2CH=CH(Cl)$, $CH_2CH=CCl_2$, $CH_2CCl=CCl_2$.

According to still a further embodiment of formula I, R^5, R^6, R^7, R^8 are in each case independently C_2-C_6-alkynyl or C_2-C_6-halogenalkynyl, in particular C_2-C_4-alkynyl or C_2-C_4-halogenalkynyl, such as $C\equiv CH$, $CH_2C\equiv CH$, $C\equiv CCl$, $CH_2C\equiv CCl$, or $CCl_2C\equiv CCl$.

According to a further specific embodiment of formula I, R^5, R^6, R^7, R^8 are in each case independently O-C_1-C_6-alkanyl. R^5, R^6, R^7, R^8 are in each case independently such as OCH_3, OC_2H_5, O-n-propyl, O-iso-propyl, O-i-butyl, O-tert-butyl or O-CH_2-$C(CH_3)_3$.

According to a further specific embodiment of formula I, R^5, R^6, R^7, R^8 are in each case independently C_3-C_6-cycloalkyl, O-C_3-C_6-cycloalkyl, CH_2-C_3-C_6-cycloalkyl, C_3-C_6-cycloalkenyl, O-C_3-C_6-cycloalkenyl, CH_2-C_3-C_6-cycloalkenyl, wherein C_3-C_6-cycloalkyl is preferably selected from the group of cyclopropyl, 1-F-cyclopropyl, 1-Cl-cyclopropyl, 2,2-F_2-cyclopropyl, 2,2-Cl_2-cyclopropyl and cyclohexyl; and wherein C_3-C_6-cycloalkenyl is selected from the group of cyclohexen-1-yl, cyclohexen-2-yl, cyclohexen-3-yl, cyclohexen-4-yl.

According to a further specific embodiment of formula I, R^5, R^6, R^7, R^8 are in each case independently O-C_2-C_6-alkenyl in particular C_2-C_4-alkenyl, more specifically C_2-C_3-alkenyl. R^5, R^6, R^7, R^8 are in each case independently such as $OCH=CH_2$, $OCH_2CH=CH_2$.

According to a further specific embodiment of formula I, R^5, R^6, R^7, R^8 are in each case independently O-C_2-C_6-alkynyl, in particular C_2-C_6-alkynyl, in particular C_2-C_4-alkynyl, more specifically C_2-C_3-alkynyl. R^5, R^6, R^7, R^8 are in each case independently such as $OCH_2C\equiv CH$.

According to a further specific embodiment of formula I, R^5 and R^6 or R^7 and R^8 form together with the C atoms to which they are bound a group C=N-OR´ such as $C=NOCH_3$, $C=NO$-CH_2CH_3 , $C=NO$-CH_2CF_3 , $C=NO$-CH_2-$CH=CH_2$, $C=NO$-CH_2-CCH, $C=NO$-CH_2-C_6H_5. Particularly preferred embodiments of R^5, R^6, R^7, R^8 according to the invention are in Table P5 below, wherein each line of lines P5-1 to P5-30 corresponds to one particular embodiment of the invention, wherein P5-1 to P5-30 are also in any combination with one another a preferred embodiment of the present invention. The connection point to the carbon atom, to which R^5 is bound is marked with "#" in the drawings.

Table P5:

No.	**R^5, R^6, R^7, R^8**	**No.**	**R^5, R^6, R^7, R^8**
P5-1	H	P5-16	$CH_2CH_2CH_2CH_2CH_3$
P5-2	CN	P5-17	$CH{=}CH_2$
P5-3	F	P5-18	$CH_2CH{=}CH_2$
P5-4	Cl	P5-19	$C{\equiv}CH$
P5-5	CH_3	P5-20	$CH_2C{\equiv}CH$
P5-6	CH_2F	P5-21	$CH_2CH_2CH(CH_3)_2$
P5-7	CHF_2	P5-22	OCH_3
P5-8	CF_3	P5-23	OC_2H_5
P5-9	C_2H_5	P5-24	$OCH_2CH_2CH_3$
P5-10	C_3H_7	P5-25	$OCH(CH_3)_2$
P5-11	$CH(CH_3)_2$	P5-26	$OCH_2\text{-}CH{=}CH_2$
P5-12	$CH_2CH_2CH_3$	P5-27	$CH_2\text{-}C{\equiv}CH$
P5-13	$CH_2CH_2CH_2CH_3$	P5-28	CH_2CF_3
P5-14	$CH_2CH(CH_3)_2$	P5-29	$CH_2CF_2CF_3$
P5-15	$C(CH_3)_3$	P5-30	$CH_2CF(CH_3)_2$

According to one embodiment of formula I, R^9 is selected from C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_3-C_6-cycloalkyl, a five- or six-membered aryl, heteroaryl; wherein the heteroaryl contain 1, 2 or 3 heteroatoms selected from N, O and S; and wherein in each case one or two CH_2 groups of the carbo- or heterocycle may be replaced by a group independently selected from C(=O) and C(=S).

According to one embodiment of formula I, when A is $C(R^7R^8)$ R^9 is selected from H, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_3-C_6-cycloalkyl, a five- or six-membered aryl, heteroaryl; wherein the heteroaryl contain 1, 2 or 3 heteroatoms selected from N, O and S; and wherein in each case one or two CH_2 groups of the carbo- or heterocycle may be replaced by a group independently selected from C(=O) and C(=S).

According to one embodiment of formula I, R^9 is selected from the group consisting of CH_3, CH_2CH_3, $CH(CH_3)_2$, $CH(CH_3)_3$, CF_3, $CF(CH_3)_2$, $CH_2OCH(CH_3)_2$, cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, C_6H_5, 4-F-C_6H_4; most preferred CH_3 and phenyl.

According to still another embodiment of formula I, R^9 is C_1-C_6-alkyl, in particular C_1-C_4-alkyl, such as CH_3 or C_2H_5, in particular CH_3 or CH_2CH_3.

According to still another embodiment of formula I, R^9 is C_1-C_6-halogenalkyl, in particular C_1-C_4-halogenalkyl, such as CF_3, CCl_3, FCH_2, $ClCH_2$, F_2CH, Cl_2CH, CF_3CH_2, CCl_3CH_2 or CF_2CHF_2.

According to still a further embodiment of formula I, R^9 is C_2-C_6-alkenyl, in particular C_2-C_4-alkenyl, such as $CH{=}CH_2$, $C(CH_3){=}CH_2$, $CH_2CH{=}CH_2$.

According to a further specific embodiment of formula I, R^9 is C_2-C_6-halogenalkenyl, in particular C_2-C_4-halogenalkenyl, more specifically C_2-C_3-halogenalkenyl such as $CH{=}CHF$, $CH{=}CHCl$, $CH{=}CF_2$, $CH{=}CCl_2$, $CH_2CH{=}CHF$, $CH_2CH{=}CHCl$, $CH_2CH{=}CF_2$, $CH_2CH{=}CCl_2$, $CF_2CH{=}CF_2$, $CCl_2CH{=}CCl_2$, $CF_2CF{=}CF_2$, $CCl_2CCl{=}CCl_2$.

According to still a further embodiment of formula I, R^9 is C_2-C_6-alkynyl or C_2-C_6-halogenalkynyl, in particular C_2-C_4-alkynyl or C_2-C_4-halogenalkynyl, such as $C{\equiv}CH$, $CH_2C{\equiv}CH$, $C{\equiv}CCl$, $CH_2C{\equiv}CCl$, or $CCl_2C{\equiv}CCl$.

According to still another embodiment of formula I, R^9 is C_3-C_6-cycloalkyl, in particular cyclopropyl, cyclohexyl.
According to still another embodiment of formula I, R^9 is C_3-C_6-cycloalkenyl, in particular cyclopentenyl, or cyclohexenyl.

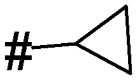
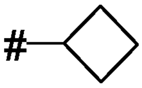
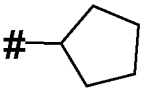
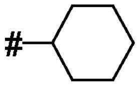
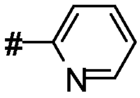
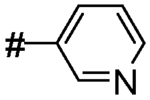
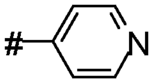
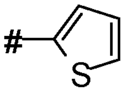
According to still another embodiment of formula I, R^9 is phenyl, wherein phenyl in each case is unsubstituted or substituted by identical or different groups R^{9a} which independently of one another are selected from halogen, C_1-C_2-alkyl, CN.

According to still another embodiment of formula I, R^9 is a 5-membered heteroaryl such as pyrrol-1-yl, pyrrol-2-yl, pyrrol-3-yl, thien-2-yl, thien-3-yl, furan-2-yl, furan-3-yl, pyrazol-1-yl, pyrazol-3-yl, pyrazol-4-yl, pyrazol-5-yl, imidazol-1-yl, imidazol-2-yl, imidazol-4-yl, imidazol-5-yl, oxazol-2-yl, oxazol4-yl, oxazol-5-yl, isoxazol-3-yl, isoxazol-4-yl, isoxazol-5-yl, thiazol-2-yl, thiazol-4-yl, thiazol-5-yl, isothiazol-3-yl, isothiazol-4-yl, isothiazol-5-yl, 1,2,4-triazolyl-1-yl, 1,2,4-triazol-3-yl 1,2,4-triazol-5-yl, 1,2,4-oxadiazol-3-yl, 1,2,4-oxadiazol-5-yl and 1,2,4-thiadiazol-3-yl, 1,2,4-thiadiazol-5-yl, preferred are pyrazol-1-yl, pyrazol-3-yl, pyrazol-4-yl, pyrazol-5-yl, 1,2,4-triazolyl-1-yl, 1,2,4-triazol-3-yl 1,2,4-triazol-5-yl, isoxazol-3-yl, isoxazol-4-yl, isoxazol-5-yl. The 5-membered heteroaryl in each case is unsubstituted or substituted by identical or different groups R^{9a} which independently of one another are selected from halogen, C_1-C_2-alkyl, CN.

According to still another embodiment of formula I, R^9 is a 6-membered heteroaryl such as pyridin-2-yl, pyridin-3-yl, pyridin-4-yl, pyridazin-3-yl, pyridazin-4-yl, pyrimidin-2-yl, pyrimidin-4-yl, pyrimidin-5-yl, pyrazin-2-yl and 1,3,5-triazin-2-yl and 1,2,4-triazin-3-yl, preferred are pyridin-2-yl, pyridin-3-yl, pyridin-4-yl. The 6-membered heteroaryl in each case is unsubstituted or substituted by identical or different groups R^{9a} which independently of one another are selected from halogen, C_1-C_2-alkyl, CN.

Particularly preferred embodiments of R^9 according to the invention are in Table P9 below, wherein each line of lines P9-1 to P9-104 corresponds to one particular embodiment of the invention, wherein P5-1 to P5-104 are also in any combination with one another a preferred embodiment of the present invention. The connection point to the carbon atom, to which R^9 is bound is marked with “#” in the drawings.

Table P9:

No.	R^9
P9-1	CH_3
P9-2	CH_2F
P9-3	CHF_2
P9-4	CF_3
P9-5	C_2H_5
P9-6	C_3H_7
P9-7	$CH(CH_3)_2$
P9-8	$CH_2CH_2CH_3$
P9-9	$CH_2CH_2CH_2CH_3$
P9-10	$CH_2CH(CH_3)_2$
P9-11	$C(CH_3)_3$
P9-12	$CH_2CH_2CH_2CH_2CH_3$
P9-13	$CH=CH_2$
P9-14	$CH_2CH=CH_2$
P9-15	$C\equiv CH$
P9-16	$CH_2C\equiv CH$
P9-17	$CH_2CH_2CH(CH_3)_2$
P9-18	$CH_2\text{-}C\equiv CH$
P9-19	
P9-20	
P9-21	
P9-22	
P9-23	
P9-24	
P9-25	
P9-26	
P9-27	C_6H_5
P9-28	$2\text{-}F\text{-}C_6H_4$
P9-29	$3\text{-}F\text{-}C_6H_4$
P9-30	$4\text{-}F\text{-}C_6H_4$
P9-31	$2\text{-}Cl\text{-}C_6H_4$
P9-32	$3\text{-}Cl\text{-}C_6H_4$
P9-33	$4\text{-}Cl\text{-}C_6H_4$
P9-34	$2\text{-}OCH_3\text{-}C_6H_4$
P9-35	$3\text{-}OCH_3\text{-}C_6H_4$
P9-36	$4\text{-}OCH_4\text{-}C_6H_4$
P9-37	$2\text{-}OCHF_2\text{-}C_6H_4$
P9-38	$3\text{-}OCHF_2\text{-}C_6H_4$
P9-39	$4\text{-}OCHF_2\text{-}C_6H_4$
P9-40	$2\text{-}CH_3\text{-}C_6H_4$
P9-41	$3\text{-}CH_3\text{-}C_6H_4$
P9-42	$4\text{-}CH_3\text{-}C_6H_4$
P9-43	$2\text{-}CF_3\text{-}C_6H_4$
P9-44	$3\text{-}CF_3\text{-}C_6H_4$
P9-45	$4\text{-}CF_3\text{-}C_6H_4$
P9-46	$2,3\text{-}F_2\text{-}C_6H_3$
P9-47	$2,4\text{-}F_2\text{-}C_6H_3$
P9-48	$2,5\text{-}F_2\text{-}C_6H_3$
P9-49	$2,6\text{-}F_2\text{-}C_6H_3$
P9-50	$3,4\text{-}F_2\text{-}C_6H_3$

No.	R^9
P9-51	$3,5-F_2-C_6H_3$
P9-52	$2,3-Cl_2-C_6H_3$
P9-53	$2,4-Cl_2-C_6H_3$
P9-54	$2,5-Cl_2-C_6H_3$
P9-55	$2,6-Cl_2-C_6H_3$
P9-56	$3,4-Cl_2-C_6H_3$
P9-57	$3,5-Cl_2-C_6H_3$
P9-58	$2,3-(CH_3)_2-C_6H_3$
P9-59	$2,4-(CH_3)_2-C_6H_3$
P9-60	$2,5-(CH_3)_2-C_6H_3$
P9-61	$2,6-(CH_3)_2-C_6H_3$
P9-62	$3,4-(CH_3)_2-C_6H_3$
P9-63	$3,5-(CH_3)_2-C_6H_3$
P9-64	$C_6H_5-CH_2$
P9-65	$2-F-C_6H_4-CH_2$
P9-66	$3-F-C_6H_4-CH_2$
P9-67	$4-F-C_6H_4-CH_2$
P9-68	$2-Cl-C_6H_4-CH_2$
P9-69	$3-Cl-C_6H_4-CH_2$
P9-70	$4-Cl-C_6H_4-CH_2$
P9-71	$2-CH_3-C_6H_4-CH_2$
P9-72	$3-CH_3-C_6H_4-CH_2$
P9-73	$4-CH_3-C_6H_4-CH_2$
P9-74	$2-CF_3-C_6H_4-CH_2$
P9-75	$3-CF_3-C_6H_4-CH_2$
P9-76	$4-CF_3-C_6H_4-CH_2$
P9-77	$2-OCH_3-C_6H_4-CH_2$

No.	R^9
P9-78	$3-OCH_3-C_6H_4-CH_2$
P9-79	$4-OCH_3-C_6H_4-CH_2$
P9-80	$2-OCHF_2-C_6H_4-CH_2$
P9-81	$3-OCHF_2-C_6H_4-CH_2$
P9-82	$4-OCHF_2-C_6H_4-CH_2$
P9-83	$2,3-F_2-C_6H_3-CH_2$
P9-84	$2,4-F_2-C_6H_3-CH_2$
P9-85	$2,5-F_2-C_6H_3-CH_2$
P9-86	$2,6-F_2-C_6H_3-CH_2$
P9-87	$3,4-F_2-C_6H_3-CH_2$
P9-88	$3,5-F_2-C_6H_3-CH_2$
P9-89	$2,3-Cl_2-C_6H_3-CH_2$
P9-90	$2,4-Cl_2-C_6H_3-CH_2$
P9-91	$2,5-Cl_2-C_6H_3-CH_2$
P9-92	$2,6-Cl_2-C_6H_3-CH_2$
P9-93	$3,4-Cl_2-C_6H_3-CH_2$
P9-94	$3,5-Cl_2-C_6H_3-CH_2$
P9-95	$2,3-(CH_3)_2-C_6H_3-CH_2$
P9-96	$2,4-(CH_3)_2-C_6H_3-CH_2$
P9-97	$2,5-(CH_3)_2-C_6H_3-CH_2$
P9-98	$2,6-(CH_3)_2-C_6H_3-CH_2$
P9-99	$3,4-(CH_3)_2-C_6H_3-CH_2$
P9-100	$3,5-(CH_3)_2-C_6H_3-CH_2$
P9-101	$CH_2OCH(CH_3)_2$
P9-102	$CF(CH_3)_2$
P9-103	CH_2CF_3
P9-104	$CH_2CF_2CF_3$

In one embodiment, the invention relates to compounds of the formula I, or the N-oxides, or the agriculturally acceptable salts thereof, wherein

X is O; A is $C(R^7R^8)$;

R^1 is H;

R^2 is selected from the group consisting of C_1-C_6-alkyl, C_1-C_6-halogenalkyl or O-C_1-C_6-alkyl;

R^3 is selected from the group consisting of C_1-C_6-alkyl, C_1-C_6-halogenalkyl or C_3-C_4-cycloalkyl;
R^4 is H;
R^5, R^6, R^7, R^8 are independently selected from H, halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_1-C_6-alkenyl, C_1-C_6-halogenalkenyl, O-C_1-C_6-alkyl, C_3-C_6-cycloalkyl, CH_2-C_3-C_6-cycloalkyl or two moieties: R^5 and R^6 or R^7 and R^8 form together with the C atoms to which they are bound a group C=N-OR´; wherein R´ is as defined above;
R^9 is selected from the group consisting of C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_3-C_6-cycloalkyl, a five- or six-membered aryl, heteroaryl; wherein the heteroaryl contain 1, 2 or 3 heteroatoms selected from N, O and S; and wherein in each case one or two CH_2 groups of the carbo- or heterocycle may be replaced by a group independently selected from C(=O) and C(=S).

In one further embodiment, the invention relates to compounds of the formula I, or the N-oxides, or the agriculturally acceptable salts thereof, wherein
X is O;
A is $C(R^7R^8)$;
R^1 is H;
R^2 is selected from the group consisting of CH_3, C_2H_5, CF_3, CH_2F, CHF_2, OCH_3, OC_2H_5, O-C_3H_7, O-C_4H_9, cyclopropyl, cyclobutyl;
R^3 is selected from the group consisting of CH_3, C_2H_5, CF_3, CH_2F, CHF_2, cyclopropyl, cyclobutyl;
R^4 is H;
R^5, R^6, R^7, R^8 are independently selected from H, halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_3-C_6-cycloalkyl, O-C_1-C_6-alkyl, or two moieties:
R^5 and R^6 or R^7 and R^8 form together with the C atoms to which they are bound a group C=N-OR´; wherein R´ is as defined above;
R^9 is selected from the group consisting of C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_3-C_6-cycloalkyl, a five- or six-membered aryl, heteroaryl; wherein the heteroaryl contain 1, 2 or 3 heteroatoms selected from N, O and S; and wherein in each case one or two CH_2 groups of the carbo- or heterocycle may be replaced by a group independently selected from C(=O) and C(=S).

In one further embodiment, the invention relates to compounds of the formula I, or the N-oxides, or the agriculturally acceptable salts thereof, wherein
X is O;
A is $C(R^7R^8)$;
R^1 is H;
R^2 is selected from the group consisting of CH_3, OCH_3;
R^3 is selected from the group consisting of CH_3, CF_3, CF_2H;
R^4 is H;
R^5 is selected from the group consisting of H, F, Cl, CN, CH_3, CH_2OCH_3.
R^6 is selected from the group consisting of C_1-C_6-alkyl, C_1-C_4-halogenalkyl, C_2-C_4-alkenyl, C_2-C_4-halogenalkenyl, cyclopropyl, CH_2-cyclopropyl,
R^7 is selected from the group consisting of H and CH_3;
R^8 is selected from the group consisting of H and CH_3.
R^9 is selected from the group consisting of CH_3, phenyl, pyridine-2-yl, pyridine-3-yl, pyridine-4-yl and cyclohexyl.

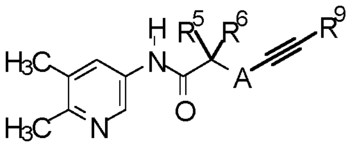
In one embodiment, the invention relates to compounds of the formula I, or the N-oxides, or the agriculturally acceptable salts thereof, wherein
X is O;

A is a direct bond
R^1 is H;
R^2 is selected from the group consisting of CH_3, OCH_3;
R^3 is selected from the group consisting of CH_3, CF_3, CF_2H;
R^4 is H;
R^5 is selected from the group consisting of H, F, Cl, CN, CH_3, CH_2OCH_3.
R^6 is selected from the group consisting of C_1-C_6-alkyl, C_1-C_4-halogenalkyl, C_2-C_4-alkenyl, C_2-C_4-halogenalkenyl, cyclopropyl, CH_2-cyclopropyl,
R^7 is selected from the group consisting of H and CH_3;
R^8 is selected from the group consisting of H and CH_3.
R^9 is selected from the group consisting of CH_3, phenyl, pyridine-2-yl, pyridine-3-yl, pyridine-4-yl and cyclohexyl.

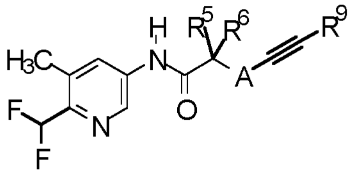
In one further embodiment, the invention relates to compounds of the formula I, or the N-oxides, or the agriculturally acceptable salts thereof, wherein
X is O;
A is a direct bond;
R^1 is H;
R^2 is selected from the group consisting of CH_3, C_2H_5, CF_3, CH_2F, CHF_2, OCH_3, OC_2H_5, O-C_3H_7, O-C_4H_9, cyclopropyl, cyclobutyl;
R^3 is selected from the group consisting of CH_3, C_2H_5, CF_3, CH_2F, CHF_2, cyclopropyl, cyclobutyl;
R^4 is H;
R^5, R^6 are independently selected from H, halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, O-C_1-C_6-alkyl, or two moieties:
R^5 and R^6 form together with the C atoms to which they are bound a group =N-OR´; wherein R´ is as defined above;
R^9 is selected from the group consisting of C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_3-C_6-cycloalkyl, a five- or six-membered aryl, heteroaryl; wherein the heteroaryl contain 1, 2 or 3 heteroatoms selected from N, O and S; and wherein in each case one or two CH_2 groups of the carbo- or heterocycle may be replaced by a group independently selected from C(=O) and C(=S).

In one further embodiment, the invention relates to compounds of the formula I, or the N-oxides, or the agriculturally acceptable salts thereof, wherein
X is O;
A is a direct bond;
R^1 is H;
R^2 is selected from the group consisting of CH_3, OCH_3;
R^3 is selected from the group consisting of CH_3, CF_3, CF_2H;
R^4 is H;
R^5 is selected from the group consisting of H, CH_3, CH_2OCH_3.
R^6 is selected from the group consisting of C_1-C_6-alkyl, C_1-C_4-halogenalkyl, C_2-C_4-alkenyl,
R^9 is selected from the group consisting of CH_3 and cyclopropyl.

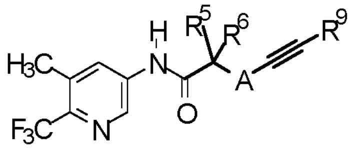
Preferred embodiments of the present invention are the following compounds I.A-1, I.A-2, I.A-3, I.A-4, I.A-5, I.A-6, I.A-6; compounds I.B-1, I.B-2, I.B-3, I.B-4, I.B-5, I.B-6. In these formulae, the substituents R^5, R^6, R^7, R^8 and R^9 are independently as defined above or preferably defined herein:



I.A-1



I.A-2



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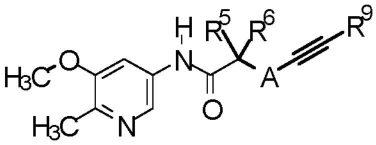

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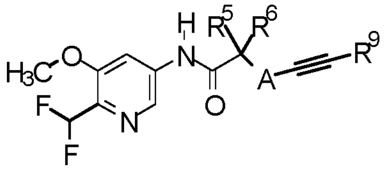

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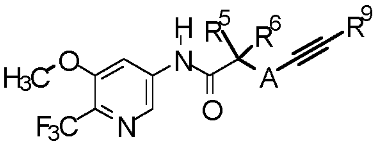

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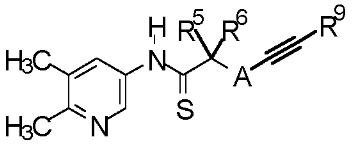
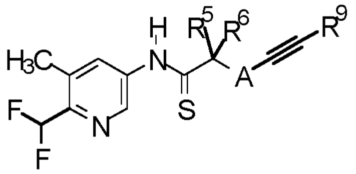


I.B-1



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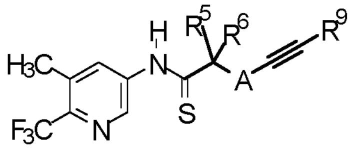

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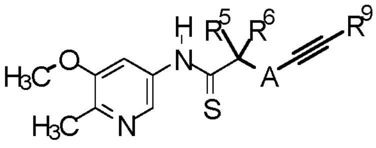
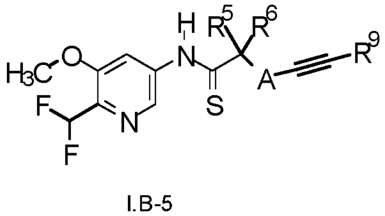


I.B-4



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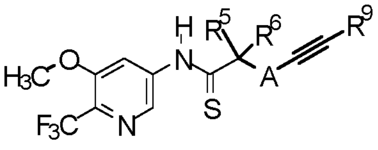


I.B-6

In particular with a view to their use, according to one embodiment, preference is given to the compounds of the compounds I.A-1, I.A-2, I.A-3, I.A-4, I.A-5, I.A-6,; compounds I.B-1, I.B-2, I.B-3, I.B-4, I.B-5, I.B-6 that are compiled in the Tables 1a to 6a. Each of the groups mentioned for a substituent in the tables is furthermore per se, independently of the combination in which it is mentioned, a particularly preferred aspect of the substituent in question.

Table 1a Compounds of the formula I.A-1, I.A-2, I.A-3, I.A-4, I.A-5, I.A-6; I.B-1, I.B-2, I.B-3, I.B-4, I.B-5, I.B-6 in which A is $-CH_2-$ and the meaning for the combination of R^5, R^6 and R^9 for each individual compound corresponds in each case to one line of Table B (compounds I.A-1.1a.B-1 to I.A-1.1a.B-396, I.A-2.1a.B-1 to I.A-2.1a.B-396, I.A-3.1a.B-1 to I.A-3.1a.B-396, I.A-4.1a.B-1 to I.A-5.1a.B-396, I.A-5.1a.B-1 to I.A-3.1a.B-396, I.A-6.1a.B-1 to I.A-6.1a.B-396; B-1.1a.B-1 to I.B-1.1a.B-396, I.B-2.1a.B-1 to I.B-2.1a.B-396, I.B-3.1a.B-1 to I.B-3.1a.B-396, I.B-4.1a.B-1 to I.B-4.1a.B-396, I.B-5.1a.B-1 to I.B-5.1a.B-396, I.B-6.1a.B-1 to I.B-6.1a.B-396).

Table 2a Compounds of the formula I.A-1, I.A-2, I.A-3, I.A-4, I.A-5, I.A-6; I.B-1, I.B-2, I.B-3, I.B-4, I.B-5, I.B-6 in which A is -CHF- and the meaning for the combination of R^5, R^6 and R^9 for each individual compound corresponds in each case to one line of Table B (compounds I.A-1.2a.B-1 to I.A-1.2a.B-396, I.A-2.2a.B-1 to I.A-2.2a.B-396, I.A-3.2a.B-1 to I.A-3.2a.B-396, I.A-4.2a.B-1 to I.A-5.2a.B-396, I.A-5.2a.B-1 to I.A-3.2a.B-396, I.A-6.2a.B-1 to I.A-6.2a.B-396; B-1.2a.B-1 to I.B-1.2a.B-396, I.B-2.2a.B-1 to I.B-2.2a.B-396, I.B-3.2a.B-1 to I.B-3.2a.B-396, I.B-4.2a.B-1 to I.B-4.2a.B-396, I.B-5.2a.B-1 to I.B-5.2a.B-396, I.B-6.2a.B-1 to I.B-6.2a.B-396).

Table 3a Compounds of the formula I.A-1, I.A-2, I.A-3, I.A-4, I.A-5, I.A-6; I.B-1, I.B-2, I.B-3, I.B-4, I.B-5, I.B-6 in which A is -$CH(CH_3)$- and the meaning for the combination of R^5, R^6 and R^9 for each individual compound corresponds in each case to one line of Table B (compounds I.A-1.3a.B-1 to I.A-1.3a.B-396, I.A-2.3a.B-1 to I.A-2.3a.B-396, I.A-3.3a.B-1 to I.A-3.3a.B-396, I.A-4.3a.B-1 to I.A-5.3a.B-396, I.A-5.3a.B-1 to I.A-3.3a.B-396, I.A-6.3a.B-1 to I.A-6.3a.B-396; B-1.3a.B-1 to I.B-1.3a.B-396, I.B-2.3a.B-1 to I.B-2.3a.B-396, I.B-3.3a.B-1 to I.B-3.3a.B-396, I.B-4.3a.B-1 to I.B-4.3a.B-396, I.B-5.3a.B-1 to I.B-5.3a.B-396, I.B-6.3a.B-1 to I.B-6.3a.B-396).

Table 4a Compounds of the formula I.A-1, I.A-2, I.A-3, I.A-4, I.A-5, I.A-6; I.B-1, I.B-2, I.B-3, I.B-4, I.B-5, I.B-6 in which A is -$CF(CH_3)$- and the meaning for the combination of R^5, R^6 and R^9 for each individual compound corresponds in each case to one line of Table B (compounds I.A-1.4a.B-1 to I.A-1.4a.B-396, I.A-2.4a.B-1 to I.A-2.4a.B-396, I.A-3.4a.B-1 to I.A-3.4a.B-396, I.A-4.4a.B-1 to I.A-5.4a.B-396, I.A-5.4a.B-1 to I.A-3.4a.B-396, I.A-6.4a.B-1 to I.A-6.4a.B-396; B-1.4a.B-1 to I.B-1.4a.B-396, I.B-2.4a.B-1 to I.B-2.4a.B-396, I.B-3.4a.B-1 to I.B-3.4a.B-396, I.B-4.4a.B-1 to I.B-4.4a.B-396, I.B-5.4a.B-1 to I.B-5.4a.B-396, I.B-6.4a.B-1 to I.B-6.4a.B-396).

Table 5a Compounds of the formula I.A-1, I.A-2, I.A-3, I.A-4, I.A-5, I.A-6; I.B-1, I.B-2, I.B-3, I.B-4, I.B-5, I.B-6 in which A is -CF_2- and the meaning for the combination of R^5, R^6 and R^9 for each individual compound corresponds in each case to one line of Table B (compounds I.A-1.5a.B-1 to I.A-1.5a.B-396, I.A-2.5a.B-1 to I.A-2.5a.B-396, I.A-3.5a.B-1 to I.A-3.5a.B-396, I.A-4.5a.B-1 to I.A-5.5a.B-396, I.A-5.5a.B-1 to I.A-3.5a.B-396, I.A-6.5a.B-1 to I.A-6.5a.B-396; B-1.5a.B-1 to I.B-1.5a.B-396, I.B-2.5a.B-1 to I.B-2.5a.B-396, I.B-3.5a.B-1 to I.B-3.5a.B-396, I.B-4.5a.B-1 to I.B-4.5a.B-396, I.B-5.5a.B-1 to I.B-5.5a.B-396, I.B-6.5a.B-1 to I.B-6.5a.B-396).

Table 6a Compounds of the formula I.A-1, I.A-2, I.A-3, I.A-4, I.A-5, I.A-6; I.B-1, I.B-2, I.B-3, I.B-4, I.B-5, I.B-6 in which A is -$C(CH_3)_2$- and the meaning for the combination of R^5, R^6 and R^9 for each individual compound corresponds in each case to one line of Table B (compounds I.A-1.6a.B-1 to I.A-1.6a.B-396, I.A-2.6a.B-1 to I.A-2.6a.B-396, I.A-3.6a.B-1 to I.A-3.6a.B-396, I.A-4.6a.B-1 to I.A-5.6a.B-396, I.A-5.6a.B-1 to I.A-3.6a.B-396, I.A-6.6a.B-1 to I.A-6.6a.B-396; B-1.6a.B-1 to I.B-1.6a.B-396, I.B-2.6a.B-1 to I.B-2.6a.B-396, I.B-3.6a.B-1 to I.B-3.6a.B-396, I.B-4.6a.B-1 to I.B-4.6a.B-396, I.B-5.6a.B-1 to I.B-5.6a.B-396, I.B-6.6a.B-1 to I.B-6.6a.B-396).

Table 7a Compounds of the formula I.A-1, I.A-2, I.A-3, I.A-4, I.A-5, I.A-6; I.B-1, I.B-2, I.B-3, I.B-4, I.B-5, I.B-6 in which A is direct bound and the meaning for the combination of R^5, R^6 and R^9 for each individual compound corresponds in each case to one line of Table B (compounds I.A-1.7a.B-1 to I.A-1.7a.B-396, I.A-2.7a.B-1 to I.A-2.7a.B-396, I.A-3.7a.B-1 to I.A-3.7a.B-396, I.A-4.7a.B-1 to I.A-5.7a.B-396, I.A-5.7a.B-1 to I.A-3.7a.B-396, I.A-6.7a.B-1 to I.A-6.7a.B-396; B-1.7a.B-1 to I.B-1.7a.B-396, I.B-2.7a.B-1 to I.B-2.7a.B-396, I.B-3.7a.B-1 to I.B-3.7a.B-396, I.B-4.7a.B-1 to I.B-4.7a.B-396, I.B-5.7a.B-1 to I.B-5.7a.B-396, I.B-6.7a.B-1 to I.B-6.7a.B-396).

Table B

No.	R^6	R^5	R^9
B-1	$CH_2CH_2CH_3$	H	CH_3
B-2	$CH(CH_3)_2$	H	CH_3
B-3	$CH_2CH(CH_3)_2$	H	CH_3
B-4	$CH(CH_3)CH_2CH_3$	H	CH_3
B-5	$C(CH_3)_3$	H	CH_3
B-6	$CH_2C(CH_3)_3$	H	CH_3
B-7	CH_2CF_3	H	CH_3
B-8	$CH_2CF_2CF_3$	H	CH_3
B-9	$CH_2CF(CH_3)_2$	H	CH_3
B-10	$CH_2C(CH_3)=CH_2$	H	CH_3
B-11	$CH_2C(F)=CH_2$	H	CH_3
B-12	$CH_2CH_2CH_3$	CH_3	CH_3
B-13	$CH(CH_3)_2$	CH_3	CH_3
B-14	$CH_2CH(CH_3)_2$	CH_3	CH_3
B-15	$CH(CH_3)CH_2CH_3$	CH_3	CH_3
B-16	$C(CH_3)_3$	CH_3	CH_3
B-17	$CH_2C(CH_3)_3$	CH_3	CH_3
B-18	CH_2CF_3	CH_3	CH_3
B-19	$CH_2CF_2CF_3$	CH_3	CH_3
B-20	$CH_2CF(CH_3)_2$	CH_3	CH_3
B-21	$CH_2C(CH_3)=CH_2$	CH_3	CH_3
B-22	$CH_2C(F)=CH_2$	CH_3	CH_3
B-23	$CH_2CH_2CH_3$	CH_2-O-CH_3	CH_3
B-24	$CH(CH_3)_2$	CH_2-O-CH_3	CH_3
B-25	$CH_2CH(CH_3)_2$	CH_2-O-CH_3	CH_3
B-26	$CH(CH_3)CH_2CH_3$	CH_2-O-CH_3	CH_3
B-27	$C(CH_3)_3$	CH_2-O-CH_3	CH_3
B-28	$CH_2C(CH_3)_3$	CH_2-O-CH_3	CH_3
B-29	CH_2CF_3	CH_2-O-CH_3	CH_3
B-30	$CH_2CF_2CF_3$	CH_2-O-CH_3	CH_3
B-31	$CH_2CF(CH_3)_2$	CH_2-O-CH_3	CH_3
B-32	$CH_2C(CH_3)=CH_2$	CH_2-O-CH_3	CH_3
B-33	$CH_2C(F)=CH_2$	CH_2-O-CH_3	CH_3
B-34	$CH_2CH_2CH_3$	H	CF_3
B-35	$CH(CH_3)_2$	H	CF_3
B-36	$CH_2CH(CH_3)_2$	H	CF_3
B-37	$CH(CH_3)CH_2CH_3$	H	CF_3
B-38	$C(CH_3)_3$	H	CF_3
B-39	$CH_2C(CH_3)_3$	H	CF_3
B-40	CH_2CF_3	H	CF_3
B-41	$CH_2CF_2CF_3$	H	CF_3
B-42	$CH_2CF(CH_3)_2$	H	CF_3
B-43	$CH_2C(CH_3)=CH_2$	H	CF_3
B-44	$CH_2C(F)=CH_2$	H	CF_3

No.	R^6	R^5	R^9
B-45	$CH_2CH_2CH_3$	CH_3	CF_3
B-46	$CH(CH_3)_2$	CH_3	CF_3
B-47	$CH_2CH(CH_3)_2$	CH_3	CF_3
B-48	$CH(CH_3)CH_2CH_3$	CH_3	CF_3
B-49	$C(CH_3)_3$	CH_3	CF_3
B-50	$CH_2C(CH_3)_3$	CH_3	CF_3
B-51	CH_2CF_3	CH_3	CF_3
B-52	$CH_2CF_2CF_3$	CH_3	CF_3
B-53	$CH_2CF(CH_3)_2$	CH_3	CF_3
B-54	$CH_2C(CH_3)=CH_2$	CH_3	CF_3
B-55	$CH_2C(F)=CH_2$	CH_3	CF_3
B-56	$CH_2CH_2CH_3$	CH_2-O-CH_3	CF_3
B-57	$CH(CH_3)_2$	CH_2-O-CH_3	CF_3
B-58	$CH_2CH(CH_3)_2$	CH_2-O-CH_3	CF_3
B-59	$CH(CH_3)CH_2CH_3$	CH_2-O-CH_3	CF_3
B-60	$C(CH_3)_3$	CH_2-O-CH_3	CF_3
B-61	$CH_2C(CH_3)_3$	CH_2-O-CH_3	CF_3
B-62	CH_2CF_3	CH_2-O-CH_3	CF_3
B-63	$CH_2CF_2CF_3$	CH_2-O-CH_3	CF_3
B-64	$CH_2CF(CH_3)_2$	CH_2-O-CH_3	CF_3
B-65	$CH_2C(CH_3)=CH_2$	CH_2-O-CH_3	CF_3
B-66	$CH_2C(F)=CH_2$	CH_2-O-CH_3	CF_3
B-67	$CH_2CH_2CH_3$	H	CH_2CH_3
B-68	$CH(CH_3)_2$	H	CH_2CH_3
B-69	$CH_2CH(CH_3)_2$	H	CH_2CH_3
B-70	$CH(CH_3)CH_2CH_3$	H	CH_2CH_3
B-71	$C(CH_3)_3$	H	CH_2CH_3
B-72	$CH_2C(CH_3)_3$	H	CH_2CH_3
B-73	CH_2CF_3	H	CH_2CH_3
B-74	$CH_2CF_2CF_3$	H	CH_2CH_3
B-75	$CH_2CF(CH_3)_2$	H	CH_2CH_3
B-76	$CH_2C(CH_3)=CH_2$	H	CH_2CH_3
B-77	$CH_2C(F)=CH_2$	H	CH_2CH_3
B-78	$CH_2CH_2CH_3$	CH_3	CH_2CH_3
B-79	$CH(CH_3)_2$	CH_3	CH_2CH_3
B-80	$CH_2CH(CH_3)_2$	CH_3	CH_2CH_3
B-81	$CH(CH_3)CH_2CH_3$	CH_3	CH_2CH_3
B-82	$C(CH_3)_3$	CH_3	CH_2CH_3
B-83	$CH_2C(CH_3)_3$	CH_3	CH_2CH_3
B-84	CH_2CF_3	CH_3	CH_2CH_3
B-85	$CH_2CF_2CF_3$	CH_3	CH_2CH_3
B-86	$CH_2CF(CH_3)_2$	CH_3	CH_2CH_3
B-87	$CH_2C(CH_3)=CH_2$	CH_3	CH_2CH_3
B-88	$CH_2C(F)=CH_2$	CH_3	CH_2CH_3
B-89	$CH_2CH_2CH_3$	CH_2-O-CH_3	CH_2CH_3

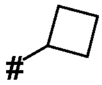
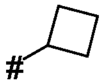
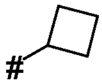
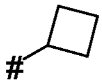
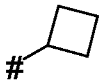
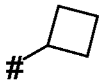
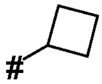
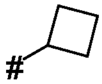
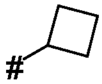
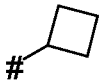
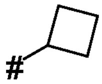
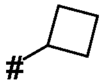
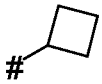
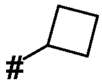
No.	R^6	R^5	R^9
B-90	$CH(CH_3)_2$	CH_2-O-CH_3	CH_2CH_3
B-91	$CH_2CH(CH_3)_2$	CH_2-O-CH_3	CH_2CH_3
B-92	$CH(CH_3)CH_2CH_3$	CH_2-O-CH_3	CH_2CH_3
B-93	$C(CH_3)_3$	CH_2-O-CH_3	CH_2CH_3
B-94	$CH_2C(CH_3)_3$	CH_2-O-CH_3	CH_2CH_3
B-95	CH_2CF_3	CH_2-O-CH_3	CH_2CH_3
B-96	$CH_2CF_2CF_3$	CH_2-O-CH_3	CH_2CH_3
B-97	$CH_2CF(CH_3)_2$	CH_2-O-CH_3	CH_2CH_3
B-98	$CH_2C(CH_3)=CH_2$	CH_2-O-CH_3	CH_2CH_3
B-99	$CH_2C(F)=CH_2$	CH_2-O-CH_3	CH_2CH_3
B-100	$CH_2CH_2CH_3$	H	$CH(CH_3)_2$
B-101	$CH(CH_3)_2$	H	$CH(CH_3)_2$
B-102	$CH_2CH(CH_3)_2$	H	$CH(CH_3)_2$
B-103	$CH(CH_3)CH_2CH_3$	H	$CH(CH_3)_2$
B-104	$C(CH_3)_3$	H	$CH(CH_3)_2$
B-105	$CH_2C(CH_3)_3$	H	$CH(CH_3)_2$
B-106	CH_2CF_3	H	$CH(CH_3)_2$
B-107	$CH_2CF_2CF_3$	H	$CH(CH_3)_2$
B-108	$CH_2CF(CH_3)_2$	H	$CH(CH_3)_2$
B-109	$CH_2C(CH_3)=CH_2$	H	$CH(CH_3)_2$
B-110	$CH_2C(F)=CH_2$	H	$CH(CH_3)_2$
B-111	$CH_2CH_2CH_3$	CH_3	$CH(CH_3)_2$
B-112	$CH(CH_3)_2$	CH_3	$CH(CH_3)_2$
B-113	$CH_2CH(CH_3)_2$	CH_3	$CH(CH_3)_2$
B-114	$CH(CH_3)CH_2CH_3$	CH_3	$CH(CH_3)_2$
B-115	$C(CH_3)_3$	CH_3	$CH(CH_3)_2$
B-116	$CH_2C(CH_3)_3$	CH_3	$CH(CH_3)_2$
B-117	CH_2CF_3	CH_3	$CH(CH_3)_2$
B-118	$CH_2CF_2CF_3$	CH_3	$CH(CH_3)_2$
B-119	$CH_2CF(CH_3)_2$	CH_3	$CH(CH_3)_2$
B-120	$CH_2C(CH_3)=CH_2$	CH_3	$CH(CH_3)_2$
B-121	$CH_2C(F)=CH_2$	CH_3	$CH(CH_3)_2$
B-122	$CH_2CH_2CH_3$	CH_2-O-CH_3	$CH(CH_3)_2$
B-123	$CH(CH_3)_2$	CH_2-O-CH_3	$CH(CH_3)_2$
B-124	$CH_2CH(CH_3)_2$	CH_2-O-CH_3	$CH(CH_3)_2$
B-125	$CH(CH_3)CH_2CH_3$	CH_2-O-CH_3	$CH(CH_3)_2$
B-126	$C(CH_3)_3$	CH_2-O-CH_3	$CH(CH_3)_2$
B-127	$CH_2C(CH_3)_3$	CH_2-O-CH_3	$CH(CH_3)_2$
B-128	CH_2CF_3	CH_2-O-CH_3	$CH(CH_3)_2$
B-129	$CH_2CF_2CF_3$	CH_2-O-CH_3	$CH(CH_3)_2$
B-130	$CH_2CF(CH_3)_2$	CH_2-O-CH_3	$CH(CH_3)_2$
B-131	$CH_2C(CH_3)=CH_2$	CH_2-O-CH_3	$CH(CH_3)_2$
B-132	$CH_2C(F)=CH_2$	CH_2-O-CH_3	$CH(CH_3)_2$
B-133	$CH_2CH_2CH_3$	H	$CF(CH_3)_2$
B-134	$CH(CH_3)_2$	H	$CF(CH_3)_2$

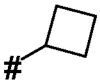
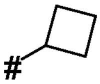
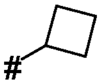
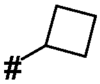
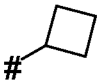
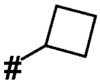
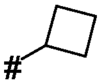
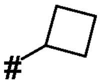
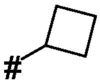
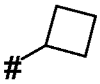
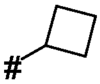
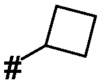
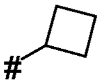
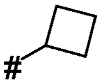
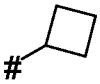
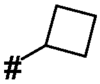
No.	R^6	R^5	R^9
B-135	$CH_2CH(CH_3)_2$	H	$CF(CH_3)_2$
B-136	$CH(CH_3)CH_2CH_3$	H	$CF(CH_3)_2$
B-137	$C(CH_3)_3$	H	$CF(CH_3)_2$
B-138	$CH_2C(CH_3)_3$	H	$CF(CH_3)_2$
B-139	CH_2CF_3	H	$CF(CH_3)_2$
B-140	$CH_2CF_2CF_3$	H	$CF(CH_3)_2$
B-141	$CH_2CF(CH_3)_2$	H	$CF(CH_3)_2$
B-142	$CH_2C(CH_3)=CH_2$	H	$CF(CH_3)_2$
B-143	$CH_2C(F)=CH_2$	H	$CF(CH_3)_2$
B-144	$CH_2CH_2CH_3$	CH_3	$CF(CH_3)_2$
B-145	$CH(CH_3)_2$	CH_3	$CF(CH_3)_2$
B-146	$CH_2CH(CH_3)_2$	CH_3	$CF(CH_3)_2$
B-147	$CH(CH_3)CH_2CH_3$	CH_3	$CF(CH_3)_2$
B-148	$C(CH_3)_3$	CH_3	$CF(CH_3)_2$
B-149	$CH_2C(CH_3)_3$	CH_3	$CF(CH_3)_2$
B-150	CH_2CF_3	CH_3	$CF(CH_3)_2$
B-151	$CH_2CF_2CF_3$	CH_3	$CF(CH_3)_2$
B-152	$CH_2CF(CH_3)_2$	CH_3	$CF(CH_3)_2$
B-153	$CH_2C(CH_3)=CH_2$	CH_3	$CF(CH_3)_2$
B-154	$CH_2C(F)=CH_2$	CH_3	$CF(CH_3)_2$
B-155	$CH_2CH_2CH_3$	CH_2-O-CH_3	$CF(CH_3)_2$
B-156	$CH(CH_3)_2$	CH_2-O-CH_3	$CF(CH_3)_2$
B-157	$CH_2CH(CH_3)_2$	CH_2-O-CH_3	$CF(CH_3)_2$
B-158	$CH(CH_3)CH_2CH_3$	CH_2-O-CH_3	$CF(CH_3)_2$
B-159	$C(CH_3)_3$	CH_2-O-CH_3	$CF(CH_3)_2$
B-160	$CH_2C(CH_3)_3$	CH_2-O-CH_3	$CF(CH_3)_2$
B-161	CH_2CF_3	CH_2-O-CH_3	$CF(CH_3)_2$
B-162	$CH_2CF_2CF_3$	CH_2-O-CH_3	$CF(CH_3)_2$
B-163	$CH_2CF(CH_3)_2$	CH_2-O-CH_3	$CF(CH_3)_2$
B-164	$CH_2C(CH_3)=CH_2$	CH_2-O-CH_3	$CF(CH_3)_2$
B-165	$CH_2C(F)=CH_2$	CH_2-O-CH_3	$CF(CH_3)_2$
B-166	$CH_2CH_2CH_3$	H	$C(CH_3)_3$
B-167	$CH(CH_3)_2$	H	$C(CH_3)_3$
B-168	$CH_2CH(CH_3)_2$	H	$C(CH_3)_3$
B-169	$CH(CH_3)CH_2CH_3$	H	$C(CH_3)_3$
B-170	$C(CH_3)_3$	H	$C(CH_3)_3$
B-171	$CH_2C(CH_3)_3$	H	$C(CH_3)_3$
B-172	CH_2CF_3	H	$C(CH_3)_3$
B-173	$CH_2CF_2CF_3$	H	$C(CH_3)_3$
B-174	$CH_2CF(CH_3)_2$	H	$C(CH_3)_3$
B-175	$CH_2C(CH_3)=CH_2$	H	$C(CH_3)_3$
B-176	$CH_2C(F)=CH_2$	H	$C(CH_3)_3$
B-177	$CH_2CH_2CH_3$	CH_3	$C(CH_3)_3$
B-178	$CH(CH_3)_2$	CH_3	$C(CH_3)_3$
B-179	$CH_2CH(CH_3)_2$	CH_3	$C(CH_3)_3$

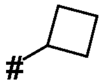
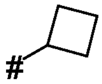
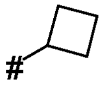
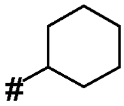
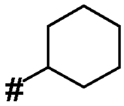
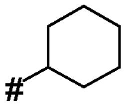
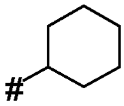
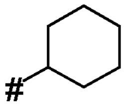
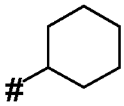
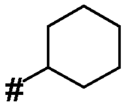
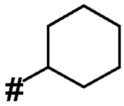
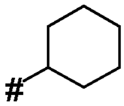
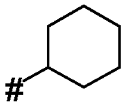
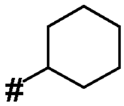
No.	R^6	R^5	R^9
B-180	$CH(CH_3)CH_2CH_3$	CH_3	$C(CH_3)_3$
B-181	$C(CH_3)_3$	CH_3	$C(CH_3)_3$
B-182	$CH_2C(CH_3)_3$	CH_3	$C(CH_3)_3$
B-183	CH_2CF_3	CH_3	$C(CH_3)_3$
B-184	$CH_2CF_2CF_3$	CH_3	$C(CH_3)_3$
B-185	$CH_2CF(CH_3)_2$	CH_3	$C(CH_3)_3$
B-186	$CH_2C(CH_3)=CH_2$	CH_3	$C(CH_3)_3$
B-187	$CH_2C(F)=CH_2$	CH_3	$C(CH_3)_3$
B-188	$CH_2CH_2CH_3$	CH_2-O-CH_3	$C(CH_3)_3$
B-189	$CH(CH_3)_2$	CH_2-O-CH_3	$C(CH_3)_3$
B-190	$CH_2CH(CH_3)_2$	CH_2-O-CH_3	$C(CH_3)_3$
B-191	$CH(CH_3)CH_2CH_3$	CH_2-O-CH_3	$C(CH_3)_3$
B-192	$C(CH_3)_3$	CH_2-O-CH_3	$C(CH_3)_3$
B-193	$CH_2C(CH_3)_3$	CH_2-O-CH_3	$C(CH_3)_3$
B-194	CH_2CF_3	CH_2-O-CH_3	$C(CH_3)_3$
B-195	$CH_2CF_2CF_3$	CH_2-O-CH_3	$C(CH_3)_3$
B-196	$CH_2CF(CH_3)_2$	CH_2-O-CH_3	$C(CH_3)_3$
B-197	$CH_2C(CH_3)=CH_2$	CH_2-O-CH_3	$C(CH_3)_3$
B-198	$CH_2C(F)=CH_2$	CH_2-O-CH_3	$C(CH_3)_3$
B-199	$CH_2CH_2CH_3$	H	CH_2-O-$CH(CH_3)_2$
B-200	$CH(CH_3)_2$	H	CH_2-O-$CH(CH_3)_2$
B-201	$CH_2CH(CH_3)_2$	H	CH_2-O-$CH(CH_3)_2$
B-202	$CH(CH_3)CH_2CH_3$	H	CH_2-O-$CH(CH_3)_2$
B-203	$C(CH_3)_3$	H	CH_2-O-$CH(CH_3)_2$
B-204	$CH_2C(CH_3)_3$	H	CH_2-O-$CH(CH_3)_2$
B-205	CH_2CF_3	H	CH_2-O-$CH(CH_3)_2$
B-206	$CH_2CF_2CF_3$	H	CH_2-O-$CH(CH_3)_2$
B-207	$CH_2CF(CH_3)_2$	H	CH_2-O-$CH(CH_3)_2$
B-208	$CH_2C(CH_3)=CH_2$	H	CH_2-O-$CH(CH_3)_2$
B-209	$CH_2C(F)=CH_2$	H	CH_2-O-$CH(CH_3)_2$
B-210	$CH_2CH_2CH_3$	CH_3	CH_2-O-$CH(CH_3)_2$
B-211	$CH(CH_3)_2$	CH_3	CH_2-O-$CH(CH_3)_2$
B-212	$CH_2CH(CH_3)_2$	CH_3	CH_2-O-$CH(CH_3)_2$
B-213	$CH(CH_3)CH_2CH_3$	CH_3	CH_2-O-$CH(CH_3)_2$
B-214	$C(CH_3)_3$	CH_3	CH_2-O-$CH(CH_3)_2$
B-215	$CH_2C(CH_3)_3$	CH_3	CH_2-O-$CH(CH_3)_2$
B-216	CH_2CF_3	CH_3	CH_2-O-$CH(CH_3)_2$
B-217	$CH_2CF_2CF_3$	CH_3	CH_2-O-$CH(CH_3)_2$
B-218	$CH_2CF(CH_3)_2$	CH_3	CH_2-O-$CH(CH_3)_2$
B-219	$CH_2C(CH_3)=CH_2$	CH_3	CH_2-O-$CH(CH_3)_2$
B-220	$CH_2C(F)=CH_2$	CH_3	CH_2-O-$CH(CH_3)_2$
B-221	$CH_2CH_2CH_3$	CH_2-O-CH_3	CH_2-O-$CH(CH_3)_2$
B-222	$CH(CH_3)_2$	CH_2-O-CH_3	CH_2-O-$CH(CH_3)_2$
B-223	$CH_2CH(CH_3)_2$	CH_2-O-CH_3	CH_2-O-$CH(CH_3)_2$
B-224	$CH(CH_3)CH_2CH_3$	CH_2-O-CH_3	CH_2-O-$CH(CH_3)_2$

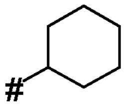
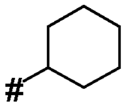
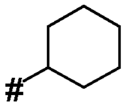
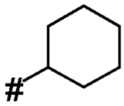
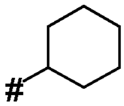
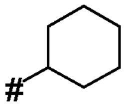
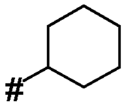
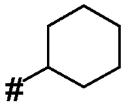
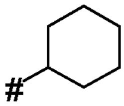
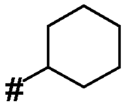
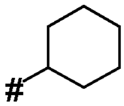
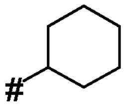
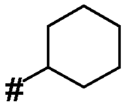
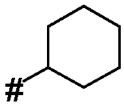
No.	R^6	R^5	R^9
B-225	$C(CH_3)_3$	CH_2-O-CH_3	CH_2-O-$CH(CH_3)_2$
B-226	$CH_2C(CH_3)_3$	CH_2-O-CH_3	CH_2-O-$CH(CH_3)_2$
B-227	CH_2CF_3	CH_2-O-CH_3	CH_2-O-$CH(CH_3)_2$
B-228	$CH_2CF_2CF_3$	CH_2-O-CH_3	CH_2-O-$CH(CH_3)_2$
B-229	$CH_2CF(CH_3)_2$	CH_2-O-CH_3	CH_2-O-$CH(CH_3)_2$
B-230	$CH_2C(CH_3){=}CH_2$	CH_2-O-CH_3	CH_2-O-$CH(CH_3)_2$
B-231	$CH_2C(F){=}CH_2$	CH_2-O-CH_3	CH_2-O-$CH(CH_3)_2$
B-232	$CH_2CH_2CH_3$	H	
B-233	$CH(CH_3)_2$	H	
B-234	$CH_2CH(CH_3)_2$	H	
B-235	$CH(CH_3)CH_2CH_3$	H	
B-236	$C(CH_3)_3$	H	
B-237	$CH_2C(CH_3)_3$	H	
B-238	CH_2CF_3	H	
B-239	$CH_2CF_2CF_3$	H	
B-240	$CH_2CF(CH_3)_2$	H	
B-241	$CH_2C(CH_3){=}CH_2$	H	
B-242	$CH_2C(F){=}CH_2$	H	
B-243	$CH_2CH_2CH_3$	CH_3	
B-244	$CH(CH_3)_2$	CH_3	
B-245	$CH_2CH(CH_3)_2$	CH_3	

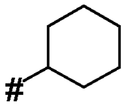
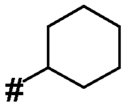
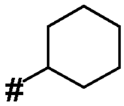
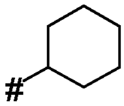
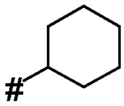
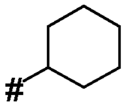
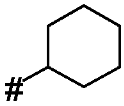
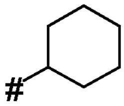
No.	R^6	R^5	R^9
B-246	$CH(CH_3)CH_2CH_3$	CH_3	
B-247	$C(CH_3)_3$	CH_3	
B-248	$CH_2C(CH_3)_3$	CH_3	
B-249	CH_2CF_3	CH_3	
B-250	$CH_2CF_2CF_3$	CH_3	
B-251	$CH_2CF(CH_3)_2$	CH_3	
B-252	$CH_2C(CH_3)=CH_2$	CH_3	
B-253	$CH_2C(F)=CH_2$	CH_3	
B-254	$CH_2CH_2CH_3$	CH_2-O-CH_3	
B-255	$CH(CH_3)_2$	CH_2-O-CH_3	
B-256	$CH_2CH(CH_3)_2$	CH_2-O-CH_3	
B-257	$CH(CH_3)CH_2CH_3$	CH_2-O-CH_3	
B-258	$C(CH_3)_3$	CH_2-O-CH_3	
B-259	$CH_2C(CH_3)_3$	CH_2-O-CH_3	
B-260	CH_2CF_3	CH_2-O-CH_3	
B-261	$CH_2CF_2CF_3$	CH_2-O-CH_3	
B-262	$CH_2CF(CH_3)_2$	CH_2-O-CH_3	

No.	R^6	R^5	R^9
B-263	$CH_2C(CH_3)=CH_2$	CH_2-O-CH_3	
B-264	$CH_2C(F)=CH_2$	CH_2-O-CH_3	
B-265	$CH_2CH_2CH_3$	H	
B-266	$CH(CH_3)_2$	H	
B-267	$CH_2CH(CH_3)_2$	H	
B-268	$CH(CH_3)CH_2CH_3$	H	
B-269	$C(CH_3)_3$	H	
B-270	$CH_2C(CH_3)_3$	H	
B-271	CH_2CF_3	H	
B-272	$CH_2CF_2CF_3$	H	
B-273	$CH_2CF(CH_3)_2$	H	
B-274	$CH_2C(CH_3)=CH_2$	H	
B-275	$CH_2C(F)=CH_2$	H	
B-276	$CH_2CH_2CH_3$	CH_3	
B-277	$CH(CH_3)_2$	CH_3	
B-278	$CH_2CH(CH_3)_2$	CH_3	

No.	R^6	R^5	R^9
B-279	$CH(CH_3)CH_2CH_3$	CH_3	
B-280	$C(CH_3)_3$	CH_3	
B-281	$CH_2C(CH_3)_3$	CH_3	
B-282	CH_2CF_3	CH_3	
B-283	$CH_2CF_2CF_3$	CH_3	
B-284	$CH_2CF(CH_3)_2$	CH_3	
B-285	$CH_2C(CH_3)=CH_2$	CH_3	
B-286	$CH_2C(F)=CH_2$	CH_3	
B-287	$CH_2CH_2CH_3$	CH_2-O-CH_3	
B-288	$CH(CH_3)_2$	CH_2-O-CH_3	
B-289	$CH_2CH(CH_3)_2$	CH_2-O-CH_3	
B-290	$CH(CH_3)CH_2CH_3$	CH_2-O-CH_3	
B-291	$C(CH_3)_3$	CH_2-O-CH_3	
B-292	$CH_2C(CH_3)_3$	CH_2-O-CH_3	
B-293	CH_2CF_3	CH_2-O-CH_3	
B-294	$CH_2CF_2CF_3$	CH_2-O-CH_3	

No.	R^6	R^5	R^9
B-295	$CH_2CF(CH_3)_2$	CH_2-O-CH_3	
B-296	$CH_2C(CH_3)=CH_2$	CH_2-O-CH_3	
B-297	$CH_2C(F)=CH_2$	CH_2-O-CH_3	
B-298	$CH_2CH_2CH_3$	H	
B-299	$CH(CH_3)_2$	H	
B-300	$CH_2CH(CH_3)_2$	H	
B-301	$CH(CH_3)CH_2CH_3$	H	
B-302	$C(CH_3)_3$	H	
B-303	$CH_2C(CH_3)_3$	H	
B-304	CH_2CF_3	H	
B-305	$CH_2CF_2CF_3$	H	
B-306	$CH_2CF(CH_3)_2$	H	
B-307	$CH_2C(CH_3)=CH_2$	H	
B-308	$CH_2C(F)=CH_2$	H	

No.	R^6	R^5	R^9
B-309	$CH_2CH_2CH_3$	CH_3	
B-310	$CH(CH_3)_2$	CH_3	
B-311	$CH_2CH(CH_3)_2$	CH_3	
B-312	$CH(CH_3)CH_2CH_3$	CH_3	
B-313	$C(CH_3)_3$	CH_3	
B-314	$CH_2C(CH_3)_3$	CH_3	
B-315	CH_2CF_3	CH_3	
B-316	$CH_2CF_2CF_3$	CH_3	
B-317	$CH_2CF(CH_3)_2$	CH_3	
B-318	$CH_2C(CH_3)=CH_2$	CH_3	
B-319	$CH_2C(F)=CH_2$	CH_3	
B-320	$CH_2CH_2CH_3$	$CH_2\text{-}O\text{-}CH_3$	
B-321	$CH(CH_3)_2$	$CH_2\text{-}O\text{-}CH_3$	
B-322	$CH_2CH(CH_3)_2$	$CH_2\text{-}O\text{-}CH_3$	

No.	R^6	R^5	R^9
B-323	$CH(CH_3)CH_2CH_3$	CH_2-O-CH_3	
B-324	$C(CH_3)_3$	CH_2-O-CH_3	
B-325	$CH_2C(CH_3)_3$	CH_2-O-CH_3	
B-326	CH_2CF_3	CH_2-O-CH_3	
B-327	$CH_2CF_2CF_3$	CH_2-O-CH_3	
B-328	$CH_2CF(CH_3)_2$	CH_2-O-CH_3	
B-329	$CH_2C(CH_3)=CH_2$	CH_2-O-CH_3	
B-330	$CH_2C(F)=CH_2$	CH_2-O-CH_3	
B-331	$CH_2CH_2CH_3$	H	C_6H_5
B-332	$CH(CH_3)_2$	H	C_6H_5
B-333	$CH_2CH(CH_3)_2$	H	C_6H_5
B-334	$CH(CH_3)CH_2CH_3$	H	C_6H_5
B-335	$C(CH_3)_3$	H	C_6H_5
B-336	$CH_2C(CH_3)_3$	H	C_6H_5
B-337	CH_2CF_3	H	C_6H_5
B-338	$CH_2CF_2CF_3$	H	C_6H_5
B-339	$CH_2CF(CH_3)_2$	H	C_6H_5
B-340	$CH_2C(CH_3)=CH_2$	H	C_6H_5
B-341	$CH_2C(F)=CH_2$	H	C_6H_5
B-342	$CH_2CH_2CH_3$	CH_3	C_6H_5
B-343	$CH(CH_3)_2$	CH_3	C_6H_5
B-344	$CH_2CH(CH_3)_2$	CH_3	C_6H_5
B-345	$CH(CH_3)CH_2CH_3$	CH_3	C_6H_5
B-346	$C(CH_3)_3$	CH_3	C_6H_5
B-347	$CH_2C(CH_3)_3$	CH_3	C_6H_5
B-348	CH_2CF_3	CH_3	C_6H_5
B-349	$CH_2CF_2CF_3$	CH_3	C_6H_5

No.	R^6	R^5	R^9
B-350	$CH_2CF(CH_3)_2$	CH_3	C_6H_5
B-351	$CH_2C(CH_3)=CH_2$	CH_3	C_6H_5
B-352	$CH_2C(F)=CH_2$	CH_3	C_6H_5
B-353	$CH_2CH_2CH_3$	CH_2-O-CH_3	C_6H_5
B-354	$CH(CH_3)_2$	CH_2-O-CH_3	C_6H_5
B-355	$CH_2CH(CH_3)_2$	CH_2-O-CH_3	C_6H_5
B-356	$CH(CH_3)CH_2CH_3$	CH_2-O-CH_3	C_6H_5
B-357	$C(CH_3)_3$	CH_2-O-CH_3	C_6H_5
B-358	$CH_2C(CH_3)_3$	CH_2-O-CH_3	C_6H_5
B-359	CH_2CF_3	CH_2-O-CH_3	C_6H_5
B-360	$CH_2CF_2CF_3$	CH_2-O-CH_3	C_6H_5
B-361	$CH_2CF(CH_3)_2$	CH_2-O-CH_3	C_6H_5
B-362	$CH_2C(CH_3)=CH_2$	CH_2-O-CH_3	C_6H_5
B-363	$CH_2C(F)=CH_2$	CH_2-O-CH_3	C_6H_5
B-364	$CH_2CH_2CH_3$	H	4-F-C_6H_4
B-365	$CH(CH_3)_2$	H	4-F-C_6H_4
B-366	$CH_2CH(CH_3)_2$	H	4-F-C_6H_4
B-367	$CH(CH_3)CH_2CH_3$	H	4-F-C_6H_4
B-368	$C(CH_3)_3$	H	4-F-C_6H_4
B-369	$CH_2C(CH_3)_3$	H	4-F-C_6H_4
B-370	CH_2CF_3	H	4-F-C_6H_4
B-371	$CH_2CF_2CF_3$	H	4-F-C_6H_4
B-372	$CH_2CF(CH_3)_2$	H	4-F-C_6H_4
B-373	$CH_2C(CH_3)=CH_2$	H	4-F-C_6H_4
B-374	$CH_2C(F)=CH_2$	H	4-F-C_6H_4
B-375	$CH_2CH_2CH_3$	CH_3	4-F-C_6H_4
B-376	$CH(CH_3)_2$	CH_3	4-F-C_6H_4
B-377	$CH_2CH(CH_3)_2$	CH_3	4-F-C_6H_4
B-378	$CH(CH_3)CH_2CH_3$	CH_3	4-F-C_6H_4
B-379	$C(CH_3)_3$	CH_3	4-F-C_6H_4
B-380	$CH_2C(CH_3)_3$	CH_3	4-F-C_6H_4
B-381	CH_2CF_3	CH_3	4-F-C_6H_4
B-382	$CH_2CF_2CF_3$	CH_3	4-F-C_6H_4
B-383	$CH_2CF(CH_3)_2$	CH_3	4-F-C_6H_4
B-384	$CH_2C(CH_3)=CH_2$	CH_3	4-F-C_6H_4
B-385	$CH_2C(F)=CH_2$	CH_3	4-F-C_6H_4
B-386	$CH_2CH_2CH_3$	CH_2-O-CH_3	4-F-C_6H_4
B-387	$CH(CH_3)_2$	CH_2-O-CH_3	4-F-C_6H_4
B-388	$CH_2CH(CH_3)_2$	CH_2-O-CH_3	4-F-C_6H_4
B-389	$CH(CH_3)CH_2CH_3$	CH_2-O-CH_3	4-F-C_6H_4
B-390	$C(CH_3)_3$	CH_2-O-CH_3	4-F-C_6H_4
B-391	$CH_2C(CH_3)_3$	CH_2-O-CH_3	4-F-C_6H_4
B-392	CH_2CF_3	CH_2-O-CH_3	4-F-C_6H_4
B-393	$CH_2CF_2CF_3$	CH_2-O-CH_3	4-F-C_6H_4
B-394	$CH_2CF(CH_3)_2$	CH_2-O-CH_3	4-F-C_6H_4

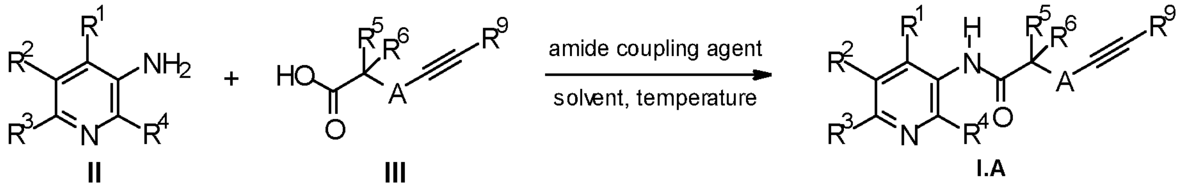
No.	R^6	R^5	R^9
B-395	$CH_2C(CH_3)=CH_2$	CH_2-O-CH_3	4-F-C_6H_4
B-396	$CH_2C(F)=CH_2$	CH_2-O-CH_3	4-F-C_6H_4

Compounds of the present invention can be made as shown in the following schemes, in which, unless otherwise stated, the definition of each variable is as defined above for a compound of formula I. The compounds of the formula I can be prepared according to methods or in analogy to methods that are described in the prior art. The synthesis takes advantage of starting materials that are commercially available or may be prepared according to conventional procedures starting from readily available compounds.

Compounds of the present invention can be made following the schemes 1 to 5 described below, in which, unless otherwise stated, the definition of each variable is as defined above for a compound of formula (I).

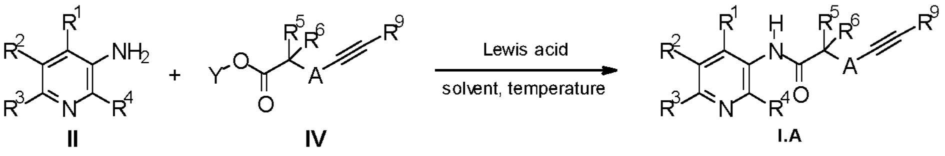
Among the various reported methods for preparing compounds of formula (I.A) (wherein X is O and R^1-R^9 and A are as defined for compounds of formula I) the most widely applied method is an amide coupling reaction of 3-aminopyridines of type II with carboxylic acids of type III. Among various reported methods for such amide coupling reactions, a robust method involves treatment of carboxylic acid of type III (R^5-R^9 and A are as defined for compounds of formula I) with an activating agent like phosgene, thionyl chloride or oxalyl chloride or an amide coupling reagent like dicyclohexylcarbodiimide in organic solvent like tetrahydrofuran (THF), dichloromethane (DCM) or dimethylformamide (DMF). Subsequent addition of an amine of type II (R^1-R^4 are as defined for compounds of formula I) in the presence of a base like triethylamine or dimethylaminopyridine gives the target compounds of formula I.A as described in Scheme 1 (see: *Chem.* Soc. *Rev.* **2009,** 606-631 or *Tetrahedron* **2005,** 10827-10852).

Scheme 1



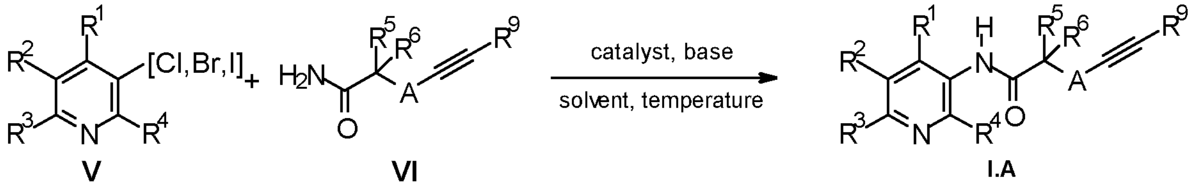
Compounds of formula (I.A) (wherein X is O and R^1-R^9 and A are as defined for compounds of formula I) can also be prepared by the amide coupling reaction between 3-aminopyridines of type II (R^1-R^4 are as defined for compounds of formula I) and an ester of type IV (R^5-R^9 and A are as defined for compounds of formula I and Y is $C_1 - C_6$ alkyl or phenyl) in the presence of a Lewis acid such as trimethyl aluminium in an inert organic solvent like toluene under heating as shown in Scheme 2.

Scheme 2



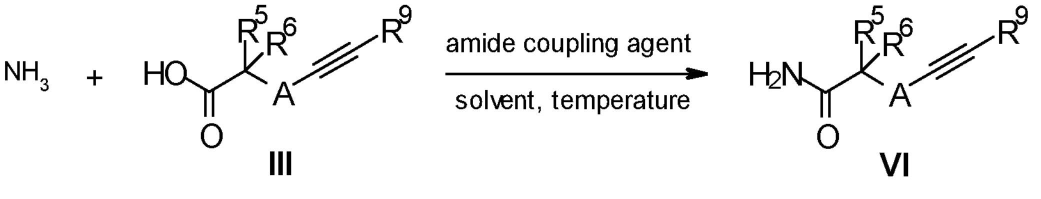
Compounds of formula (I.A) (wherein X is O and R^1-R^9 and A are as defined for compounds of formula I) can alternatively be prepared by the coupling of 3-halopyridines of type V (R^1-R^4 are as defined for compounds of formula I and halogen are preferably chloro, bromo or iodo) with amide of type VI (R^5-R^9 and A are as defined for compounds of formula I) in the presence of a base such as cesium carbonate or sodium tertiary-butoxide in the presence of a transition metal catalyst such as a copper-based catalyst such as copper oxide, copper (I) acetylacetonate or copper (I) bromide-1,10-phenanthroline complex, a nickel catalyst such as Dichloro(1,3-bis(diphenylphosphino)propane)nickel or a palladium-based catalyst such as Chloro(2-dicyclohexylphosphino-2',4',6'-triisopropyl-1,1'-biphenyl)[2-(2'-amino-1,1'-biphenyl)]palladium(II), X-Phos aminobiphenyl palladium chloride precatalyst or [1,3-Bis(2,6-Diisopropylphenyl)imidazol-2-ylidene](3-chloropyridyl)palladium(II) dichloride in an aprotic solvent such as toluene or N,N-dimethylformamide at room temperature or while heating. This is shown in Scheme 3.

Scheme 3



Among the various reported methods for preparing compounds of formula VI (R^5-R^9 and A are as defined for compounds of formula I), the most widely applied method involves treatment of carboxylic acid III (R^5-R^9 and A are as defined for compounds of formula I) with an activating agent like phosgene, thionyl chloride or oxalyl chloride or an amide coupling reagent like dicyclohexylcarbodiimide in an inert organic solvent like tetrahydrofuran (THF), dichloromethane (DCM) or dimethylformamide (DMF). Subsequent addition of ammonia or an ammonium salt such as ammonium chloride or ammonium hydroxide in the presence or absence of a catalyst like dimethylaminopyridine gives the target compounds of formula VI as described in Scheme 4 (see: *Chem.* Soc. *Rev.* **2009,** 606-631 or *Tetrahedron* **2005,** 10827-10852).

Scheme 4

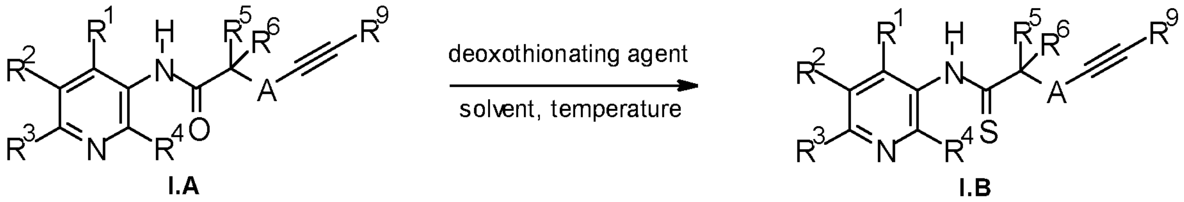


A skilled person will realize that carboxylic acids of formula (III) (R^5-R^9 and A are as defined for compounds of formula I) can be prepared from the corresponding esters such as compounds of formula (IV) (R^5-R^9 and A are as defined for compounds of formula I and Y is C_1 – C_6 alkyl or phenyl). A skilled person will also realize that the *alpha* functionalization of these esters can be performed by deprotonation with a strong base like lithium diisopropylamine in an inert solvent like THF at temperatures between -78 °C and 20 °C followed by reaction with an electrophilic reagent like an alkyl iodide or a source of electrophilic fluorine, as described in *March's Advanced Organic Chemistry,* Smith and March, 6th edition, Wiley, 2007. This reaction can be repeated to prepare acids of formula (III) and the introduced alkyl, alkenyl and alkynyl groups can be further functionalized by halogenation, cyclopropanation, oxidation or reduction, cross coupling (eg Sonogashira coupling) to prepare acid derivatives of formula (III) from commercially available esters.

A skilled person will realize that carboxylic acids of formula (III) (R^5-R^9 are as defined for compounds of formula I and A is a bond) can be prepared by various methods that involve functional group transformations, such as a triple bond can be obtained from an aldehyde using the Bestmann-Ohira reagent as described in *J. Org. Chem.,* 1982, *47,* 1837-1845). Other new methods for the preparation of carboxylic acids of formula (III) (R^5-R^9 are as defined for compounds of formula I and A is a bond) are described in literatures (see: *Chem. Commun.* **2014**, 13052-13055; *Org. Lett.* **2013**, 1472-1475).

As shown in scheme 5, treatment of compounds of general formula (I.A) (wherein X is O and R^1-R^9 and A are as defined for compounds of formula I) with a deoxothionating agent like P_4S_{10} or Lawesson's reagent in an inert organic solvent like toluene at temperatures between 20 °C and 150 °C can afford compounds of general formula (I.B) (wherein X is S and R^1-R^9 and A are as defined for compounds of formula I).

Scheme 5



A skilled person will realize that using standard synthesis protocol compounds of formula (I.A) (wherein X is O and R^1-R^9 and A are as defined for compounds of formula I) can alternatively be obtained by transformation of another, closely related, compound of formula (I.A). Non-exhaustive examples include oxidation and reduction reactions, coupling reactions, nucleophilic or electrophilic aromatic substitution reactions, nucleophilic substitution reactions, nucleophilic addition reactions, cycloaddition reactions, halogenation reactions and hydrolysis reactions.

Certain intermediates described in the above schemes are novel and as such form a further aspect of the invention.

The compounds of the formula II and V are commercially available.

The N-oxides may be prepared from the inventive compounds according to conventional oxidation methods as described in WO 03/64572 or *J. Med. Chem.* **1995**,1892-903 or *J. Heterocycl. Chem.* **1981**,1305-8 or. *J. Am. Chem. Soc.* **2001**, 5962-5973. The oxidation may lead to pure mono-N-oxides or to a mixture of different N-oxides, which can be separated by conventional methods such as chromatography.

The compounds I and the compositions according to the invention are particularly important in the control of a multitude of phytopathogenic fungi on various cultivated plants, such as cereals, e. g. wheat, rye, barley, triticale, oats or rice; beet, e. g. sugar beet or fodder beet; fruits, such as pomes, stone fruits or soft fruits, e. g. apples, pears, plums, peaches, almonds, cherries, strawberries, raspberries, blackberries or gooseberries; leguminous plants, such as lentils, peas, alfalfa or soybeans; oil plants, such as rape, mustard, olives, sunflowers, coconut, cocoa beans, castor oil plants, oil palms, ground nuts or soybeans; cucurbits, such as squashes, cucumber or melons; fiber plants, such as cotton, flax, hemp or jute; citrus fruit, such as oranges, lemons, grapefruits or mandarins; vegetables, such as spinach, lettuce, asparagus, cabbages, carrots, onions, tomatoes, potatoes, cucurbits or paprika; lauraceous plants, such as avocados, cinnamon or camphor; energy and raw material plants, such as corn, soybean, rape, sugar cane or oil palm; corn; tobacco; nuts; coffee; tea; bananas; vines (table grapes and grape juice grape vines); hop; turf; sweet leaf (also called Stevia); natural rubber plants or ornamental and forestry plants, such as flowers, shrubs, broad-leaved trees or evergreens, e. g. conifers; and on the plant propagation material, such as seeds, and the crop material of these plants.

Preferably, compounds I and compositions thereof, respectively are used for controlling a multitude of fungi on field crops, such as potatoes sugar beets, tobacco, wheat, rye, barley, oats, rice, corn, cotton, soybeans, rape, legumes, sunflowers, coffee or sugar cane; fruits; vines; ornamentals; or vegetables, such as cucumbers, tomatoes, beans or squashes.

The term "plant propagation material" is to be understood to denote all the generative parts of the plant such as seeds and vegetative plant material such as cuttings and tubers (e. g. potatoes), which can be used for the multiplication of the plant. This includes seeds, roots, fruits, tubers, bulbs, rhizomes, shoots, sprouts and other parts of plants, including seedlings and young plants, which are to be transplanted after germination or after emergence from soil. These young plants may also be protected before transplantation by a total or partial treatment by immersion or pouring.

Preferably, treatment of plant propagation materials with compounds I and compositions thereof, respectively, is used for controlling a multitude of fungi on cereals, such as wheat, rye, barley and oats; rice, corn, cotton and soybeans.

The term "cultivated plants" is to be understood as including plants which have been modified by mutagenesis or genetic engineering in order to provide a new trait to a plant or to modify an already present trait.

Mutagenesis includes techniques of random mutagenesis using X-rays or mutagenic chemicals, but also techniques of targeted mutagenesis, to create mutations at a specific locus of a plant genome. Targeted mutagenesis techniques frequently use oligonucleotides or proteins like CRISPR/Cas, zinc-finger nucleases, TALENs or meganucleases to achieve the targeting effect. Genetic engineering usually uses recombinant DNA techniques to create modifications in a plant genome which under natural circumstances cannot readily be obtained by cross breeding, mutagenesis or natural recombination. Typically, one or more genes are integrated into the genome of a plant to add a trait or improve a trait. These integrated genes are also referred to as transgenes in the art, while plant comprising such transgenes are referred to as transgenic plants. The process of plant transformation usually produces several transformation events, wich differ in the genomic locus in which a transgene has been integrated. Plants comprising a specific transgene on a specific genomic locus are usually described as comprising a specific “event”, which is referred to by a specific event name. Traits which have been introduced in plants or have been modified include herbicide tolerance, insect resistance, increased yield and tolerance to abiotic conditions, like drought.

Herbicide tolerance has been created by using mutagenesis as well as using genetic engineering. Plants which have been rendered tolerant to acetolactate synthase (ALS) inhibitor herbicides by mutagenesis and breeding comprise plant varieties commercially available under the name Clearfield®.

Herbicide tolerance has been created via the use of transgenes to glyphosate, glufosinate, 2,4-D, dicamba, oxynil herbicides, like bromoxynil and ioxynil, sulfonylurea herbicides, ALS inhibitors and 4-hydroxyphenylpyruvate dioxygenase (HPPD) inhibitors, like isoxaflutole and mesotrione.

Transgenes wich have been used to provide herbicide tolerance traits comprise: for tolerance to glyphosate: cp4 epsps, epsps grg23ace5, mepsps, 2mepsps, gat4601, gat4621, goxv247; for tolerance to glufosinate: pat and bar, for tolerance to 2,4-D: aad-1, aad-12; for tolerance to dicamba: dmo; for tolerance to oxynil herbicies: bxn; for tolerance to sulfonylurea herbicides: zm-hra, csr1-2, gm-hra, S4-HrA; for tolerance to ALS inhibitors: csr1-2; and for tolerance to HPPD inhibitors: hppdPF, W336, avhppd-03.

Transgenic corn events comprising herbicide tolerance genes include, but are not limited to, DAS40278, MON801, MON802, MON809, MON810, MON832, MON87411, MON87419, MON87427, MON88017, MON89034, NK603, GA21, MZHG0JG, HCEM485, VCO-01981-5, 676, 678, 680, 33121, 4114, 59122, 98140, Bt10, Bt176, CBH-351, DBT418, DLL25, MS3, MS6, MZIR098, T25, TC1507 and TC6275.

Transgenic soybean events comprising herbicide tolerance genes include, but are not limited to, GTS 40-3-2, MON87705, MON87708, MON87712, MON87769, MON89788, A2704-12, A2704-21, A5547-127, A5547-35, DP356043, DAS44406-6, DAS68416-4, DAS-81419-2, GU262, SYHT0H2, W62, W98, FG72 and CV127.

Transgenic cotton events comprising herbicide tolerance genes include, but are not limited to, 19-51a, 31707, 42317, 81910, 281-24-236, 3006-210-23, BXN10211, BXN10215, BXN10222, BXN10224, MON1445, MON1698, MON88701, MON88913, GHB119, GHB614, LLCotton25, T303-3 and T304-40.

Transgenic canola events comprising herbicide tolerance genes are for example, but not excluding others, MON88302, HCR-1, HCN10, HCN28, HCN92, MS1, MS8, PHY14, PHY23, PHY35, PHY36, RF1, RF2 and RF3.

Insect resistance has mainly been created by transferring bacterial genes for insecticidal proteins to plants: Transgenes which have most frequently been used are toxin genes of *Bacillus* spp. and synthetic variants thereof, like cry1A, cry1Ab, cry1Ab-Ac, cry1Ac, cry1A.105, cry1F, cry1Fa2, cry2Ab2, cry2Ae, mcry3A, ecry3.1Ab, cry3Bb1, cry34Ab1, cry35Ab1, cry9C, vip3A(a), vip3Aa20. However, also genes of plant origin, such as genes coding for protease inhibitors, like CpTI and pinII, have been transferred to other plants. A further approach uses transgenes such as dvsnf7 to produce double-stranded RNA in plants.

Transgenic corn events comprising genes for insecticidal proteins or double stranded RNA include, but are not limited to, Bt10, Bt11, Bt176, MON801, MON802, MON809, MON810, MON863, MON87411, MON88017, MON89034, 33121, 4114, 5307, 59122, TC1507, TC6275, CBH-351, MIR162, DBT418 and MZIR098. Transgenic soybean events comprising genes for insecticidal proteins include, but are not limited to, MON87701, MON87751 and DAS-81419. Transgenic cotton events comprising genes for insecticidal proteins include, but are not limited to, SGK321, MON531, MON757, MON1076, MON15985, 31707, 31803, 31807, 31808, 42317, BNLA-601, Event1, COT67B, COT102, T303-3, T304-40, GFM Cry1A, GK12, MLS 9124, 281-24-236, 3006-210-23, GHB119 and SGK321.

Increased yield has been created by using the transgene athb17, being present for example in corn event MON87403, or by using the transgene bbx32, being present for example in the soybean event MON87712.

Cultivated plants comprising a modified oil content have been created by using the transgenes: gm-fad2-1, Pj.D6D, Nc.Fad3, fad2-1A and fatb1-A. Soybean events comprising at least one of these genes are: 260-05, MON87705 and MON87769.

Tolerance to abiotic conditions, such as drought, has been created by using the transgene cspB, comprised by the corn event MON87460 and by using the transgene Hahb-4, comprised by soybean event IND-00410-5.

Traits are frequently combined by combining genes in a transformation event or by combining different events during the breeding process resulting in a cultivated plant with stacked traits.

Preferred combinations of traits are combinations of herbicide tolerance traits to different groups of herbicides, combinations of insect tolerance to different kind of insects, in particular tolerance to lepidopteran and coleopteran insects, combinations of herbicide tolerance with one or several types of insect resistance, combinations of herbicide tolerance with increased yield as well as combinations of herbicide tolerance and tolerance to abiotic conditions.

Plants comprising singular or stacked traits as well as the genes and events providing these traits are well known in the art. For example, detailed information as to the mutagenized or integrated genes and the respective events are available from websites of the organizations "International Service for the Acquisition of Agri-biotech Applications (ISAAA)" (http://www.isaaa.org/gmapprovaldatabase) and the "Center for Environmental Risk Assessment (CERA)" (http://cera-gmc.org/GMCropDatabase). Further information on specific events and methods to detect them can be found for canola events MS1, MS8, RF3, GT73, MON88302, KK179 in WO01/031042, WO01/041558, WO01/041558, WO02/036831, WO11/153186, WO13/003558, for cotton events MON1445, MON15985, MON531 (MON15985), LLCotton25, MON88913, COT102, 281-24-236, 3006-210-23, COT67B, GHB614, T304-40, GHB119, MON88701, 81910 in WO02/034946, WO02/100163, WO02/100163, WO03/013224, WO04/072235, WO04/039986, WO05/103266, WO05/103266, WO06/128573, WO07/017186, WO08/122406, WO08/151780, WO12/134808, WO13/112527; for corn events GA21, MON810, DLL25, TC1507, MON863, MIR604, LY038, MON88017, 3272, 59122, NK603, MIR162, MON89034, 98140, 32138, MON87460, 5307, 4114, MON87427, DAS40278, MON87411, 33121, MON87403, MON87419 in WO98/044140, US02/102582, US03/126634, WO04/099447, WO04/011601, WO05/103301, WO05/061720, WO05/059103, WO06/098952, WO06/039376, US2007/292854, WO07/142840, WO07/140256, WO08/112019, WO09/103049, WO09/111263, WO10/077816, WO11/084621, WO11/062904, WO11/022469, WO13/169923, WO14/116854, WO15/053998, WO15/142571; for potato events E12, F10, J3, J55, V11, X17, Y9 in WO14/178910, WO14/178913, WO14/178941, WO14/179276, WO16/183445, WO17/062831, WO17/062825; for rice events LLRICE06, LLRICE601, LLRICE62 in WO00/026345, WO00/026356, WO00/026345; and for soybean events H7-1, MON89788, A2704-12, A5547-127, DP305423, DP356043, MON87701, MON87769, CV127, MON87705, DAS68416-4, MON87708, MON87712, SYHT0H2, DAS81419, DAS81419 x DAS44406-6, MON87751 in WO04/074492, WO06/130436, WO06/108674, WO06/108675, WO08/054747, WO08/002872, WO09/064652, WO09/102873, WO10/080829, WO10/037016, WO11/066384, WO11/034704, WO12/051199, WO12/082548, WO13/016527, WO13/016516, WO14/201235.

The use of compounds I and compositions according to the invention, respectively, on cultivated plants may result in effects which are specific to a cultivated plant comprising a certain gene or event. These effects might involve changes in growth behavior or changed resistance to biotic or abiotic stress factors. Such effects may in particular comprise enhanced yield, enhanced resistance or tolerance to insects, nematodes, fungal, bacterial, mycoplasma, viral or viroid pathogens as well as early vigour, early or delayed ripening, cold or heat tolerance as well as changed amino acid or fatty acid spectrum or content.

The compounds I and compositions thereof, respectively, are particularly suitable for controlling the following plant diseases:

Albugo spp. (white rust) on ornamentals, vegetables (e. g. *A. candida*) and sunflowers (e. g. *A. tragopogonis*); *Alternaria* spp. (Alternaria leaf spot) on vegetables (e.g. *A. dauci* or *A. porri*), oilseed rape (*A. brassicicola* or *brassicae*), sugar beets (*A. tenuis*), fruits (e.g. *A. grandis*), rice, soybeans, potatoes and tomatoes (e. g. *A. solani*, *A. grandis* or *A. alternata*), tomatoes (e. g. *A. solani* or *A. alternata*) and wheat (e.g. A. *triticina*); *Aphanomyces* spp. on sugar beets and vegetables; *Ascochyta* spp. on cereals and vegetables, e. g. *A. tritici* (anthracnose) on wheat and *A. hordei* on barley; *Aureobasidium zeae* (syn. *Kapatiella* zeae) on corn; *Bipolaris* and *Drechslera* spp. (teleomorph: *Cochliobolus* spp.), e. g. Southern leaf blight (*D. maydis)* or Northern leaf blight (*B. zeicola*) on corn, e. g. spot blotch (*B. sorokiniana*) on cereals and e. g. *B. oryzae* on rice and turfs; *Blumeria* (formerly *Erysiphe*) *graminis* (powdery mildew) on cereals (e. g. on wheat or barley); *Botrytis cinerea* (teleomorph: *Botryotinia fuckeliana*: grey mold) on fruits and berries (e. g. strawberries), vegetables (e. g. lettuce, carrots, celery and cabbages); *B. squamosa* or *B. allii* on onion family), oilseed rape, ornamentals (e.g. *B eliptica*), vines, forestry plants and wheat; *Bremia lactucae* (downy mildew) on lettuce; *Ceratocystis* (syn. *Ophiostoma*) spp. (rot or wilt) on broad-leaved trees and evergreens, e. g. *C. ulmi* (Dutch elm disease) on elms; *Cercospora* spp. (Cercospora leaf spots) on corn (e. g. Gray leaf spot: *C. zeae-maydis*), rice, sugar beets (e. g. *C. beticola*), sugar cane, vegetables, coffee, soybeans (e. g. *C. sojina* or *C. kikuchii*) and rice; *Cladobotryum (syn. Dactylium)* spp. (e.g. *C. mycophilum* (formerly *Dactylium dendroides*, teleomorph: *Nectria albertinii*, *Nectria rosella* syn. *Hypomyces rosellus)* on mushrooms; *Cladosporium* spp. on tomatoes (e. g. *C. fulvum*: leaf mold) and cereals, e. g. *C. herbarum* (black ear) on wheat; *Claviceps purpurea* (ergot) on cereals; *Cochliobolus* (anamorph: *Helminthosporium* of *Bipolaris*) spp. (leaf spots) on corn (*C. carbonum*), cereals (e. g. *C. sativus*, anamorph: *B. sorokiniana*) and rice (e. g. *C. miyabeanus*, anamorph: *H. oryzae*); *Colletotrichum* (teleomorph: *Glomerella*) spp. (anthracnose) on cotton (e. g. *C. gossypii*), corn (e. g. *C. graminicola:* Anthracnose stalk rot), soft fruits, potatoes (e. g. *C. coccodes*: black dot), beans (e. g. *C. lindemuthianum*), soybeans (e. g. *C. truncatum* or *C. gloeosporioides*), vegetables (e.g. *C. lagenarium* or *C. capsici*), fruits (e.g. *C. acutatum*), coffee (e.g. *C. coffeanum* or *C. kahawae*) and *C. gloeosporioides* on various crops; *Corticium* spp., e. g. *C. sasakii* (sheath blight) on rice; *Corynespora cassiicola* (leaf spots) on soybeans, cotton and ornamentals; *Cycloconium* spp., e. g. *C. oleaginum* on olive trees; *Cylindrocarpon* spp. (e. g. fruit tree canker or young vine decline, teleomorph: *Nectria* or *Neonectria* spp.) on fruit trees, vines (e. g. *C. liriodendri*, teleomorph: *Neonectria liriodendri*: Black Foot Disease) and ornamentals; *Dematophora* (teleomorph: *Rosellinia*) *necatrix* (root and stem rot) on soybeans; *Diaporthe* spp., e. g. *D. phaseolorum* (damping off) on soybeans; *Drechslera* (syn. *Helminthosporium*, teleomorph: *Pyrenophora*) spp. on corn, cereals, such as barley (e. g. *D. teres*, net blotch) and wheat (e. g. *D. tritici-repentis*: tan spot), rice and turf; Esca (dieback, apoplexy) on vines, caused by *Formitiporia* (syn. *Phellinus*) *punctata*, *F. mediterranea*, *Phaeomoniella chlamydospora* (formerly *Phaeoacremonium chlamydosporum*), *Phaeoacremonium aleophilum* and/or *Botryosphaeria obtusa*; *Elsinoe* spp. on pome fruits (*E. pyri*), soft fruits (*E. veneta*: anthracnose) and vines (*E. ampelina*: anthracnose); *Entyloma oryzae* (leaf smut) on rice; *Epicoccum* spp. (black mold) on wheat; *Erysiphe* spp. (powdery mildew) on sugar beets (*E. betae*), vegetables (e. g. *E. pisi*), such as cucurbits (e. g. *E. cichoracearum*), cabbages, oilseed rape (e. g. *E. cruciferarum*); *Eutypa lata* (Eutypa canker or dieback, anamorph: *Cytosporina lata*, syn. *Libertella blepharis*) on fruit trees, vines and ornamental woods; *Exserohilum* (syn. *Helminthosporium*) spp. on corn (e. g. *E. turcicum*); *Fusarium* (teleomorph: *Gibberella*) spp. (wilt, root or stem rot) on various plants, such as *F. graminearum* or *F. culmorum* (root rot, scab or head blight) on cereals (e. g. wheat or barley), *F. oxysporum* on tomatoes, *F. solani* (f. sp. *glycines* now syn. *F. virguliforme*) and *F. tucumaniae* and *F. brasiliense* each causing sudden death syndrome on soybeans, and *F. verticillioides* on corn; *Gaeumannomyces graminis* (take-all) on cereals (e. g. wheat or barley) and corn; *Gibberella* spp. on cereals (e. g. *G. zeae*) and rice (e. g. *G. fujikuroi*: Bakanae disease); *Glomerella cingulata* on vines, pome fruits and other plants and *G. gossypii* on cotton; Grain-staining complex on rice; *Guignardia bidwellii* (black rot) on vines; *Gymnosporangium* spp. on rosaceous plants and junipers, e. g. *G. sabinae* (rust) on pears; *Helminthosporium* spp. (syn. *Drechslera*, teleomorph: *Cochliobolus*) on corn, cereals, potatoes and rice; *Hemileia* spp., e. g. *H. vastatrix* (coffee leaf rust) on coffee; *Isariopsis clavispora* (syn. *Cladosporium vitis*) on vines; *Macrophomina phaseolina* (syn. *phaseoli*) (root and stem rot) on soybeans and cotton; *Microdochium* (syn. *Fusarium*) *nivale* (pink snow mold) on cereals (e. g. wheat or barley); *Microsphaera diffusa* (powdery mildew) on soybeans; *Monilinia* spp., e. g. *M. laxa*, *M. fructicola* and *M. fructigena* (syn. *Monilia* spp.: bloom and twig blight, brown rot) on stone fruits and other rosaceous plants; *Mycosphaerella* spp. on cereals, bananas, soft fruits and ground nuts, such as e. g. *M. graminicola* (anamorph: *Zymoseptoria tritici* formerly *Septoria tritici*: Septoria blotch) on wheat or *M. fijiensis* (syn. *Pseudocercospora fijiensis*: black Sigatoka disease) and *M. musicola* on bananas, *M. arachidicola* (syn. *M. arachidis* or *Cercospora arachidis*), *M. berkeleyi* on peanuts, *M. pisi* on peas and *M. brassiciola* on brassicas; *Peronospora* spp. (downy mildew) on cabbage (e. g. *P. brassicae*), oilseed rape (e. g. *P. parasitica*), onions (e. g. *P. destructor*), tobacco (*P. tabacina*) and soybeans (e. g. *P. manshurica*); *Phakopsora pachyrhizi* and *P. meibomiae* (soybean rust) on soybeans; *Phialophora* spp. e. g. on vines (e. g. *P. tracheiphila* and *P. tetraspora*) and soybeans (e. g. *P. gregata*: stem rot); *Phoma lingam* (syn. *Leptosphaeria biglobosa* and *L. maculans*: root and stem rot) on oilseed rape and cabbage, *P. betae* (root rot, leaf spot and damping-off) on sugar beets and *P. zeae-maydis* (syn. *Phyllostica zeae)* on corn; *Phomopsis* spp. on sunflowers, vines (e. g. *P. viticola*: can and leaf spot) and soybeans (e. g. stem rot: *P. phaseoli*, teleomorph: *Diaporthe phaseolorum*); *Physoderma maydis* (brown spots) on corn; *Phytophthora* spp. (wilt, root, leaf, fruit and stem root) on various plants, such as paprika and cucurbits (e. g. *P. capsici*), soybeans (e. g. *P. megasperma*, syn. *P. sojae*), potatoes and tomatoes (e. g. *P. infestans*: late blight) and broad-leaved trees (e. g. *P. ramorum*: sudden oak death); *Plasmodiophora brassicae* (club root) on cabbage,oilseed rape, radish and other plants; *Plasmopara* spp., e. g. *P. viticola* (grapevine downy mildew) on vines and *P. halstedii* on sunflowers; *Podosphaera* spp. (powdery mildew) on rosaceous plants, hop, pome and soft fruits (e. g. *P. leucotricha* on apples) and curcurbits (*P. xanthii*); *Polymyxa* spp., e. g. on cereals, such as barley and wheat (*P. graminis*) and sugar beets (*P. betae*) and thereby transmitted viral diseases; *Pseudocercosporella herpotrichoides* (syn. *Oculimacula yallundae, O. acuformis*: eyespot, teleomorph: *Tapesia yallundae*) on cereals, e. g. wheat or barley; *Pseudoperonospora* (downy mildew) on various plants, e. g. *P. cubensis* on cucurbits or *P. humili* on hop; *Pseudopezicula tracheiphila* (red fire disease or ‚rotbrenneR´, anamorph: *Phialophora*) on vines; *Puccinia* spp. (rusts) on various plants, e. g. *P. triticina* (brown or leaf rust), *P. striiformis* (stripe or yellow rust), *P. hordei* (dwarf rust), *P. graminis* (stem or black rust) or *P. recondita* (brown or leaf rust) on cereals, such as e. g. wheat, barley or rye, *P. kuehnii* (orange rust) on sugar cane and *P. asparagi* on asparagus; *Pyrenopeziza spp.*, e.g. *P. brassicae* on oilseed rape; *Pyrenophora* (anamorph: *Drechslera*) *tritici-repentis* (tan spot) on wheat or *P. teres* (net blotch) on barley; *Pyricularia* spp., e. g. *P. oryzae* (teleomorph: *Magnaporthe grisea*: rice blast) on rice and *P. grisea* on turf and cereals; *Pythium* spp. (damping-off) on turf, rice, corn, wheat, cotton, oilseed rape, sunflowers, soybeans, sugar beets, vegetables and various other plants (e. g. *P. ultimum* or *P. aphanidermatum*) and *P. oligandrum* on mushrooms; *Ramularia* spp., e. g. *R. collo-cygni* (Ramularia leaf spots, Physiological leaf spots) on barley, *R. areola* (teleomorph: *Mycosphaerella areola*) on cotton and *R. beticola* on sugar beets; *Rhizoctonia* spp. on cotton, rice, potatoes, turf, corn, oilseed rape, potatoes, sugar beets, vegetables and various other plants, e. g. *R. solani* (root and stem rot) on soybeans, *R. solani* (sheath blight) on rice or *R. cerealis* (Rhizoctonia spring blight) on wheat or barley; *Rhizopus stolonifer* (black mold, soft rot) on strawberries, carrots, cabbage, vines and tomatoes; *Rhynchosporium secalis* and *R. commune* (scald) on barley, rye and triticale; *Sarocladium* *oryzae* and *S. attenuatum* (sheath rot) on rice; *Sclerotinia* spp. (stem rot or white mold) on vegetables (*S. minor* and *S. sclerotiorum*) and field crops, such as oilseed rape, sunflowers (e. g. *S. sclerotiorum*) and soybeans, *S. rolfsii* (syn. *Athelia rolfsii)* on soybeans, peanut, vegetables, corn, cereals and ornamentals; *Septoria* spp. on various plants, e. g. *S. glycines* (brown spot) on soybeans, *S. tritici* (syn. *Zymoseptoria tritici,* Septoria blotch) on wheat and *S.* (syn. *Stagonospora*) *nodorum* (Stagonospora blotch) on cereals; *Uncinula* (syn. *Erysiphe*) *necator* (powdery mildew, anamorph: *Oidium tuckeri*) on vines; *Setosphaeria* spp. (leaf blight) on corn (e. g. *S. turcicum*, syn. *Helminthosporium turcicum*) and turf; *Sphacelotheca* spp. (smut) on corn, (e. g. *S. reiliana*, syn. *Ustilago reiliana*: head smut), sorghum und sugar cane; *Sphaerotheca fuliginea* (syn. *Podosphaera xanthii*: powdery mildew) on cucurbits; *Spongospora subterranea* (powdery scab) on potatoes and thereby transmitted viral diseases; *Stagonospora* spp. on cereals, e. g. *S. nodorum* (Stagonospora blotch, teleomorph: *Leptosphaeria* [syn. *Phaeosphaeria*] *nodorum,* syn. *Septoria nodorum*) on wheat; *Synchytrium endobioticum* on potatoes (potato wart disease); *Taphrina* spp., e. g. *T. deformans* (leaf curl disease) on peaches and *T. pruni* (plum pocket) on plums; *Thielaviopsis* spp. (black root rot) on tobacco, pome fruits, vegetables, soybeans and cotton, e. g. *T. basicola* (syn. *Chalara elegans*); *Tilletia* spp. (common bunt or stinking smut) on cereals, such as e. g. *T. tritici* (syn. *T. caries*, wheat bunt) and *T. controversa* (dwarf bunt) on wheat; *Trichoderma harzianum on mushrooms*; *Typhula incarnata* (grey snow mold) on barley or wheat; *Urocystis* spp., e. g. *U. occulta* (stem smut) on rye; *Uromyces* spp. (rust) on vegetables, such as beans (e. g. *U. appendiculatus*, syn. *U. phaseoli*), sugar beets (e. g. *U. betae* or *U. beticola*) and on pulses (e.g. *U. vignae, U. pisi, U. viciae-fabae* and *U. fabae)*; *Ustilago* spp. (loose smut) on cereals (e. g. *U. nuda* and *U. avaenae*), corn (e. g. *U. maydis*: corn smut) and sugar cane; *Venturia* spp. (scab) on apples (e. g. *V. inaequalis*) and pears; and *Verticillium* spp. (wilt) on various plants, such as fruits and ornamentals, vines, soft fruits, vegetables and field crops, e. g. *V. longisporum* on oilseed rape, *V. dahliae* on strawberries, oilseed rape, potatoes and tomatoes, and *V. fungicola* on mushrooms; *Zymoseptoria tritici* on cereals.

In a preferred embodiment the compounds I, their mixtures with other active compounds as defined herein and compositions thereof, respectively, are particularly suitable for controlling the following plant diseases: *Puccinia* spp. (rusts) on various plants, for example, but not limited to *P. triticina* (brown or leaf rust), *P. striiformis* (stripe or yellow rust), *P. hordei* (dwarf rust), *P. graminis* (stem or black rust) or *P. recondita* (brown or leaf rust) on cereals, such as e. g. wheat, barley or rye, *P. sorghi* (common rust) on maize, *P. polysora* (southern rust) on maize; *P. coronata* e.g. on oats, *P. sorghi* und *P. polysora* on corn; *Puccinia spp.* on other crops, e.g. *P. heliathi* on sunflower, *P. arachidis* on peanuts; *Uromyces spp.* on pulses and other crops crops, e.g. *Uromyces viciae-fabae*, *Uromyces vigniae*, *Uromyces pisi*, *U. ciceris-arietini*, *U. betae syn U. beticola;* and *Phakopsoraceae* spp. on various plants, in particular *Phakopsora pachyrhizi* and *P. meibomiae* (soybean rust) on soybeans.

Additionally, to date, no cross-resistance has been observed between the compounds I and the current fungicidal solutions used to control phytopathogenic fungi including but not limited to *Zymoseptoria tritici*, *Phakopsora pachyrhizi*, *Botrytis cinerea*, *Blumeria graminis*, *Pyrenophora tritici-repentis*, *Pyrenophora teres*, *Alternaria* spp*.*, *Plasmopara viticola*, preferably selected from *Zymospeptoria tritici* and *Phakopsora pachyrhizi*:

Fungicide-resistant strains of the above-mentioned phytopathgenic fungi have been reported, with strains resistant to one or more fungicides from various fungicidal mode of action classes being observed including but not limited to beta-tubulin assembly inhibitors, sterol demethylation-inhibitors (DMI), quinone-outside-inhibitors (QoI) and succinate dehydrogenase inhibitors (SDHI). Thus, compounds I are useful to control phytopathogenic fungi comprising at least one of the following mutations: E198A/G/K or F200Y in the beta-tubulin gene conferring resistance to beta-tubulin assembly inhibitors (Phytopathol (2008) 98: 397-404), I365N/S, V368F, Q369H/P, N373S, T447S in the histidine kinase gene *Os1* conferring resistance to MAP / histidin kinase inhibitors (dicarboximides; ibida); G143A, G137R or F129L in the mitochondrial cytochrome B Gene (Phytopathol (2003) 93: 891-900; Pest Manag Sci (2016) 72: 121 1-1215) resulting in resistance to QoI; V136A, Y137F (homologous to Y144F/H e.g. in *Parastagonospora nodorum* or Y136F e.g. in *Erysiphe necator*), K147Q, A379G, I381V, G461S or S509T in the *Cyp51* gene resulting in resistance to DMI (Phytopathol (2016) 106: 1278-1284); P225T/L/F, N225I/T, R265P, T268I/A, H272R/Y/L, H277Y or N230I in the succinate dehydrogenase iron-sulfur subunit gene *SdhB*, K49E, R64K, N75S, G79R, T79N/I, W80S, P80H/L, N86S/A, G91R, H134R, S135R, H146R/LK, R151S/T/M, H152R, H153R, I161S, V166M, T168R and G171D in the subunit C gene *SdhC*; and I50F, D124E, M114V, H134R, D145G in the subunit D gene *SdhD* conferring resistance to SDHI ((2002) 58: 876-88; Pest Manag Sci (2014) 70: 378-388; Environ Microbiol (2014) 16: 2253-66; Pest Manag Sci (2018) 74: 672–681; http://www.frac.info/working-group/sdhi-fungicides), and I86F in the subunit C gene *SdhC* (*Journal of Plant Diseases and Protection 125, 21-26*).

The compounds I and compositions thereof, respectively, are also suitable for controlling harmful fungi in the protection of stored products or harvest and in the protection of materials.

The term "protection of materials" is to be understood to denote the protection of technical and non-living materials, such as adhesives, glues, wood, paper and paperboard, textiles, leather, paint dispersions, plastics, cooling lubricants, fiber or fabrics, against the infestation and destruction by harmful microorganisms, such as fungi and bacteria. As to the protection of wood and other materials, the particular attention is paid to the following harmful fungi: Ascomycetes such as *Ophiostoma* spp., *Ceratocystis* spp., *Aureobasidium pullulans*, *Sclerophoma* spp., *Chaetomium* spp., *Humicola* spp., *Petriella* spp., *Trichurus* spp.; Basidiomycetes such as *Coniophora* spp., *Coriolus* spp., *Gloeophyllum* spp., *Lentinus* spp., *Pleurotus* spp., *Poria* spp., *Serpula* spp. and *Tyromyces* spp., Deuteromycetes such as *Aspergillus* spp., *Cladosporium* spp., *Penicillium* spp., *Trichoderma* spp., *Alternaria* spp., *Paecilomyces* spp. and Zygomycetes such as *Mucor* spp., and in addition in the protection of stored products and harvest the following yeast fungi are worthy of note: *Candida* spp. and *Saccharomyces cerevisae*.

The method of treatment according to the invention can also be used in the field of protecting stored products or harvest against attack of fungi and microorganisms. According to the present invention, the term "stored products" is understood to denote natural substances of plant or animal origin and their processed forms, which have been taken from the natural life cycle and for which long-term protection is desired. Stored products of crop plant origin, such as plants or parts thereof, for example stalks, leafs, tubers, seeds, fruits or grains, can be protected in the freshly harvested state or in processed form, such as pre-dried, moistened, comminuted, ground, pressed or roasted, which process is also known as post-harvest treatment. Also falling under the definition of stored products is timber, whether in the form of crude timber, such as construction timber, electricity pylons and barriers, or in the form of finished articles, such as furniture or objects made from wood. Stored products of animal origin are hides, leather, furs, hairs and the like. The combinations according the present invention can prevent disadvantageous effects such as decay, discoloration or mold. Preferably "stored products" is understood to denote natural substances of plant origin and their processed forms, more preferably fruits and their processed forms, such as pomes, stone fruits, soft fruits and citrus fruits and their processed forms.

The compounds I and compositions thereof, respectively, may be used for improving the health of a plant. The invention also relates to a method for improving plant health by treating a plant, its propagation material and/or the locus where the plant is growing or is to grow with an effective amount of compounds I and compositions thereof, respectively.

The term "plant health" is to be understood to denote a condition of the plant and/or its products which is determined by several indicators alone or in combination with each other such as yield (e. g. increased biomass and/or increased content of valuable ingredients), plant vigor (e. g. improved plant growth and/or greener leaves ("greening effect")), quality (e. g. improved content or composition of certain ingredients) and tolerance to abiotic and/or biotic stress. The above identified indicators for the health condition of a plant may be interdependent or may result from each other.

The compounds of formula I can be present in different crystal modifications whose biological activity may differ. They are likewise subject matter of the present invention.

The compounds I are employed as such or in form of compositions by treating the fungi or the plants, plant propagation materials, such as seeds, soil, surfaces, materials or rooms to be protected from fungal attack with a fungicidally effective amount of the active substances. The application can be carried out both before and after the infection of the plants, plant propagation materials, such as seeds, soil, surfaces, materials or rooms by the fungi.

Plant propagation materials may be treated with compounds I as such or a composition comprising at least one compound I prophylactically either at or before planting or transplanting.

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

An agrochemical composition comprises a fungicidally effective amount of a compound I. The term "effective amount" denotes an amount of the composition or of the compounds I, which is sufficient for controlling harmful fungi on cultivated plants or in the protection of materials and which does not result in a substantial damage to the treated plants. Such an amount can vary in a broad range and is dependent on various factors, such as the fungal species to be controlled, the treated cultivated plant or material, the climatic conditions and the specific compound I used.

The compounds I, their N-oxides and salts can be converted into customary types of agrochemical compositions, e. g. solutions, emulsions, suspensions, dusts, powders, pastes, granules, pressings, capsules, and mixtures thereof. Examples for composition types are suspensions (e. g. SC, OD, FS), emulsifiable concentrates (e. g. EC), emulsions (e. g. EW, EO, ES, ME), capsules (e. g. CS, ZC), pastes, pastilles, wettable powders or dusts (e. g. WP, SP, WS, DP, DS), pressings (e. g. BR, TB, DT), granules (e. g. WG, SG, GR, FG, GG, MG), insecticidal articles (e. g. LN), as well as gel formulations for the treatment of plant propagation materials such as seeds (e. g. GF). These and further compositions types are defined in the "Catalogue of pesticide formulation types and international coding system", Technical Monograph No. 2, 6th Ed. May 2008, CropLife International.

The compositions are prepared in a known manner, such as described by Mollet and Grubemann, Formulation technology, Wiley VCH, Weinheim, 2001; or Knowles, New developments in crop protection product formulation, Agrow Reports DS243, T&F Informa, London, 2005.

Suitable auxiliaries are solvents, liquid carriers, solid carriers or fillers, surfactants, dispersants, emulsifiers, wetters, adjuvants, solubilizers, penetration enhancers, protective colloids, adhesion agents, thickeners, humectants, repellents, attractants, feeding stimulants, compatibilizers, bactericides, anti-freezing agents, anti-foaming agents, colorants, tackifiers and binders.

Suitable solvents and liquid carriers are water and organic solvents, such as mineral oil fractions of medium to high boiling point, e. g. kerosene, diesel oil; oils of vegetable or animal origin; aliphatic, cyclic and aromatic hydrocarbons, e. g. toluene, paraffin, tetrahydronaphthalene, alkylated naphthalenes; alcohols, e. g. ethanol, propanol, butanol, benzyl alcohol, cyclohexanol; glycols; DMSO; ketones, e. g. cyclohexanone; esters, e. g. lactates, carbonates, fatty acid esters, gamma-butyrolactone; fatty acids; phosphonates; amines; amides, e. g. N-methyl pyrrolidone, fatty acid dimethyl amides; and mixtures thereof.

Suitable solid carriers or fillers are mineral earths, e. g. silicates, silica gels, talc, kaolins, limestone, lime, chalk, clays, dolomite, diatomaceous earth, bentonite, calcium sulfate, magnesium sulfate, magnesium oxide; polysaccharides, e. g. cellulose, starch; fertilizers, e. g. ammonium sulfate, ammonium phosphate, ammonium nitrate, ureas; products of vegetable origin, e. g. cereal meal, tree bark meal, wood meal, nutshell meal, and mixtures thereof.

Suitable surfactants are surface-active compounds, such as anionic, cationic, nonionic and amphoteric surfactants, block polymers, polyelectrolytes, and mixtures thereof. Such surfactants can be used as emulsifier, dispersant, solubilizer, wetter, penetration enhancer, protective colloid, or adjuvant. Examples of surfactants are listed in McCutcheon's, Vol.1: Emulsifiers & Detergents, McCutcheon's Directories, Glen Rock, USA, 2008 (International Ed. or North American Ed.).

Suitable anionic surfactants are alkali, alkaline earth or ammonium salts of sulfonates, sulfates, phosphates, carboxylates, and mixtures thereof. Examples of sulfonates are alkylaryl sulfonates, diphenyl sulfonates, alpha-olefin sulfonates, lignin sulfonates, sulfonates of fatty acids and oils, sulfonates of ethoxylated alkylphenols, sulfonates of alkoxylated arylphenols, sulfonates of condensed naphthalenes, sulfonates of dodecyl- and tridecylbenzenes, sulfonates of naphthalenes and alkyl naphthalenes, sulfosuccinates or sulfosuccinamates. Examples of sulfates are sulfates of fatty acids and oils, of ethoxylated alkylphenols, of alcohols, of ethoxylated alcohols, or of fatty acid esters. Examples of phosphates are phosphate esters. Examples of carboxylates are alkyl carboxylates, and carboxylated alcohol or alkylphenol ethoxylates.

Suitable nonionic surfactants are alkoxylates, N-substituted fatty acid amides, amine oxides, esters, sugar-based surfactants, polymeric surfactants, and mixtures thereof. Examples of alkoxylates are compounds such as alcohols, alkylphenols, amines, amides, arylphenols, fatty acids or fatty acid esters which have been alkoxylated with 1 to 50 equivalents. Ethylene oxide and/or propylene oxide may be employed for the alkoxylation, preferably ethylene oxide. Examples of N-substituted fatty acid amides are fatty acid glucamides or fatty acid alkanolamides. Examples of esters are fatty acid esters, glycerol esters or monoglycerides. Examples of sugar-based surfactants are sorbitans, ethoxylated sorbitans, sucrose and glucose esters or alkylpolyglucosides. Examples of polymeric surfactants are home- or copolymers of vinyl pyrrolidone, vinyl alcohols, or vinyl acetate.

Suitable cationic surfactants are quaternary surfactants, for example quaternary ammonium compounds with one or two hydrophobic groups, or salts of long-chain primary amines. Suitable amphoteric surfactants are alkylbetains and imidazolines. Suitable block polymers are block polymers of the A-B or A-B-A type comprising blocks of polyethylene oxide and polypropylene oxide, or of the A-B-C type comprising alkanol, polyethylene oxide and polypropylene oxide. Suitable polyelectrolytes are polyacids or polybases. Examples of polyacids are alkali salts of polyacrylic acid or polyacid comb polymers. Examples of polybases are polyvinyl amines or polyethylene amines.

Suitable adjuvants are compounds, which have a negligible or even no pesticidal activity themselves, and which improve the biological performance of the compound I on the target. Examples are surfactants, mineral or vegetable oils, and other auxiliaries. Further examples are listed by Knowles, Adjuvants and additives, Agrow Reports DS256, T&F Informa UK, 2006, chapter 5.

Suitable thickeners are polysaccharides (e. g. xanthan gum, carboxymethyl cellulose), inorganic clays (organically modified or unmodified), polycarboxylates, and silicates.

Suitable bactericides are bronopol and isothiazolinone derivatives such as alkylisothiazolinones and benzisothiazolinones.

Suitable anti-freezing agents are ethylene glycol, propylene glycol, urea and glycerin.

Suitable anti-foaming agents are silicones, long chain alcohols, and salts of fatty acids.

Suitable colorants (e. g. in red, blue, or green) are pigments of low water solubility and water-soluble dyes. Examples are inorganic colorants (e. g. iron oxide, titan oxide, iron hexacyanoferrate) and organic colorants (e. g. alizarin-, azo- and phthalocyanine colorants).

Suitable tackifiers or binders are polyvinyl pyrrolidones, polyvinyl acetates, polyvinyl alcohols, polyacrylates, biological or synthetic waxes, and cellulose ethers.

Examples for composition types and their preparation are:

i) Water-soluble concentrates (SL, LS)

10-60 wt% of a compound I and 5-15 wt% wetting agent (e. g. alcohol alkoxylates) are dissolved in water and/or in a water-soluble solvent (e. g. alcohols) ad 100 wt%. The active substance dissolves upon dilution with water.

ii) Dispersible concentrates (DC)

5-25 wt% of a compound I and 1-10 wt% dispersant (e. g. polyvinyl pyrrolidone) are dissolved in organic solvent (e. g. cyclohexanone) ad 100 wt%. Dilution with water gives a dispersion.

iii) Emulsifiable concentrates (EC)

15-70 wt% of a compound I and 5-10 wt% emulsifiers (e. g. calcium dodecylbenzenesulfonate and castor oil ethoxylate) are dissolved in water-insoluble organic solvent (e. g. aromatic hydrocarbon) ad 100 wt%. Dilution with water gives an emulsion.

iv) Emulsions (EW, EO, ES)

5-40 wt% of a compound I and 1-10 wt% emulsifiers (e. g. calcium dodecylbenzenesulfonate and castor oil ethoxylate) are dissolved in 20-40 wt% water-insoluble organic solvent (e. g. aromatic hydrocarbon). This mixture is introduced into water ad 100 wt% by means of an emulsifying machine and made into a homogeneous emulsion. Dilution with water gives an emulsion.

v) Suspensions (SC, OD, FS)

In an agitated ball mill, 20-60 wt% of a compound I are comminuted with addition of 2-10 wt% dispersants and wetting agents (e. g. sodium lignosulfonate and alcohol ethoxylate), 0.1-2 wt% thickener (e. g. xanthan gum) and water ad 100 wt% to give a fine active substance suspension. Dilution with water gives a stable suspension of the active substance. For FS type composition up to 40 wt% binder (e. g. polyvinyl alcohol) is added.

vi) Water-dispersible granules and water-soluble granules (WG, SG)

50-80 wt% of a compound I are ground finely with addition of dispersants and wetting agents (e. g. sodium lignosulfonate and alcohol ethoxylate) ad 100 wt% and prepared as water-dispersible or water-soluble granules by means of technical appliances (e. g. extrusion, spray tower, fluidized bed). Dilution with water gives a stable dispersion or solution of the active substance.

vii) Water-dispersible powders and water-soluble powders (WP, SP, WS)

50-80 wt% of a compound I are ground in a rotor-stator mill with addition of 1-5 wt% dispersants (e. g. sodium lignosulfonate), 1-3 wt% wetting agents (e. g. alcohol ethoxylate) and solid carrier (e. g. silica gel) ad 100 wt%. Dilution with water gives a stable dispersion or solution of the active substance.

viii) Gel (GW, GF)

In an agitated ball mill, 5-25 wt% of a compound I are comminuted with addition of 3-10 wt% dispersants (e. g. sodium lignosulfonate), 1-5 wt% thickener (e. g. carboxymethyl cellulose) and water ad 100 wt% to give a fine suspension of the active substance. Dilution with water gives a stable suspension of the active substance.

ix) Microemulsion (ME)

5-20 wt% of a compound I are added to 5-30 wt% organic solvent blend (e. g. fatty acid dimethyl amide and cyclohexanone), 10-25 wt% surfactant blend (e. g. alcohol ethoxylate and arylphenol ethoxylate), and water ad 100 %. This mixture is stirred for 1 h to produce spontaneously a thermodynamically stable microemulsion.

x) Microcapsules (CS)

An oil phase comprising 5-50 wt% of a compound I, 0-40 wt% water insoluble organic solvent (e. g. aromatic hydrocarbon), 2-15 wt% acrylic monomers (e. g. methylmethacrylate, methacrylic acid and a di- or triacrylate) are dispersed into an aqueous solution of a protective colloid (e. g. polyvinyl alcohol). Radical polymerization results in the formation of poly(meth)acrylate microcapsules. Alternatively, an oil phase comprising 5-50 wt% of a compound I according to the invention, 0-40 wt% water insoluble organic solvent (e. g. aromatic hydrocarbon), and an isocyanate monomer (e. g. diphenylmethene-4,4'-diisocyanatae) are dispersed into an aqueous solution of a protective colloid (e. g. polyvinyl alcohol). The addition of a polyamine (e. g. hexamethylenediamine) results in the formation of polyurea microcapsules. The monomers amount to 1-10 wt%. The wt% relate to the total CS composition.

xi) Dustable powders (DP, DS)

1-10 wt% of a compound I are ground finely and mixed intimately with solid carrier (e. g. finely divided kaolin) ad 100 wt%.

xii) Granules (GR, FG)

0.5-30 wt% of a compound I is ground finely and associated with solid carrier (e. g. silicate) ad 100 wt%. Granulation is achieved by extrusion, spray-drying or fluidized bed.

xiii) Ultra-low volume liquids (UL)

1-50 wt% of a compound I are dissolved in organic solvent (e. g. aromatic hydrocarbon) ad 100 wt%.

The compositions types i) to xiii) may optionally comprise further auxiliaries, such as 0.1-1 wt% bactericides, 5-15 wt% anti-freezing agents, 0.1-1 wt% anti-foaming agents, and 0.1-1 wt% colorants.

The agrochemical compositions generally comprise between 0.01 and 95%, preferably between 0.1 and 90%, more preferably between 1 and 70%, and in particular between 10 and 60%, by weight of active substance. The active substances are employed in a purity of from 90% to 100%, preferably from 95% to 100% (according to NMR spectrum).

For the purposes of treatment of plant propagation materials, particularly seeds, solutions for seed treatment (LS), Suspoemulsions (SE), flowable concentrates (FS), powders for dry treatment (DS), water-dispersible powders for slurry treatment (WS), water-soluble powders (SS), emulsions (ES), emulsifiable concentrates (EC), and gels (GF) are usually employed. The compositions in question give, after two-to-tenfold dilution, active substance concentrations of from 0.01 to 60% by weight, preferably from 0.1 to 40%, in the ready-to-use preparations. Application can be carried out before or during sowing. Methods for applying compound I and compositions thereof, respectively, onto plant propagation material, especially seeds, include dressing, coating, pelleting, dusting, and soaking as well as in-furrow application methods. Preferably, compound I or the compositions thereof, respectively, are applied on to the plant propagation material by a method such that germination is not induced, e. g. by seed dressing, pelleting, coating and dusting.

When employed in plant protection, the amounts of active substances applied are, depending on the kind of effect desired, from 0.001 to 2 kg per ha, preferably from 0.005 to 2 kg per ha, more preferably from 0.05 to 0.9 kg per ha, and in particular from 0.1 to 0.75 kg per ha.

In treatment of plant propagation materials such as seeds, e. g. by dusting, coating or drenching seed, amounts of active substance of from 0.1 to 1000 g, preferably from 1 to 1000 g, more preferably from 1 to 100 g and most preferably from 5 to 100 g, per 100 kilogram of plant propagation material (preferably seeds) are generally required.

When used in the protection of materials or stored products, the amount of active substance applied depends on the kind of application area and on the desired effect. Amounts customarily applied in the protection of materials are 0.001 g to 2 kg, preferably 0.005 g to 1 kg, of active substance per cubic meter of treated material.

Various types of oils, wetters, adjuvants, fertilizer, or micronutrients, and further pesticides (e. g. herbicides, insecticides, fungicides, growth regulators, safeners, biopesticides) may be added to the active substances or the compositions comprising them as premix or, if appropriate not until immediately prior to use (tank mix). These agents can be admixed with the compositions according to the invention in a weight ratio of 1:100 to 100:1, preferably 1:10 to 10:1.

A pesticide is generally a chemical or biological agent (such as pestidal active ingredient, compound, composition, virus, bacterium, antimicrobial or disinfectant) that through its effect deters, incapacitates, kills or otherwise discourages pests. Target pests can include insects, plant pathogens, weeds, mollusks, birds, mammals, fish, nematodes (roundworms), and microbes that destroy property, cause nuisance, spread disease or are vectors for disease. The term “pesticide” includes also plant growth regulators that alter the expected growth, flowering, or reproduction rate of plants; defoliants that cause leaves or other foliage to drop from a plant, usually to facilitate harvest; desiccants that promote drying of living tissues, such as unwanted plant tops; plant activators that activate plant physiology for defense of against certain pests; safeners that reduce unwanted herbicidal action of pesticides on crop plants; and plant growth promoters that affect plant physiology e.g. to increase plant growth, biomass, yield or any other quality parameter of the harvestable goods of a crop plant.

The user applies the composition according to the invention usually from a predosage device, a knapsack sprayer, a spray tank, a spray plane, or an irrigation system. Usually, the agrochemical composition is made up with water, buffer, and/or further auxiliaries to the desired application concentration and the ready-to-use spray liquor or the agrochemical composition according to the invention is thus obtained. Usually, 20 to 2000 liters, preferably 50 to 400 liters, of the ready-to-use spray liquor are applied per hectare of agricultural useful area.

According to one embodiment, individual components of the composition according to the invention such as parts of a kit or parts of a binary or ternary mixture may be mixed by the user himself in a spray tank or any other kind of vessel used for applications (e. g. seed treater drums, seed pelleting machinery, knapsack sprayer) and further auxiliaries may be added, if appropriate.

Consequently, one embodiment of the invention is a kit for preparing a usable pesticidal composition, the kit comprising a) a composition comprising component 1) as defined herein and at least one auxiliary; and b) a composition comprising component 2) as defined herein and at least one auxiliary; and optionally c) a composition comprising at least one auxiliary and optionally a further active component 3) as defined herein.

Mixing the compounds I or the compositions comprising them in the use form as fungicides with other fungicides results in many cases in an expansion of the fungicidal spectrum of activity being obtained or in a prevention of fungicide resistance development. Furthermore, in many cases, synergistic effects are obtained.

The following list of pesticides II (e. g. pesticidally-active substances and biopesticides), in conjunction with which the compounds I can be used, is intended to illustrate the possible combinations but does not limit them:

A) Respiration inhibitors

- Inhibitors of complex III at Q_o site: azoxystrobin (A.1.1), coumethoxystrobin (A.1.2), coumoxystrobin (A.1.3), dimoxystrobin (A.1.4), enestroburin (A.1.5), fenaminstrobin (A.1.6), fenoxystrobin/flufenoxystrobin (A.1.7), fluoxastrobin (A.1.8), kresoxim-methyl (A.1.9), mandestrobin (A.1.10), metominostrobin (A.1.11), orysastrobin (A.1.12), picoxystrobin (A.1.13), pyraclostrobin (A.1.14), pyrametostrobin (A.1.15), pyraoxystrobin (A.1.16), trifloxystrobin (A.1.17), 2-(2-(3-(2,6-dichlorophenyl)-1-methyl-allylideneaminooxymethyl)-phenyl)-2-methoxyimino-*N*-methyl-acetamide (A.1.18), pyribencarb (A.1.19), triclopyricarb/chlorodincarb (A.1.20), famoxadone (A.1.21), fenamidone (A.1.21a), methyl-*N*-[2-[(1,4-dimethyl-5-phenyl-pyrazol-3-yl)oxylmethyl]phenyl]-*N*-methoxy-carbamate (A.1.22), metyltetrapole (A.1.25), (*Z*,2*E*)-5-[1-(2,4-dichlorophenyl)pyrazol-3-yl]-oxy-2-methoxyimino-*N*,3-dimethyl-pent-3-enamide (A.1.34), (*Z*,2*E*)-5-[1-(4-chlorophenyl)pyrazol-3-yl]oxy-2-methoxyimino-*N*,3-dimethyl-pent-3-enamide (A.1.35), pyriminostrobin (A.1.36), bifujunzhi (A.1.37), 2-(ortho-((2,5-dimethylphenyl-oxymethylen)phenyl)-3-methoxy-acrylic acid methylester (A.1.38);
- inhibitors of complex III at Q_i site: cyazofamid (A.2.1), amisulbrom (A.2.2), [(6*S*,7*R*,8*R*)-8-benzyl-3-[(3-hydroxy-4-methoxy-pyridine-2-carbonyl)amino]-6-methyl-4,9-dioxo-1,5-dioxonan-7-yl] 2-methylpropanoate (A.2.3), fenpicoxamid (A.2.4), florylpicoxamid (A.2.5);
- inhibitors of complex II: benodanil (A.3.1), benzovindiflupyr (A.3.2), bixafen (A.3.3), boscalid (A.3.4), carboxin (A.3.5), fenfuram (A.3.6), fluopyram (A.3.7), flutolanil (A.3.8), fluxapyroxad (A.3.9), furametpyr (A.3.10), isofetamid (A.3.11), isopyrazam (A.3.12), mepronil (A.3.13), oxycarboxin (A.3.14), penflufen (A.3.15), penthiopyrad (A.3.16), pydiflumetofen (A.3.17), pyraziflumid (A.3.18), sedaxane (A.3.19), tecloftalam (A.3.20), thifluzamide (A.3.21), inpyrfluxam (A.3.22), pyrapropoyne (A.3.23), fluindapyr (A.3.28), N-[2-[2-chloro-4-(trifluoro¬methyl)phenoxy]phenyl]-3-(difluoromethyl)-5-fluoro-1-methyl-pyrazole-4-carboxamide (A.3.29), methyl (*E*)-2-[2-[(5-cyano-2-methyl-phenoxy)methyl]phenyl]-3-methoxy-prop-2-enoate (A.3.30), isoflucypram (A.3.31), 2-(difluoromethyl)-*N*-(1,1,3-trimethyl-indan-4-yl)pyridine-3-carboxamide (A.3.32), 2-(difluoromethyl)-*N*-[(3*R*)-1,1,3-trimethylindan-4-yl]pyridine-3-carboxamide (A.3.33), 2-(difluoromethyl)-*N*-(3-ethyl-1,1-dimethyl-indan-4-yl)-pyridine-3-carboxamide (A.3.34), 2-(difluoromethyl)-*N*-[(3*R*)-3-ethyl-1,1-dimethyl-indan-4-yl]-pyridine-3-carboxamide (A.3.35), 2-(difluoromethyl)-*N*-(1,1-dimethyl-3-propyl-indan-4-yl)pyridine-3-carboxamide (A.3.36), 2-(difluoromethyl)-*N*-[(3*R*)-1,1-dimethyl-3-propyl-indan-4-yl]-pyridine-3-carboxamide (A.3.37), 2-(difluoromethyl)-*N*-(3-isobutyl-1,1-dimethyl-indan-4-yl)-pyridine-3-carboxamide (A.3.38), 2-(difluoromethyl)-*N*-[(3*R*)-3-isobutyl-1,1-dimethyl-indan-4-yl]pyridine-3-carboxamide (A.3.39);
- other respiration inhibitors: diflumetorim (A.4.1); nitrophenyl derivates: binapacryl (A.4.2), dinobuton (A.4.3), dinocap (A.4.4), fluazinam (A.4.5), meptyldinocap (A.4.6), ferimzone (A.4.7); organometal compounds: fentin salts, e. g. fentin-acetate (A.4.8), fentin chloride (A.4.9) or fentin hydroxide (A.4.10); ametoctradin (A.4.11); silthiofam (A.4.12);

B) Sterol biosynthesis inhibitors (SBI fungicides)

- C14 demethylase inhibitors: triazoles: azaconazole (B.1.1), bitertanol (B.1.2), bromuconazole (B.1.3), cyproconazole (B.1.4), difenoconazole (B.1.5), diniconazole (B.1.6), diniconazole-M (B.1.7), epoxiconazole (B.1.8), fenbuconazole (B.1.9), fluquinconazole (B.1.10), flusilazole (B.1.11), flutriafol (B.1.12), hexaconazole (B.1.13), imibenconazole (B.1.14), ipconazole (B.1.15), metconazole (B.1.17), myclobutanil (B.1.18), oxpoconazole (B.1.19), paclobutrazole (B.1.20), penconazole (B.1.21), propiconazole (B.1.22), prothioconazole (B.1.23), simeconazole (B.1.24), tebuconazole (B.1.25), tetraconazole (B.1.26), triadimefon (B.1.27), triadimenol (B.1.28), triticonazole (B.1.29), uniconazole (B.1.30), 2-(2,4-difluorophenyl)-1,1-difluoro-3-(tetrazol-1-yl)-1-[5-[4-(2,2,2-trifluoroethoxy)phenyl]-2-pyridyl]propan-2-ol (B.1.31), 2-(2,4-difluorophenyl)-1,1-difluoro-3-(tetrazol-1-yl)-1-[5-[4-(trifluoromethoxy)phenyl]-2-pyridyl]propan-2-ol (B.1.32), 4-[[6-[2-(2,4-difluorophenyl)-1,1-difluoro-2-hydroxy-3-(5-sulfanyl-1,2,4-triazol-1-yl)propyl]-3-pyridyl]oxy]benzonitrile (B.1.33), ipfentrifluconazole (B.1.37), mefentrifluconazole (B.1.38), 2-(chloromethyl)-2-methyl-5-(p-tolylmethyl)-1-(1,2,4-triazol-1-ylmethyl)cyclopentanol (B.1.43); imidazoles: imazalil (B.1.44), pefurazoate (B.1.45), prochloraz (B.1.46), triflumizol (B.1.47); pyrimidines, pyridines, piperazines: fenarimol (B.1.49), pyrifenox (B.1.50), triforine (B.1.51), [3-(4-chloro-2-fluoro-phenyl)-5-(2,4-difluorophenyl)isoxazol-4-yl]-(3-pyridyl)methanol (B.1.52);
- Delta14-reductase inhibitors: aldimorph (B.2.1), dodemorph (B.2.2), dodemorph-acetate (B.2.3), fenpropimorph (B.2.4), tridemorph (B.2.5), fenpropidin (B.2.6), piperalin (B.2.7), spiroxamine (B.2.8);
- Inhibitors of 3-keto reductase: fenhexamid (B.3.1);
- Other Sterol biosynthesis inhibitors: chlorphenomizole (B.4.1);

C) Nucleic acid synthesis inhibitors

- phenylamides or acyl amino acid fungicides: benalaxyl (C.1.1), benalaxyl-M (C.1.2), kiralaxyl (C.1.3), metalaxyl (C.1.4), metalaxyl-M (C.1.5), ofurace (C.1.6), oxadixyl (C.1.7);
- other nucleic acid synthesis inhibitors: hymexazole (C.2.1), octhilinone (C.2.2), oxolinic acid (C.2.3), bupirimate (C.2.4), 5-fluorocytosine (C.2.5), 5-fluoro-2-(p-tolylmethoxy)pyrimidin-4-amine (C.2.6), 5-fluoro-2-(4-fluorophenylmethoxy)pyrimidin-4-amine (C.2.7), 5-fluoro-2-(4-chlorophenylmethoxy)pyrimidin-4 amine (C.2.8);

D) Inhibitors of cell division and cytoskeleton

- tubulin inhibitors: benomyl (D.1.1), carbendazim (D.1.2), fuberidazole (D1.3), thiabendazole (D.1.4), thiophanate-methyl (D.1.5), pyridachlometyl (D.1.6), *N*-ethyl-2-[(3-ethynyl-8-methyl-6-quinolyl)oxy]butanamide (D.1.8), *N*-ethyl-2-[(3-ethynyl-8-methyl-6-quinolyl)oxy]-2-methylsulfanyl-acetamide (D.1.9), 2-[(3-ethynyl-8-methyl-6-quinolyl)oxy]-*N*-(2-fluoroethyl)butanamide (D.1.10), 2-[(3-ethynyl-8-methyl-6-quinolyl)oxy]-*N*-(2-fluoroethyl)-2-methoxy-acetamide (D.1.11), 2-[(3-ethynyl-8-methyl-6-quinolyl)oxy]-*N*-propyl-butanamide (D.1.12), 2-[(3-ethynyl-8-methyl-6-quinolyl)oxy]-2-methoxy-*N*-propyl-acetamide (D.1.13), 2-[(3-ethynyl-8-methyl-6-quinolyl)oxy]-2-methylsulfanyl-*N*-propyl-acetamide (D.1.14), 2-[(3-ethynyl-8-methyl-6-quinolyl)oxy]-*N*-(2-fluoroethyl)-2-methylsulfanyl-acetamide (D.1.15), 4-(2-bromo-4-fluoro-phenyl)-*N*-(2-chloro-6-fluoro-phenyl)-2,5-dimethyl-pyrazol-3-amine (D.1.16);
- other cell division inhibitors: diethofencarb (D.2.1), ethaboxam (D.2.2), pencycuron (D.2.3), fluopicolide (D.2.4), zoxamide (D.2.5), metrafenone (D.2.6), pyriofenone (D.2.7), phenamacril (D.2.8);

E) Inhibitors of amino acid and protein synthesis

- methionine synthesis inhibitors: cyprodinil (E.1.1), mepanipyrim (E.1.2), pyrimethanil (E.1.3);
- protein synthesis inhibitors: blasticidin-S (E.2.1), kasugamycin (E.2.2), kasugamycin hydrochloride-hydrate (E.2.3), mildiomycin (E.2.4), streptomycin (E.2.5), oxytetracyclin (E.2.6);

F) Signal transduction inhibitors

- MAP / histidine kinase inhibitors: fluoroimid (F.1.1), iprodione (F.1.2), procymidone (F.1.3), vinclozolin (F.1.4), fludioxonil (F.1.5);
- G protein inhibitors: quinoxyfen (F.2.1);

G) Lipid and membrane synthesis inhibitors

- Phospholipid biosynthesis inhibitors: edifenphos (G.1.1), iprobenfos (G.1.2), pyrazophos (G.1.3), isoprothiolane (G.1.4);
- lipid peroxidation: dicloran (G.2.1), quintozene (G.2.2), tecnazene (G.2.3), tolclofos-methyl (G.2.4), biphenyl (G.2.5), chloroneb (G.2.6), etridiazole (G.2.7), zinc thiazole (G.2.8);
- phospholipid biosynthesis and cell wall deposition: dimethomorph (G.3.1), flumorph (G.3.2), mandipropamid (G.3.3), pyrimorph (G.3.4), benthiavalicarb (G.3.5), iprovalicarb (G.3.6), valifenalate (G.3.7);
- compounds affecting cell membrane permeability and fatty acides: propamocarb (G.4.1);
- inhibitors of oxysterol binding protein: oxathiapiprolin (G.5.1), fluoxapiprolin (G.5.3), 4-[1-[2-[3-(difluoromethyl)-5-methyl-pyrazol-1-yl]acetyl]-4-piperidyl]-*N*-tetralin-1-yl-pyridine-2-carboxamide (G.5.4), 4-[1-[2-[3,5-bis(difluoromethyl)pyrazol-1-yl]acetyl]-4-piperidyl]-*N*-tetralin-1-yl-pyridine-2-carboxamide (G.5.5), 4-[1-[2-[3-(difluoromethyl)-5-(trifluoromethyl)pyrazol-1-yl]acetyl]-4-piperidyl]-*N*-tetralin-1-yl-pyridine-2-carboxamide (G.5.6), 4-[1-[2-[5-cyclopropyl-3-(difluoromethyl)pyrazol-1-yl]acetyl]-4-piperidyl]-*N*-tetralin-1-yl-pyridine-2-carboxamide (G.5.7), 4-[1-[2-[5-methyl-3-(trifluoromethyl)pyrazol-1-yl]acetyl]-4-piperidyl]-*N*-tetralin-1-yl-pyridine-2-carboxamide (G.5.8), 4-[1-[2-[5-(difluoromethyl)-3-(trifluoromethyl)pyrazol-1-yl]acetyl]-4-piperidyl]-*N*-tetralin-1-yl-pyridine-2-carboxamide (G.5.9), 4-[1-[2-[3,5-bis(trifluoromethyl)pyrazol-1-yl]acetyl]-4-piperidyl]-*N*-tetralin-1-yl-pyridine-2-carboxamide (G.5.10), (4-[1-[2-[5-cyclopropyl-3-(trifluoromethyl)pyrazol-1-yl]acetyl]-4-piperidyl]-*N*-tetralin-1-yl-pyridine-2-carboxamide (G.5.11);

H) Inhibitors with Multi Site Action

- inorganic active substances: Bordeaux mixture (H.1.1), copper (H.1.2), copper acetate (H.1.3), copper hydroxide (H.1.4), copper oxychloride (H.1.5), basic copper sulfate (H.1.6), sulfur (H.1.7);
- thio- and dithiocarbamates: ferbam (H.2.1), mancozeb (H.2.2), maneb (H.2.3), metam (H.2.4), metiram (H.2.5), propineb (H.2.6), thiram (H.2.7), zineb (H.2.8), ziram (H.2.9);
- organochlorine compounds: anilazine (H.3.1), chlorothalonil (H.3.2), captafol (H.3.3), captan (H.3.4), folpet (H.3.5), dichlofluanid (H.3.6), dichlorophen (H.3.7), hexachlorobenzene (H.3.8), pentachlorphenole (H.3.9) and its salts, phthalide (H.3.10), tolylfluanid (H.3.11);
- guanidines and others: guanidine (H.4.1), dodine (H.4.2), dodine free base (H.4.3), guazatine (H.4.4), guazatine-acetate (H.4.5), iminoctadine (H.4.6), iminoctadine-triacetate (H.4.7), iminoctadine-tris(albesilate) (H.4.8), dithianon (H.4.9), 2,6-dimethyl-1*H*,5*H*-[1,4]dithiino[2,3-c:5,6-c']dipyrrole-1,3,5,7(2*H*,6*H*)-tetraone (H.4.10);

I) Cell wall synthesis inhibitors

- inhibitors of glucan synthesis: validamycin (I.1.1), polyoxin B (I.1.2);
- melanin synthesis inhibitors: pyroquilon (I.2.1), tricyclazole (I.2.2), carpropamid (I.2.3), dicyclomet (I.2.4), fenoxanil (I.2.5);

J) Plant defence inducers

- acibenzolar-S-methyl (J.1.1), probenazole (J.1.2), isotianil (J.1.3), tiadinil (J.1.4), prohexadione-calcium (J.1.5); phosphonates: fosetyl (J.1.6), fosetyl-aluminum (J.1.7), phosphorous acid and its salts (J.1.8), calcium phosphonate (J.1.11), potassium phosphonate (J.1.12), potassium or sodium bicarbonate (J.1.9), 4-cyclopropyl-*N*-(2,4-dimethoxyphenyl)thiadiazole-5-carboxamide (J.1.10);

K) Unknown mode of action

- bronopol (K.1.1), chinomethionat (K.1.2), cyflufenamid (K.1.3), cymoxanil (K.1.4), dazomet (K.1.5), debacarb (K.1.6), diclocymet (K.1.7), diclomezine (K.1.8), difenzoquat (K.1.9), difenzoquat-methylsulfate (K.1.10), diphenylamin (K.1.11), fenitropan (K.1.12), fenpyrazamine (K.1.13), flumetover (K.1.14), flusulfamide (K.1.15), flutianil (K.1.16), harpin (K.1.17), methasulfocarb (K.1.18), nitrapyrin (K.1.19), nitrothal-isopropyl (K.1.20), tolprocarb (K.1.21), oxin-copper (K.1.22), proquinazid (K.1.23), tebufloquin (K.1.24), tecloftalam (K.1.25), triazoxide (K.1.26), *N'*-(4-(4-chloro-3-trifluoromethyl-phenoxy)-2,5-dimethyl-phenyl)-*N*-ethyl-*N*-methyl formamidine (K.1.27), *N'*-(4-(4-fluoro-3-trifluoromethyl-phenoxy)-2,5-dimethyl-phenyl)-*N*-ethyl-*N*-methyl formamidine (K.1.28), *N'*-[4-[[3-[(4-chlorophenyl)methyl]-1,2,4-thiadiazol-5-yl]-oxy]-2,5-dimethyl-phenyl]-*N*-ethyl-*N*-methyl-formamidine (K.1.29), *N'*-(5-bromo-6-indan-2-yloxy-2-methyl-3-pyridyl)-*N*-ethyl-*N*-methyl-formamidine (K.1.30), *N'*-[5-bromo-6-[1-(3,5-difluorophenyl)ethoxy]-2-methyl-3-pyridyl]-*N*-ethyl-*N*-methyl-formamidine (K.1.31), *N'*-[5-bromo-6-(4-isopropylcyclohexoxy)-2-methyl-3-pyridyl]-*N*-ethyl-*N*-methyl-formamidine (K.1.32), *N'*-[5-bromo-2-methyl-6-(1-phenylethoxy)-3-pyridyl]-*N*-ethyl-*N*-methyl-formamidine (K.1.33), *N'*-(2-methyl-5-trifluoromethyl-4-(3-trimethylsilanyl-propoxy)-phenyl)-*N*-ethyl-*N*-methyl formamidine (K.1.34), *N'*-(5-difluoromethyl-2-methyl-4-(3-trimethylsilanyl-propoxy)-phenyl)-*N*-ethyl-*N*-methyl formamidine (K.1.35), 2-(4-chloro-phenyl)-*N*-[4-(3,4-dimethoxy-phenyl)-isoxazol-5-yl]-2-prop-2-ynyloxy-acetamide (K.1.36), 3-[5-(4-chloro-phenyl)-2,3-dimethyl-isoxazolidin-3-yl]-pyridine (pyrisoxazole) (K.1.37), 3-[5-(4-methylphenyl)-2,3-dimethyl-isoxazolidin-3 yl]-pyridine (K.1.38), 5-chloro-1-(4,6-dimethoxy-pyrimidin-2-yl)-2-methyl-1*H*-benzoimidazole (K.1.39), ethyl (*Z*)-3-amino-2-cyano-3-phenyl-prop-2-enoate (K.1.40), picarbutrazox (K.1.41), pentyl *N*-[6-[[(*Z*)-[(1-methyltetrazol-5-yl)-phenyl-methylene]amino]oxymethyl]-2-pyridyl]carbamate (K.1.42), but-3-ynyl *N*-[6-[[(*Z*)-[(1-methyltetrazol-5-yl)-phenyl-methylene]amino]oxymethyl]-2-pyridyl]carbamate (K.1.43), ipflufenoquin (K.1.44), quinofumelin (K.1.47), benziothiazolinone (K.1.48), bromothalonil (K.1.49), 2-(6-benzyl-2-pyridyl)quinazoline (K.1.50), 2-[6-(3-fluoro-4-methoxy-phenyl)-5-methyl-2-pyridyl]quinazoline (K.1.51), dichlobentiazox (K.1.52), *N'*-(2,5-dimethyl-4-phenoxy-phenyl)-*N*-ethyl-*N*-methyl-formamidine (K.1.53), pyrifenamine (K.1.54), fluopimomide (K.1.55), N'-[5-bromo-2-methyl-6-(1-methyl-2 propoxy-ethoxy)-3-pyridyl]-N-ethyl-N-methyl-formamidine (K.1.56);

M) Growth regulators

abscisic acid (M.1.1), amidochlor, ancymidol, 6-benzylaminopurine, brassinolide, butralin, chlormequat, chlormequat chloride, choline chloride, cyclanilide, daminozide, dikegulac, dimethipin, 2,6-dimethylpuridine, ethephon, flumetralin, flurprimidol, fluthiacet, forchlorfenuron, gibberellic acid, inabenfide, indole-3-acetic acid , maleic hydrazide, mefluidide, mepiquat, mepiquat chloride, naphthaleneacetic acid, *N*-6-benzyladenine, paclobutrazol, prohexadione, prohexadione-calcium, prohydrojasmon, thidiazuron, triapenthenol, tributyl phosphorotrithioate, 2,3,5-tri-iodobenzoic acid , trinexapac-ethyl, uniconazole;

N) Herbicides from classes N.1 to N.15

N.1 Lipid biosynthesis inhibitors: alloxydim, alloxydim-sodium, butroxydim, clethodim, clodinafop, clodinafop-propargyl, cycloxydim, cyhalofop, cyhalofop-butyl, diclofop, diclofop-methyl, fenoxaprop, fenoxaprop-ethyl, fenoxaprop-P, fenoxaprop-P-ethyl, fluazifop, fluazifop-butyl, fluazifop-P, fluazifop-P-butyl, haloxyfop, haloxyfop-methyl, haloxyfop-P, haloxyfop-P-methyl, metamifop, pinoxaden, profoxydim, propaquizafop, quizalofop, quizalofop-ethyl, quizalofop-tefuryl, quizalofop-P, quizalofop-P-ethyl, quizalofop-P-tefuryl, sethoxydim, tepraloxydim, tralkoxydim, 4-(4'-chloro-4-cyclo¬propyl-2'-fluoro[1,1'-biphenyl]-3-yl)-5-hydroxy-2,2,6,6-tetramethyl-2*H*-pyran-3(6*H*)-one (1312337-72-6); 4-(2',4'-dichloro-4-cyclopropyl[1,1'-biphenyl]-3-yl)-5-hydroxy-2,2,6,6-tetramethyl-2*H*-pyran-3(6*H*)-one (1312337-45-

3); 4-(4'-chloro-4-ethyl-2'-fluoro[1,1'-biphenyl]-3-yl)-5-hydroxy-2,2,6,6-tetramethyl-2*H*-pyran-3(6*H*)-one (1033757-93-5); 4-(2',4'-dichloro-4-ethyl[1,1'-biphenyl]-3-yl)-2,2,6,6-tetramethyl-2*H*-pyran-3,5(4*H*,6*H*)-dione (1312340-84-3); 5-(acetyloxy)-4-(4'-chloro-4-cyclopropyl-2'-fluoro[1,1'-biphenyl]-3-yl)-3,6-dihydro-2,2,6,6-tetramethyl-2*H*-pyran-3-one (1312337-48-6); 5-(acetyloxy)-4-(2´,4'-dichloro-4-cyclopropyl- [1,1'-biphenyl]-3-yl)-3,6-dihydro-2,2,6,6-tetramethyl-2*H*-pyran-3-one; 5-(acetyloxy)-4-(4'-chloro-4-ethyl-2'-fluoro[1,1'-biphenyl]-3-yl)-3,6-dihydro-2,2,6,6-tetramethyl-2*H*-pyran-3-one (1312340-82-1); 5-(acetyloxy)-4-(2',4'-dichloro-4-ethyl[1,1'-biphenyl]-3-yl)-3,6-dihydro-2,2,6,6-tetramethyl-2*H*-pyran-3-one (1033760-55-2); 4-(4'-chloro-4-cyclopropyl-2'-fluoro[1,1'-biphenyl]-3-yl)-5,6-dihydro-2,2,6,6-tetramethyl-5-oxo-2*H*-pyran-3-yl carbonic acid methyl ester (1312337-51-1); 4-(2´,4'-dichloro -4-cyclopropyl- [1,1'-biphenyl]-3-yl)-5,6-dihydro-2,2,6,6-tetramethyl-5-oxo-2*H*-pyran-3-yl carbonic acid methyl ester; 4-(4'-chloro-4-ethyl-2'-fluoro[1,1'-biphenyl]-3-yl)-5,6-dihydro-2,2,6,6-tetramethyl-5-oxo-2*H*-pyran-3-yl carbonic acid methyl ester (1312340-83-2); 4-(2',4'-dichloro-4-ethyl¬[1,1'-biphenyl]-3-yl)-5,6-dihydro-2,2,6,6-tetramethyl-5-oxo-2*H*-pyran-3-yl carbonic acid methyl ester (1033760-58-5); benfuresate, butylate, cycloate, dalapon, dimepiperate, EPTC, esprocarb, ethofumesate, flupropanate, molinate, orbencarb, pebulate, prosulfocarb, TCA, thiobencarb, tiocarbazil, triallate, vernolate;

N.2 ALS inhibitors: amidosulfuron, azimsulfuron, bensulfuron, bensulfuron-methyl, chlorimuron, chlorimuron-ethyl, chlorsulfuron, cinosulfuron, cyclosulfamuron, ethametsulfuron, ethametsulfuron-methyl, ethoxysulfuron, flazasulfuron, flucetosulfuron, flupyrsulfuron, flupyrsulfuron-methyl-sodium, foramsulfuron, halosulfuron, halosulfuron-methyl, imazosulfuron, iodosulfuron, iodosulfuron-methyl-sodium, iofensulfuron, iofensulfuron-sodium, mesosulfuron, metazosulfuron, metsulfuron, metsulfuron-methyl, nicosulfuron, orthosulfamuron, oxasulfuron, primisulfuron, primisulfuron-methyl, propyrisulfuron, prosulfuron, pyrazosulfuron, pyrazosulfuron-ethyl, rimsulfuron, sulfometuron, sulfometuron-methyl, sulfosulfuron, thifensulfuron, thifensulfuron-methyl, triasulfuron, tribenuron, tribenuron-methyl, trifloxysulfuron, triflusulfuron, triflusulfuron-methyl, tritosulfuron, imazamethabenz, imazamethabenz-methyl, imazamox, imazapic, imazapyr, imazaquin, imazethapyr; cloransulam, cloransulam-methyl, diclosulam, flumetsulam, florasulam, metosulam, penoxsulam, pyrimisulfan, pyroxsulam; bispyribac, bispyribac-sodium, pyribenzoxim, pyriftalid, pyriminobac, pyriminobac-methyl, pyrithiobac, pyrithiobac-sodium, 4-[[[2-[(4,6-dimethoxy-2-pyrimidinyl)oxy]phenyl]methyl]amino]-benzoic acid-1-methyl¬ethyl ester (420138-41-6), 4-[[[2-[(4,6-dimethoxy-2-pyrimidinyl)oxy]-phenyl]¬methyl]amino]-benzoic acid propyl ester (420138-40-5), *N*-(4-bromophenyl)-2-[(4,6-dimethoxy-2-pyrimidinyl)oxy]benzenemethanamine (420138-01-8); flucarbazone, flucarbazone-sodium, propoxycarbazone, propoxycarbazone-sodium, thiencarbazone, thiencarbazone-methyl; triafamone;

N.3 Photosynthesis inhibitors: amicarbazone; chlorotriazine; ametryn, atrazine, chloridazone, cyanazine, desmetryn, dimethametryn,hexazinone, metribuzin, prometon, prometryn, propazine, simazine, simetryn, terbumeton, terbuthylazin, terbutryn, trietazin; chlorobromuron, chlorotoluron, chloroxuron, dimefuron, diuron, fluometuron, isoproturon, isouron, linuron, metamitron, methabenzthiazuron, metobenzuron, metoxuron, monolinuron, neburon, siduron, tebuthiuron, thiadiazuron, desmedipham, karbutilat, phenmedipham, phenmedipham-ethyl, bromofenoxim, bromoxynil and its salts and esters, ioxynil and its salts and esters, bromacil, lenacil, terbacil, bentazon, bentazon-sodium, pyridate, pyridafol, pentanochlor, propanil; diquat, diquat-dibromide, paraquat, paraquat-dichloride, paraquat-dimetilsulfate, 1-(6-tert-butylpyrimidin-4-yl)-2-hydroxy-4-meth¬oxy-3-methyl-2H-pyrrol-5-one (1654744-66-7), 1-(5-tert-butylisoxazol-3-yl)-2-hydroxy-4 methoxy-3-methyl-2H-pyrrol-5-one (1637455-12-9), 1-(5-tert-butylisoxazol-3-yl)-4-chloro-2 hydroxy-3-methyl-2H-pyrrol-5-one (1637453-94-1), 1-

(5-tert-butyl-1-methyl-pyrazol-3-yl)-4 chloro-2-hydroxy-3-methyl-2H-pyrrol-5-one (1654057-29-0), 1-(5-tert-butyl-1-methyl-pyrazol-3-yl)-3-chloro-2-hydroxy-4-methyl-2H-pyrrol-5-one (1654747-80-4), 4-hydroxy-1 methoxy-5-methyl-3-[4-(trifluoromethyl)-2-pyridyl]imidazolidin-2-one; (2023785-78-4), 4 hydroxy-1,5-dimethyl-3-[4-(trifluoromethyl)-2-pyridyl]imidazolidin-2-one (2023785-79-5), 5 ethoxy-4-hydroxy-1-methyl-3-[4-(trifluoromethyl)-2-pyridyl]imidazolidin-2-one (1701416-69-4), 4-hydroxy-1-methyl-3-[4-(trifluoromethyl)-2-pyridyl]imidazolidin-2-one (1708087-22-2), 4 hydroxy-1,5-dimethyl-3-[1-methyl-5-(trifluoromethyl)pyrazol-3-yl]imidazolidin-2-one (2023785-80-8), 1-(5-tert-butylisoxazol-3-yl)-4-ethoxy-5-hydroxy-3-methyl-imidazolidin-2-one (1844836-64-1);

N.4 protoporphyrinogen-IX oxidase inhibitors: acifluorfen, acifluorfen-sodium, azafenidin, bencarbazone, benzfendizone, bifenox, butafenacil, carfentrazone, carfentrazone-ethyl, chlormethoxyfen, cinidon-ethyl, fluazolate, flufenpyr, flufenpyr-ethyl, flumiclorac, flumiclorac-pentyl, flumioxazin, fluoroglycofen, fluoroglycofen-ethyl, fluthiacet, fluthiacet-methyl, fomesafen, halosafen, lactofen, oxadiargyl, oxadiazon, oxyfluorfen, pentoxazone, profluazol, pyraclonil, pyraflufen, pyraflufen-ethyl, saflufenacil, sulfentrazone, thidiazimin, tiafenacil, trifludimoxazin, ethyl [3-[2-chloro-4-fluoro-5-(1-methyl-6-trifluoromethyl-2,4-dioxo-1,2,3,4-tetrahydropyrimidin-3-yl)phenoxy]-2-pyridyloxy]acetate (353292-31-6), *N*-ethyl-3-(2,6-dichloro-4-trifluoromethylphenoxy)-5-methyl-1*H*-pyrazole-1-carboxamide (452098-92-9), *N*-tetrahydrofurfuryl-3-(2,6-dichloro-4-trifluoromethylphenoxy)-5-methyl-1*H*-pyrazole-1-carboxamide (915396-43-9), *N*-ethyl-3-(2-chloro-6-fluoro-4-trifluoromethyl¬phenoxy)-5-methyl-1*H*-pyrazole-1-carboxamide (452099-05-7), *N*-tetrahydro¬furfuryl-3-(2-chloro-6-fluoro-4-trifluoro¬methylphenoxy)-5-methyl-1*H*-pyrazole-1-carboxamide (452100-03-7), 3-[7-fluoro-3-oxo-4-(prop-2-ynyl)-3,4-dihydro-2*H*-benzo[1,4]oxazin-6-yl]-1,5-dimethyl-6-thioxo-[1,3,5]triazinan-2,4-dione (451484-50-7), 2-(2,2,7-trifluoro-3-oxo-4-prop-2-ynyl-3,4-dihydro-2*H*-benzo[1,4]oxazin-6-yl)-4,5,6,7-tetrahydro-isoindole-1,3-dione (1300118-96-0), 1-methyl-6-trifluoro¬methyl-3-(2,2,7-tri-fluoro-3-oxo-4-prop-2-ynyl-3,4-dihydro-2*H*-benzo[1,4]oxazin-6-yl)-1*H*-pyrimidine-2,4-dione (1304113-05-0), methyl (*E*)-4-[2-chloro-5-[4-chloro-5-(difluoromethoxy)-1*H*-methyl-pyrazol-3-yl]-4-fluoro-phenoxy]-3-methoxy-but-2-enoate (948893-00-3), 3-[7-chloro-5-fluoro-2-(trifluoromethyl)-1*H*-benzimidazol-4-yl]-1-methyl-6-(trifluoromethyl)-1*H*-pyrimidine-2,4-dione (212754-02-4);

N.5 Bleacher herbicides: beflubutamid, diflufenican, fluridone, flurochloridone, flurtamone, norflurazon, picolinafen, 4-(3-trifluoromethyl¬phenoxy)-2-(4-trifluoromethylphenyl)pyrimidine (180608-33-7); benzobicyclon, benzofenap, bicyclopyrone, clomazone, fenquintrione, isoxaflutole, mesotrione, pyrasulfotole, pyrazolynate, pyrazoxyfen, sulcotrione, tefuryltrione, tembotrione, tolpyralate, topramezone; aclonifen, amitrole, flumeturon;

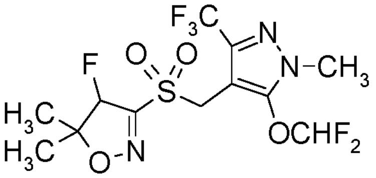
N.6 EPSP synthase inhibitors: glyphosate, glyphosate-isopropylammonium, glyposate-potassium, glyphosate-trimesium (sulfosate);

N.7 Glutamine synthase inhibitors: bilanaphos (bialaphos), bilanaphos-sodium, glufosinate, glufosinate-P, glufosinate-ammonium;

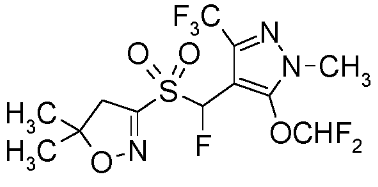
N.8 DHP synthase inhibitors: asulam;

N.9 Mitosis inhibitors: benfluralin, butralin, dinitramine, ethalfluralin, fluchloralin, oryzalin, pendimethalin, prodiamine, trifluralin; amiprophos, amiprophos-methyl, butamiphos; chlorthal, chlorthal-dimethyl, dithiopyr, thiazopyr, propyzamide, tebutam; carbetamide, chlorpropham, flamprop, flamprop-isopropyl, flamprop-methyl, flamprop-M-isopropyl, flamprop-M-methyl, propham;

N.10 VLCFA inhibitors: acetochlor, alachlor, butachlor, dimethachlor, dimethenamid, dimethenamid-P, metazachlor, metolachlor, metolachlor-S, pethoxamid, pretilachlor, propachlor, propisochlor, thenylchlor, flufenacet, mefenacet, diphenamid, naproanilide, napropamide, napropamide-M, fentrazamide, anilofos, cafenstrole, fenoxasulfone, ipfencarbazone, piperophos, pyroxasulfone, isoxazoline compounds of the formulae II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8 and II.9



II.1



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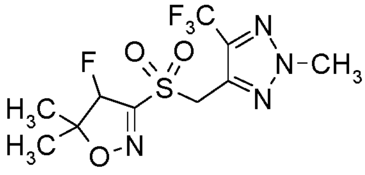

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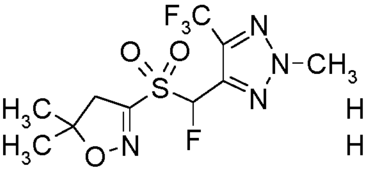

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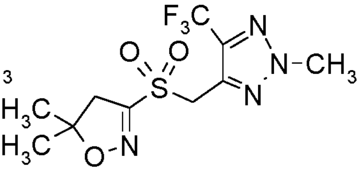

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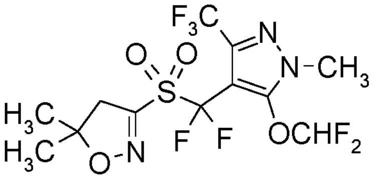

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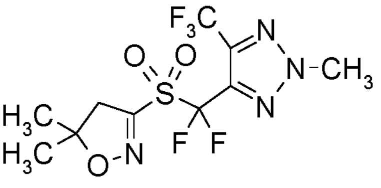

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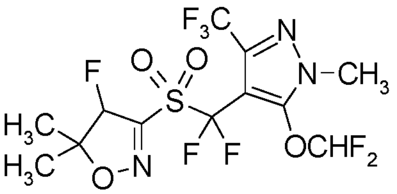

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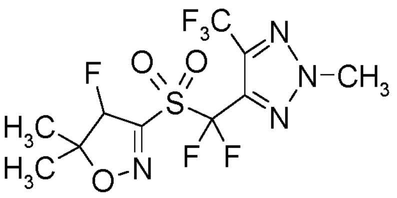


II.9

;

N.11 Cellulose biosynthesis inhibitors: chlorthiamid, dichlobenil, flupoxam, indaziflam, isoxaben, triaziflam, 1-cyclohexyl-5-pentafluorphenyloxy-14-[1,2,4,6]thiatriazin-3-ylamine (175899-01-1);

N.12 Decoupler herbicides: dinoseb, dinoterb, DNOC and its salts;

N.13 Auxinic herbicides: 2,4-D and its salts and esters, clacyfos, 2,4-DB and its salts and esters, aminocyclopyrachlor and its salts and esters, aminopyralid and its salts such as aminopyralid-dimethylammonium, aminopyralid-tris(2-hydroxypropyl)ammonium and its esters, benazolin, benazolin-ethyl, chloramben and its salts and esters, clomeprop, clopyralid and its salts and esters, dicamba and its salts and esters, dichlorprop and its salts and esters, dichlorprop-P and its salts and esters, fluroxypyr, fluroxypyr-butometyl, fluroxypyr-meptyl, halauxifen and its salts and esters (943832-60-8); MCPA and its salts and esters, MCPA-thioethyl, MCPB and its salts and esters, mecoprop and its salts and esters, mecoprop-P and its salts and esters, picloram and its salts and esters, quinclorac, quinmerac, TBA (2,3,6) and its salts and esters, triclopyr and its salts and esters, 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)-5-fluoropyridine-2-carboxylic acid, florpyrauxifen-benzyl, florpyrauxifen;

N.14 Auxin transport inhibitors: diflufenzopyr, diflufenzopyr-sodium, naptalam, naptalam-sodium;

N.15 Other herbicides: bromobutide, chlorflurenol, chlorflurenol-methyl, cinmethylin, cumyluron, cyclopyrimorate (499223-49-3) and its salts and esters, dalapon, dazomet, difenzoquat, difenzoquat-metilsulfate, dimethipin, DSMA, dymron, endothal and its salts, etobenzanid, flurenol, flurenol-butyl, flurprimidol, fosamine, fosamine-ammonium, indanofan, maleic hydrazide, mefluidide, metam, methiozolin (403640-27-7), methyl azide, methyl bromide, methyl-dymron, methyl iodide, MSMA, oleic acid, oxaziclomefone, pelargonic acid, pyributicarb, quinoclamine, tridiphane;

O) Insecticides from classes O.1 to O.29

O.1 Acetylcholine esterase (AChE) inhibitors: aldicarb (O.1.1), alanycarb (O.1.2), bendiocarb (O.1.3), benfuracarb (O.1.4), butocarboxim (O.1.5), butoxycarboxim (O.1.6), carbaryl (O.1.7), carbofuran (O.1.8), carbosulfan (O.1.9), ethiofencarb (O.1.10), fenobucarb (O.1.11), formetanate (O.1.12), furathiocarb (O.1.13), isoprocarb (O.1.14), methiocarb (O.1.15), methomyl (O.1.16), metolcarb (O.1.17), oxamyl (O.1.18), pirimicarb (O.1.19), propoxur (O.1.20), thiodicarb (O.1.21), thiofanox (O.1.22), trimethacarb (O.1.23), XMC (O.1.24), xylylcarb (O.1.25), triazamate (O.1.26), acephate (O.1.27), azamethiphos (O.1.28), azinphos-ethyl (O.1.29), azinphosmethyl (O.1.30), cadusafos (O.1.31), chlorethoxyfos (O.1.32), chlorfenvinphos (O.1.33), chlormephos (O.1.34), chlorpyrifos (O.1.35), chlorpyrifos-methyl (O.1.36), coumaphos (O.1.37), cyanophos (O.1.38), demeton-S-methyl (O.1.39), diazinon (O.1.40), dichlorvos/ DDVP (O.1.41), dicrotophos (O.1.42), dimethoate (O.1.43), dimethylvinphos (O.1.44), disulfoton (O.1.45), EPN (O.1.46), ethion (O.1.47), ethoprophos (O.1.48), famphur (O.1.49), fenamiphos (O.1.50), fenitrothion (O.1.51), fenthion (O.1.52), fosthiazate (O.1.53), heptenophos (O.1.54), imicyafos (O.1.55), isofenphos (O.1.56), isopropyl O-(methoxyaminothio-phosphoryl) salicylate (O.1.57), isoxathion (O.1.58), malathion (O.1.59), mecarbam (O.1.60), methamidophos (O.1.61), methidathion (O.1.62), mevinphos (O.1.63), monocrotophos (O.1.64), naled (O.1.65), omethoate (O.1.66), oxydemeton-methyl (O.1.67), parathion (O.1.68), parathion-methyl (O.1.69), phenthoate (O.1.70), phorate (O.1.71), phosalone (O.1.72), phosmet (O.1.73), phosphamidon (O.1.74), phoxim (O.1.75), pirimiphos- methyl (O.1.76), profenofos (O.1.77), propetamphos (O.1.78), prothiofos (O.1.79), pyraclofos (O.1.80), pyridaphenthion (O.1.81), quinalphos (O.1.82), sulfotep (O.1.83), tebupirimfos (O.1.84), temephos (O.1.85), terbufos (O.1.86), tetrachlorvinphos (O.1.87), thiometon (O.1.88), triazophos (O.1.89), trichlorfon (O.1.90), vamidothion (O.1.91);

O.2 GABA-gated chloride channel antagonists: endosulfan (O.2.1), chlordane (O.2.2), ethiprole (O.2.3), fipronil (O.2.4), flufiprole (O.2.5), pyrafluprole (O.2.6), pyriprole (O.2.7);

O.3 Sodium channel modulators: acrinathrin (O.3.1), allethrin (O.3.2), d-cis-trans allethrin (O.3.3), d-trans allethrin (O.3.4), bifenthrin (O.3.5), kappa-bifenthrin (O.3.6), bioallethrin (O.3.7), bioallethrin S-cylclopentenyl (O.3.8), bioresmethrin (O.3.9), cycloprothrin (O.3.10), cyfluthrin (O.3.11), beta-cyfluthrin (O.3.12), cyhalothrin (O.3.13), lambda-cyhalothrin (O.3.14), gamma-cyhalothrin (O.3.15), cypermethrin (O.3.16), alpha-cypermethrin (O.3.17), beta-cypermethrin (O.3.18), theta-cypermethrin (O.3.19), zeta-cypermethrin (O.3.20), cyphenothrin (O.3.21), deltamethrin (O.3.22), empenthrin (O.3.23), esfenvalerate (O.3.24), etofenprox (O.3.25), fenpropathrin (O.3.26), fenvalerate (O.3.27), flucythrinate (O.3.28), flumethrin (O.3.29), tau-fluvalinate (O.3.30), halfenprox (O.3.31), heptafluthrin (O.3.32), imiprothrin (O.3.33), meperfluthrin (O.3.34), metofluthrin (O.3.35), momfluorothrin (O.3.36), epsilon-momfluorothrin (O.3.37), permethrin (O.3.38), phenothrin (O.3.39), prallethrin (O.3.40), profluthrin (O.3.41), pyrethrin (pyrethrum) (O.3.42), resmethrin (O.3.43), silafluofen

(O.3.44), tefluthrin (O.3.45), kappa-tefluthrin (O.3.46), tetramethylfluthrin (O.3.47), tetramethrin (O.3.48), tralomethrin (O.3.49), transfluthrin (O.3.50), DDT (O.3.51), methoxychlor (O.3.52);

O.4 Nicotinic acetylcholine receptor agonists (nAChR): acetamiprid (O.4.1), clothianidin (O.4.2), cycloxaprid (O.4.3), dinotefuran (O.4.4), imidacloprid (O.4.5), nitenpyram (O.4.6), thiacloprid (O.4.7), thiamethoxam (O.4.8), 4,5-dihydro-*N*-nitro-1-(2-oxiranylmethyl)-1*H*-imidazol-2-amine (O.4.9), (2*E*)-1-[(6-chloropyridin-3-yl)methyl]-*N'*-nitro-2-pentylidene-hydrazinecarboximidamide (O.4.10), 1-[(6-chloropyridin-3-yl)methyl]-7-methyl-8-nitro-5-propoxy-1,2,3,5,6,7-hexahydroimidazo[1,2-a]pyridine (O.4.11), nicotine (O.4.12), sulfoxaflor (O.4.13), flupyradifurone (O.4.14), triflumezopyrim (O.4.15), (3*R*)-3-(2-chlorothiazol-5-yl)-8-methyl-5-oxo-6-phenyl-2,3-dihydrothiazolo[3,2-a]pyrimidin-8-ium-7-olate (O.4.16), (3*S*)-3-(6-chloro-3-pyridyl)-8-methyl-5-oxo-6-phenyl-2,3-dihydrothiazolo[3,2-a]pyrimidin-8-ium-7-olate (O.4.17), (3*S*)-8-methyl-5-oxo-6-phenyl-3-pyrimidin-5-yl-2,3-dihydrothiazolo[3,2-a]pyrimidin-8-ium-7-olate (O.4.18), (3*R*)-3-(2-chlorothiazol-5-yl)-8-methyl-5-oxo-6-[3-(trifluoromethyl)phenyl]-2,3-dihydrothiazolo[3,2-a]pyrimidin-8-ium-7-olate (O.4.19), (3*R*)-3-(2-chlorothiazol-5-yl)-6-(3,5-dichlorophenyl)-8-methyl-5-oxo-2,3-dihydrothiazolo[3,2-a]pyrimidin-8-ium-7-olate (O.4.20), (3*R*)-3-(2-chlorothiazol-5-yl)-8-ethyl-5-oxo-6-phenyl-2,3-di-hydrothiazolo[3,2-a]pyrimidin-8-ium-7-olate (O.4.21);

O.5 Nicotinic acetylcholine receptor allosteric activators: spinosad (O.5.1), spinetoram (O.5.2);

O.6 Chloride channel activators: abamectin (O.6.1), emamectin benzoate (O.6.2), ivermectin (O.6.3), lepimectin (O.6.4), milbemectin (O.6.5);

O.7 Juvenile hormone mimics: hydroprene (O.7.1), kinoprene (O.7.2), methoprene (O.7.3), fenoxycarb (O.7.4), pyriproxyfen (O.7.5);

O.8 miscellaneous non-specific (multi-site) inhibitors: methyl bromide (O.8.1) and other alkyl halides, chloropicrin (O.8.2), sulfuryl fluoride (O.8.3), borax (O.8.4), tartar emetic (O.8.5);

O.9 Chordotonal organ TRPV channel modulators: pymetrozine (O.9.1), pyrifluquinazon (O.9.2), flonicamid (O.9.3);

O.10 Mite growth inhibitors: clofentezine (O.10.1), hexythiazox (O.10.2), diflovidazin (O.10.3), etoxazole (O.10.4);

O.11 Microbial disruptors of insect midgut membranes: *Bacillus thuringiensis*, *Bacillus sphaericus* and the insecticdal proteins they produce: *Bacillus thuringiensis* subsp. *Israelensis* (O.11.1), *Bacillus sphaericus* (O.11.2), *Bacillus thuringiensis* subsp. *aizawai* (O.11.3), *Bacillus thuringiensis* subsp. *kurstaki* (O.11.4), *Bacillus thuringiensis* subsp. *tenebrionis* (O.11.5), the Bt crop proteins: Cry1Ab (O.11.6), Cry1Ac (O.11.7), Cry1Fa (O.11.8), Cry2Ab (O.11.9), mCry3A (O.11.10), Cry3Ab (O.11.11), Cry3Bb (O.11.12), Cry34/35Ab1 (O.11.13);

O.12 Inhibitors of mitochondrial ATP synthase: diafenthiuron (O.12.1), azocyclotin (O.12.2), cyhexatin (O.12.3), fenbutatin oxide (O.12.4), propargite (O.12.5), tetradifon (O.12.6);

O.13 Uncouplers of oxidative phosphorylation via disruption of the proton gradient: chlorfenapyr (O.13.1), DNOC (O.13.2), sulfluramid (O.13.3);

O.14 Nicotinic acetylcholine receptor (nAChR) channel blockers: bensultap (O.14.1), cartap hydrochloride (O.14.2), thiocyclam (O.14.3), thiosultap sodium (O.14.4);

O.15 Inhibitors of the chitin biosynthesis type 0: bistrifluron (O.15.1), chlorfluazuron (O.15.2), diflubenzuron (O.15.3), flucycloxuron (O.15.4), flufenoxuron (O.15.5), hexaflumuron (O.15.6), lufenuron (O.15.7), novaluron (O.15.8), noviflumuron (O.15.9), teflubenzuron (O.15.10), triflumuron (O.15.11);

O.16 Inhibitors of the chitin biosynthesis type 1: buprofezin (O.16.1);

O.17 Moulting disruptors: cyromazine (O.17.1);

O.18 Ecdyson receptor agonists: methoxyfenozide (O.18.1), tebufenozide (O.18.2), halofenozide (O.18.3), fufenozide (O.18.4), chromafenozide (O.18.5);

O.19 Octopamin receptor agonists: amitraz (O.19.1);

O.20 Mitochondrial complex III electron transport inhibitors: hydramethylnon (O.20.1), acequinocyl (O.20.2), fluacrypyrim (O.20.3), bifenazate (O.20.4);

O.21 Mitochondrial complex I electron transport inhibitors: fenazaquin (O.21.1), fenpyroximate (O.21.2), pyrimidifen (O.21.3), pyridaben (O.21.4), tebufenpyrad (O.21.5), tolfenpyrad (O.21.6), rotenone (O.21.7);

O.22 Voltage-dependent sodium channel blockers: indoxacarb (O.22.1), metaflumizonev (O.22.2), 2-[2-(4-cyanophenyl)-1-[3-(trifluoromethyl)phenyl]ethylidene]-*N*-[4-(difluoromethoxy)phenyl]-hydrazinecarboxamide (O.22.3), *N*-(3-chloro-2-methylphenyl)-2-[(4-chlorophenyl)-[4-[methyl(methylsulfonyl)amino]phenyl]methylene]-hydrazinecarboxamide (O.22.4);

O.23 Inhibitors of the of acetyl CoA carboxylase: spirodiclofen (O.23.1), spiromesifen (O.23.2), spirotetramat (O.23.3), spiropidion (O.23.4);

O.24 Mitochondrial complex IV electron transport inhibitors: aluminium phosphide (O.24.1), calcium phosphide (O.24.2), phosphine (O.24.3), zinc phosphide (O.24.4), cyanide (O.24.5);

O.25 Mitochondrial complex II electron transport inhibitors: cyenopyrafen (O.25.1), cyflumetofen (O.25.2);

O.26 Ryanodine receptor-modulators: flubendiamide (O.26.1), chlorantraniliprole (O.26.2), cyantraniliprole (O.26.3), cyclaniliprole (O.26.4), tetraniliprole (O.26.5), (*R*)-3-chloro-N^1-{2-methyl-4-[1,2,2,2 –tetrafluoro-1-(trifluoromethyl)ethyl]phenyl}-N^2-(1-methyl-2-methylsulfonylethyl)phthalamide (O.26.6), (*S*)-3-chloro-N^1-{2-methyl-4-[1,2,2,2–tetrafluoro-1-(trifluoromethyl)ethyl]phenyl}-N^2-(1-methyl-2-methylsulfonylethyl)phthalamide (O.26.7), methyl-2-[3,5-dibromo-2-({[3-bromo-1-(3-chloropyridin-2-yl)-1*H*-pyrazol-5-yl]carbonyl}-amino)benzoyl]-1,2-dimethylhydrazinecarboxylate (O.26.8), *N*-[4,6-dichloro-2-[(diethyl-lambda-4-sulfanylidene)carbamoyl]-phenyl]-2-(3-chloro-2-pyridyl)-5-(trifluoromethyl)pyrazole-3-carboxamide (O.26.9), *N*-[4-chloro-2-[(diethyl-lambda-4-sulfanylidene)carbamoyl]-6-methyl-phenyl]-2-(3-chloro-2-pyridyl)-5-(trifluoromethyl)pyrazole-3-carboxamide (O.26.10), *N*-[4-chloro-2-[(di-2-propyl-lambda-4-sulfanylidene)carbamoyl]-6-methyl-phenyl]-2-(3-chloro-2-pyridyl)-5-(trifluoromethyl)pyrazole-3-carboxamide (O.26.11), *N*-[4,6-dichloro-2-[(di-2-propyl-lambda-4-sulfanylidene)carbamoyl]-phenyl]-2-(3-chloro-2-pyridyl)-5-(trifluoromethyl)pyrazole-3-carboxamide (O.26.12), *N*-[4,6-dibromo-2-[(diethyl-lambda-4-sulfanylidene)carbamoyl]-phenyl]-2-(3-chloro-2-pyridyl)-5-(trifluoromethyl)pyrazole-3-carboxamide (O.26.13), *N*-[2-(5-amino-1,3,4-thiadiazol-2-yl)-4-chloro-6-methylphenyl]-3-bromo-1-(3-chloro-2-pyridinyl)-1*H*-pyrazole-5-carboxamide (O.26.14), 3-chloro-1-(3-chloro-2-pyridinyl)-*N*-[2,4-dichloro-6-[[(1-cyano-1-methylethyl)amino]carbonyl]phenyl]-1*H*-pyrazole-5-carboxamide (O.26.15), tetrachlorantraniliprole (O.26.16), *N*-[4-chloro-2-[[(1,1-dimethylethyl)amino]carbonyl]-6-methylphenyl]-1-(3-chloro-2-pyridinyl)-3-(fluoromethoxy)-1*H*-pyrazole-5-carboxamide (O.26.17), cyhalodiamide (O.26.18);

O.27: Chordotonal organ Modulators – undefined target site: flonicamid (O.27.1);

O.28. insecticidal active compounds of unknown or uncertain mode of action: afidopyropen (O.28.1), afoxolaner (O.28.2), azadirachtin (O.28.3), amidoflumet (O.28.4), benzoximate (O.28.5), broflanilide (O.28.6), bromopropylate (O.28.7), chinomethionat (O.28.8), cryolite (O.28.9), dicloromezotiaz (O.28.10), dicofol (O.28.11), flufenerim (O.28.12), flometoquin (O.28.13), fluensulfone (O.28.14), fluhexafon (O.28.15), fluopyram (O.28.16), fluralaner (O.28.17), metoxadiazone (O.28.18), piperonyl butoxide (O.28.19), pyflubumide (O.28.20), pyridalyl (O.28.21), tioxazafen (O.28.22), 11-(4-chloro-2,6-dimethylphenyl)-12-hydroxy-1,4-

dioxa-9-azadispiro[4.2.4.2]-tetradec-11-en-10-one, 3-(4'-fluoro-2,4-dimethylbiphenyl-3-yl)-4-hydroxy-8-oxa-1-azaspiro[4.5]dec-3-en-2-one, 1-[2-fluoro-4-methyl-5-[(2,2,2-trifluoroethyl)sulfinyl]phenyl]-3-(trifluoromethyl)-1*H*-1,2,4-triazole-5-amine (O.28.23), *Bacillus firmus* I-1582 (O.28.24), flupyrimin (O.28.25), fluazaindolizine (O.28.26), 4-[5-(3,5-dichlorophenyl)-5-(trifluoromethyl)-4*H*-isoxazol-3-yl]-2-methyl-*N*-(1-oxothietan-3-yl)benzamide (O.28.27), fluxametamide (O.28.28), 5-[3-[2,6-dichloro-4-(3,3-dichloroallyloxy)phenoxy]propoxy]-1*H*-pyrazole (O.28.1), 4-cyano-*N*-[2-cyano-5-[[2,6-dibromo-4-[1,2,2,3,3,3-hexafluoro-1-(trifluoromethyl)propyl]phenyl]carbamoyl]phenyl]-2-methyl-benzamide (O.28.29), 4-cyano-3-[(4-cyano-2-methyl-benzoyl)amino]-*N*-[2,6-dichloro-4-[1,2,2,3,3,3-hexafluoro-1-(trifluoromethyl)propyl]phenyl]-2-fluoro-benzamide (O.28.30), *N*-[5-[[2-chloro-6-cyano-4-[1,2,2,3,3,3-hexafluoro-1-(trifluoromethyl)propyl]phenyl]carbamoyl]-2-cyano-phenyl]-4-cyano-2-methyl-benzamide (O.28.31), *N*-[5-[[2-bromo-6-chloro-4-[2,2,2-trifluoro-1-hydroxy-1-(trifluoromethyl)ethyl]phenyl]carbamoyl]-2-cyano-phenyl]-4-cyano-2-methyl-benzamide (O.28.32), *N*-[5-[[2-bromo-6-chloro-4-[1,2,2,3,3,3-hexafluoro-1-(trifluoromethyl)propyl]phenyl]carbamoyl]-2-cyano-phenyl]-4-cyano-2-methyl-benzamide (O.28.33), 4-cyano-*N*-[2-cyano-5-[[2,6-dichloro-4-[1,2,2,3,3,3-hexafluoro-1-(trifluoromethyl)-propyl]phenyl]carbamoyl]phenyl]-2-methyl-benzamide (O.28.34), 4-cyano-*N*-[2-cyano-5-[[2,6-dichloro-4-[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]phenyl]carbamoyl]phenyl]-2-methyl-benzamide (O.28.35), *N*-[5-[[2-bromo-6-chloro-4-[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]phenyl]carbamoyl]-2-cyano-phenyl]-4-cyano-2-methyl-benzamide (O.28.36); 2-(1,3-dioxan-2-yl)-6-[2-(3-pyridinyl)-5-thiazolyl]-pyridine (O.28.37), 2-[6-[2-(5-fluoro-3-pyridinyl)-5-thiazolyl]-2-pyridinyl]-pyrimidine (O.28.38), 2-[6-[2-(3-pyridinyl)-5-thiazolyl]-2-pyridinyl]-pyrimidine (O.28.39), *N*-methylsulfonyl-6-[2-(3-pyridyl)thiazol-5-yl]pyridine-2-carboxamide (O.28.40), *N*-methylsulfonyl-6-[2-(3-pyridyl)thiazol-5-yl]pyridine-2-carboxamide (O.28.41), 1-[(6-chloro-3-pyridinyl)methyl]-1,2,3,5,6,7-hexahydro-5-methoxy-7-methyl-8-nitro-imidazo[1,2-a]pyridine (O.28.42), 1-[(6-chloropyridin-3-yl)methyl]-7-methyl-8-nitro-1,2,3,5,6,7-hexahydroimidazo[1,2-a]pyridin-5-ol (O.28.43), 1-isopropyl-*N*,5-dimethyl-*N*-pyridazin-4-yl-pyrazole-4-carboxamide (O.28.44), 1-(1,2-dimethylpropyl)-*N*-ethyl-5-methyl-*N*-pyridazin-4-yl-pyrazole-4-carboxamide (O.28.45), *N*,5-dimethyl-*N*-pyridazin-4-yl-1-(2,2,2-trifluoro-1-methyl-ethyl)pyrazole-4-carboxamide (O.28.46), 1-[1-(1-cyanocyclopropyl)ethyl]-*N*-ethyl-5-methyl-*N*-pyridazin-4-yl-pyrazole-4-carboxamide (O.28.47), *N*-ethyl-1-(2-fluoro-1-methyl-propyl)-5-meth-yl-*N*-pyridazin-4-yl-pyrazole-4-carboxamide (O.28.48), 1-(1,2-dimethylpropyl)-*N*,5-dimethyl-*N*-pyridazin-4-yl-pyrazole-4-carboxamide (O.28.49), 1-[1-(1-cyanocyclopropyl)ethyl]-*N*,5-dimethyl-*N*-pyridazin-4-yl-pyrazole-4-carboxamide (O.28.50), *N*-methyl-1-(2-fluoro-1-methyl-propyl]-5-methyl-*N*-pyridazin-4-yl-pyrazole-4-carboxamide (O.28.51), 1-(4,4-difluorocyclohexyl)-*N*-ethyl-5-methyl-*N*-pyridazin-4-yl-pyrazole-4-carboxamide (O.28.52), 1-(4,4-difluorocyclohexyl)-*N*,5-dimethyl-*N*-pyridazin-4-yl-pyrazole-4-carboxamide (O.28.53), *N*-(1-methylethyl)-2-(3-pyridinyl)-2*H*-indazole-4-carboxamide (O.28.54), *N*-cyclopropyl-2-(3-pyridinyl)-2*H*-indazole-4-carboxamide (O.28.55), *N*-cyclohexyl-2-(3-pyridinyl)-2*H*-indazole-4-carboxamide (O.28.56), 2-(3-pyridinyl)-*N*-(2,2,2-trifluoroethyl)-2*H*-indazole-4-carboxamide (O.28.57), 2-(3-pyridinyl)-*N*-[(tetrahydro-2-furanyl)methyl]-2*H*-indazole-5-carboxamide (O.28.58), methyl 2-[[2-(3-pyridinyl)-2*H*-indazol-5-yl]carbonyl]hydrazinecarboxylate (O.28.59), *N*-[(2,2-difluorocyclopropyl)methyl]-2-(3-pyridinyl)-2*H*-indazole-5-carboxamide (O.28.60), *N*-(2,2-difluoropropyl)-2-(3-pyridinyl)-2*H*-indazole-5-carboxamide (O.28.61), 2-(3-pyridinyl)-*N*-(2-pyrimidinylmethyl)-2*H*-indazole-5-carboxamide (O.28.62), *N*-[(5-methyl-2-pyrazinyl)methyl]-2-(3-pyridinyl)-2*H*-indazole-5-carboxamide (O.28.63), tyclopyrazoflor (O.28.64), sarolaner (O.28.65), lotilaner (O.28.66), *N*-[4-chloro-3-[[(phenylmethyl)amino]carbonyl]phenyl]-1-methyl-3-(1,1,2,2,2-pentafluoroethyl)-4-(trifluoromethyl)-1*H*-pyrazole-5-carboxamide (O.28.67), M.UN.22a 2-(3-ethylsulfonyl-2-pyridyl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridine (O.28.68), 2-[3-ethylsulfonyl-5-(trifluoromethyl)-2-pyridyl]-3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridine (O.28.69), iscocycloseram(O.28.70), *N*-[4-chloro-3-(cyclopropylcarbamoyl)phenyl]-2-methyl-5-(1,1,2,2,2-pentafluoroethyl)-4-(trifluoromethyl)pyrazole-3-carboxamide (O.28.72), *N*-[4-chloro-3-[(1-cyanocyclopropyl)carbamoyl]phenyl]-2-methyl-5-(1,1,2,2,2-pentafluoroethyl)-4-(trifluoromethyl)pyrazole-3-carboxamide (O.28.73), acynonapyr (O.28.74), benzpyrimoxan (O.28.75), chloro-*N*-(1-cyanocyclopropyl)-5-[1-[2-methyl-5-(1,1,2,2,2-pentafluoroethyl)-4-(trifluoromethyl)pyrazol-3-yl]pyrazol-4-yl]benzamide (O.28.76), oxazosulfyl (O.28.77), [(2*S*,3*R*,4*R*,5*S*,6*S*)-3,5-dimethoxy-6-methyl-4-propoxy-tetrahydropyran-2-yl]-*N*-[4-[1-[4-(trifluoromethoxy)phenyl]-1,2,4-triazol-3-yl]phenyl]carbamate (O.28.78), [(2*S*,3*R*,4*R*,5*S*,6*S*)-3,4,5-trimethoxy-6-methyl-tetrahydropyran-2-yl] N-[4-[1-[4-(trifluoromethoxy)phenyl]-1,2,4-triazol-3-yl]phenyl]carbamate (O.28.79), [(2*S*,3*R*,4*R*,5*S*,6*S*)-3,5-dimethoxy-6-methyl-4-propoxy-tetrahydropyran-2-yl]-*N*-[4-[1-[4-(1,1,2,2,2-pentafluoroethoxy)phenyl]-1,2,4-triazol-3-yl]phenyl]carbamate (O.28.80), [(2*S*,3*R*,4*R*,5*S*,6*S*)-3,4,5-trimethoxy-6-methyl-tetrahydropyran-2-yl]-*N*-[4-[1-[4-(1,1,2,2,2-pentafluoroethoxy)phenyl]-1,2,4-triazol-3-yl]phenyl]carbamate (O.28.81), (2*Z*)-3-(2-isopropylphenyl)-2-[(*E*)-[4-[1-[4-(1,1,2,2,2-pentafluoroethoxy)phenyl]-1,2,4-triazol-3-yl]phenyl]methylenehydrazono]thiazolidin-4-one (O.28.82), 2-(6-chloro-3-ethylsulfonyl-imidazo[1,2-a]pyridin-2-yl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridine (O.28.83), 2-(6-bromo-3-ethylsulfonyl-imidazo[1,2-a]pyridin-2-yl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridine (O.28.84), 2-(3-ethylsulfonyl-6-iodo-imidazo[1,2-a]pyridin-2-yl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridine (O.28.85), 2-[3-ethylsulfonyl-6-(trifluoromethyl)imidazo[1,2-a]pyridin-2-yl]-3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridine (O.28.86), 2-(7-chloro-3-ethylsulfonyl-imidazo[1,2-a]pyridin-2-yl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridine (O.28.87), 2-(3-ethylsulfonyl-7-iodo-imidazo[1,2-a]pyridin-2-yl)-3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridine (O.28.88), 3-ethylsulfonyl-6-iodo-2-[3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridin-2-yl]imidazo[1,2-a]pyridine-8-carbonitrile (O.28.89), 2-[3-ethylsulfonyl-8-fluoro-6-(trifluoromethyl)imidazo[1,2-a]pyridin-2-yl]-3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridine (O.28.90), 2-[3-ethylsulfonyl-7-(trifluoromethyl)imidazo[1,2-a]pyridin-2-yl]-3-methyl-6-(trifluoromethylsulfinyl)imidazo-[4,5-b]pyridine (O.28.91), 2-[3-ethylsulfonyl-7-(trifluoromethyl)imidazo[1,2-a]pyridin-2-yl]-3-methyl-6-(trifluoromethyl)imidazo[4,5-c]pyridine (O.28.92), 2-(6-bromo-3-ethylsulfonyl-imidazo[1,2-a]pyridin-2-yl)-6-(trifluoromethyl)pyrazolo[4,3-c]pyridine (O.28.93).

The active substances referred to as component 2, their preparation and their activity e. g. against harmful fungi is known (cf.: http://www.alanwood.net/pesticides/); these substances are commercially available. The compounds described by IUPAC nomenclature, their preparation and their pesticidal activity are also known (cf. Can. J. Plant Sci. 48(6), 587-94, 1968; EP-A 141 317; EP-A 152 031; EP-A 226 917; EP-A 243 970; EP-A 256 503; EP-A 428 941; EP-A 532 022; EP-A 1 028 125; EP-A 1 035 122; EP-A 1 201 648; EP-A 1 122 244, JP 2002316902; DE 19650197; DE 10021412; DE 102005009458; US 3,296,272; US 3,325,503; WO 98/46608; WO 99/14187; WO 99/24413; WO 99/27783; WO 00/29404; WO 00/46148; WO 00/65913; WO 01/54501; WO 01/56358; WO 02/22583; WO 02/40431; WO 03/10149; WO 03/11853; WO 03/14103; WO 03/16286; WO 03/53145; WO 03/61388; WO 03/66609; WO 03/74491; WO 04/49804; WO 04/83193; WO 05/120234; WO 05/123689; WO 05/123690; WO 05/63721; WO 05/87772; WO 05/87773; WO 06/15866; WO 06/87325;

WO 06/87343; WO 07/82098; WO 07/90624, WO 10/139271, WO 11/028657, WO 12/168188, WO 07/006670, WO 11/77514; WO 13/047749, WO 10/069882, WO 13/047441, WO 03/16303, WO 09/90181, WO 13/007767, WO 13/010862, WO 13/127704, WO 13/024009, WO 13/24010, WO 13/047441, WO 13/162072, WO 13/092224, WO 11/135833, CN 1907024, CN 1456054, CN 103387541, CN 1309897, WO 12/84812, CN 1907024, WO 09094442, WO 14/60177, WO 13/116251, WO 08/013622, WO 15/65922, WO 94/01546, EP 2865265, WO 07/129454, WO 12/165511, WO 11/081174, WO 13/47441, JP2015089883, JP2015120675, WO2015119246, WO2011135827, WO2012084812).

The present invention furthermore relates to agrochemical compositions comprising a mixture of at least one compound I (component 1) and at least one further active substance useful for plant protection, e. g. selected from the groups A) to O) (component 2), in particular one further fungicide, e. g. one or more fungicide from the groups A) to K), as described above, and if desired one suitable solvent or solid carrier. Those mixtures are of particular interest, since many of them at the same application rate show higher efficiencies against harmful fungi. Furthermore, combating harmful fungi with a mixture of compounds I and at least one fungicide from groups A) to K), as described above, is more efficient than combating those fungi with individual compounds I or individual fungicides from groups A) to K).

By applying compounds I together with at least one active substance from groups A) to O) a synergistic effect can be obtained, i.e. more than simple addition of the individual effects is obtained (synergistic mixtures).

This can be obtained by applying the compounds I and at least one further active substance simultaneously, either jointly (e. g. as tank-mix) or seperately, or in succession, wherein the time interval between the individual applications is selected to ensure that the active substance applied first still occurs at the site of action in a sufficient amount at the time of application of the further active substance(s). The order of application is not essential for working of the present invention.

When applying compounds I and a pesticide II sequentially the time between both applications may vary e. g. between 2 hours to 7 days. Also, a broader range is possible ranging from 0.25 hour to 30 days, preferably from 0.5 hour to 14 days, particularly from 1 hour to 7 days or from 1.5 hours to 5 days, even more preferred from 2 hours to 1 day.

In the binary mixtures and compositions according to the invention the weight ratio of the component 1) and the component 2) generally depends from the properties of the active components used, usually it is in the range of from 1:10,000 to 10,000:1, often it is in the range of from 1:100 to 100:1, regularly in the range of from 1:50 to 50:1, preferably in the range of from 1:20 to 20:1, more preferably in the range of from 1:10 to 10:1, even more preferably in the range of from 1:4 to 4:1 and in particular in the range of from 1:2 to 2:1.

According to further embodiments of the binary mixtures and compositions, the weight ratio of the component 1) and the component 2) usually is in the range of from 1000:1 to 1:1, often in the range of from 100: 1 to 1:1, regularly in the range of from 50:1 to 1:1, preferably in the range of from 20:1 to 1:1, more preferably in the range of from 10:1 to 1:1, even more preferably in the range of from 4:1 to 1:1 and in particular in the range of from 2:1 to 1:1.

According to a further embodiments of the binary mixtures and compositions, the weight ratio of the component 1) and the component 2) usually is in the range of from 1:1 to 1:1000, often in the range of from 1:1 to 1:100, regularly in the range of from 1:1 to 1:50, preferably in the range of from 1:1 to 1:20, more preferably in the range of from 1:1 to 1:10, even more preferably in the range of from 1:1 to 1:4 and in particular in the range of from 1:1 to 1:2.

In the ternary mixtures, i.e. compositions according to the invention comprising the component 1) and component 2) and a compound III (component 3), the weight ratio of component 1) and component 2) depends from the properties of the active substances used, usually it is in the range of from 1:100 to 100:1, regularly in the range of from 1:50 to 50:1, preferably in the range of from 1:20 to 20:1, more preferably in the range of from 1:10 to 10:1 and in particular in the range of from 1:4 to 4:1, and the weight ratio of component 1) and component 3) usually it is in the range of from 1:100 to 100:1, regularly in the range of from 1:50 to 50:1, preferably in the range of from 1:20 to 20:1, more preferably in the range of from 1:10 to 10:1 and in particular in the range of from 1:4 to 4:1.

Any further active components are, if desired, added in a ratio of from 20:1 to 1:20 to the component 1).

These ratios are also suitable for inventive mixtures applied by seed treatment.

Accordingly, the present invention furthermore relates to mixtures comprising one compound of the formula I (component 1, a group represented by the expression "(I)") and one pesticide II (component 2), wherein pesticide II is an active ingredient selected from the groups A) to O) defined above.

The mixtures of active substances can be prepared as compositions comprising besides the active ingredients at least one inert ingredient (auxiliary) by usual means, e. g. by the means given for the compositions of compounds I.

Concerning usual ingredients of such compositions reference is made to the explanations given for the compositions containing compounds I.

The mixtures of active substances according to the present invention are suitable as fungicides, as are the compounds of formula I. They are distinguished by an outstanding effectiveness against a broad spectrum of phytopathogenic fungi, especially from the classes of the Ascomycetes, Basidiomycetes, Deuteromycetes and Peronosporomycetes (syn. Oomycetes). In addition, it is referred to the explanations regarding the fungicidal activity of the compounds and the compositions containing compounds I, respectively.

Example 1- Synthesis of 5-cyclopropyl-N-[6-(difluoromethyl)-5-methyl-3-pyridyl]-2-isobutyl-2-methyl-pent-4-ynamide

1.1. Ethyl 5-cyclopropyl-2-isobutyl-2-methyl-pent-4-ynoate

44 ml 2m LDA-solution in tetrahydrofuran/hexanes (88 mmol) was added to a solution of 11,5 g (72,6 mmol) ethyl 2,4-dimethylpentanoate in 150 ml tetrahydrofuran at -78°C. Afterwards 14 g (80 mmol) HMPA (hexamethylphosphoric triamide) was added and the reaction mixture was stirred for 30 min at -78°C. Subsequently 15 g (94 mmol) 3-bromoprop-1-ynylcyclopropane was added and the reaction mixture was stirred for 3 h at -78°C. The reaction mixture was quenched with 200 ml aq. NH_4Cl-solution and extracted with methyl-t-butylether, the organic layer was dried over sodium sulfate and concentrated. The residue was purified by column-chromatography using petrolether/methyl-t-butylether-mixtures to give 12.5 g (73% of theory) 5-cyclopropyl-2-isobutyl-2-methyl-pent-4-ynoate as yellow oil.

^{1}H-NMR ($CDCl_3$, δ in ppm): 0.48 - 0.54 (m, 2 H) 0.61 - 0.65 (m, 2 H) 0.78 (dd, *J*=6.42, 1.41 Hz, 6 H) 1.08 - 1.14 (m, 1 H) 1.15 (s, 3 H) 1.19 (t, *J*=7.15 Hz, 3 H) 1.36 - 1.42 (m, 1 H) 1.51 - 1.60 (m, 2 H) 2.20 - 2.27 (m, 1 H) 2.32 - 2.38 (m, 1 H) 4.05 (qd, *J*=7.11, 0.92 Hz, 2 H)

1.2. 5-Cyclopropyl-2-isobutyl-2-methyl-pent-4-ynoic acid

A solution of 18 g (0,32 mol) KOH-solution in 40 ml water was added to a solution of 7,9 g (33,5 mmol) ethyl 5-cyclopropyl-2-isobutyl-2-methyl-pent-4-ynoate in 80 ml methanol. The reaction mixture was stirred for 16 h at 80°C, concentrated i. vac. and the residue was diluted with 50 ml water. The aqueous layer was acidified to pH=2 with 2m HCl-solution and was extracted with ethyl acetate. The combined organic phases were dried over sodium sulfate and concentrated to give 6,2 g crude 5-cyclopropyl-2-isobutyl-2-methyl-pent-4-ynoic acid as yellow oil.

^{1}H-NMR ($CDCl_3$, δ in ppm): 0.50 - 0.55 (m, 2 H) 0.60 - 0.67 (m, 2 H) 0.82 (dd, *J*=6.36, 1.10 Hz, 6 H) 1.09 - 1.14 (m, 1 H) 1.19 (s, 3 H) 1.41 - 1.46 (m, 1 H) 1.55 - 1.66 (m, 2 H) 2.24 - 2.31 (m, 1 H) 2.34 - 2.40 (m,1 H)

1.3. 5-Cyclopropyl-N-[6-(difluoromethyl)-5-methyl-3-pyridyl]-2-isobutyl-2-methyl-pent-4-ynamide

A mixture of 0,385 g (1,85 mmol) 5-cyclopropyl-2-isobutyl-2-methyl-pent-4-ynoic acid and 0,309 g (2,31 mmol) 1-chloro-*N*,*N*,2-trimethyl-1-propenylamine in 20 ml tetrahydrofuran was stirred for 2 h at 20°C. Subsequently 0,300 g (1,54 mmol) 6-(difluoromethyl)-5-methyl-pyridin-3-amine in 10 ml tetrahydrofuran and 0,622 g (6,16 mmol) triethylamine were added and the reaction mixture was stirred for 16 h at 20°C. Afterwards the reaction mixture was diluted with 50 ml water and extracted with 50 ml ethyl acetate, the organic layer was dried over sodium sulfate and concentrated. The residue was purified by column chromatography with petrolether/ethyl acetate mixtures to give 123 mg (23% of theory) 5-cyclopropyl-N-[6-(difluoromethyl)-5-methyl-3-pyridyl]-2-isobutyl-2-methyl-pent-4-ynamide as white solid.

^{1}H-NMR ($CDCl_3$, δ in ppm): 0.47 - 0.52 (m, 2 H) 0.68 - 0.74 (m, 2 H) 0.91 (t, *J*=6.48 Hz, 6 H) 1.16 - 1.24 (m, 1 H) 1.37 (s, 3 H) 1.53 - 1.61 (m, 1 H) 1.70 - 1.84 (m, 2 H) 2.35 - 2.42 (m, 1 H) 2.49 - 2.60 (m, 4 H), 6.63 - 6.93 (m, 1 H) 8.04 (s, 1 H) 8.64 (d, *J*=2.08 Hz, 1 H)

Example 2 - Synthesis of 2-tert-butyl-N-(5,6-dimethyl-3-pyridyl)-4-phenyl-but-3-ynamide

2.1. tert-Butyl 2-iodo-3,3-dimethyl-butanoate

76 ml 2m LDA-solution in tetrahydrofuran/hexanes (151 mmol) was added to a solution of 20 g (116 mmol) tert-butyl 3,3-dimethylbutanoate in 200 ml tetrahydrofuran at -78°C. After 0,5 h 44 g (174 mmol) Iodine dissolved in tetrahydrofuran was added and the reaction mixture was stirre for 2 h at -78°C. The reaction mixture was quenched with aqueous ammonium chloride solution and the aqueous phase was extracted with methyl-t-butyl ether. The organic phase was dried over sodium sulfate and concentrated and the residue was purified by colomn chromatography with petrol ether/methyl-t-butyl ether-mixtures to 17,8 g (51 % of theory) tert-Butyl 2-iodo-3,3-dimethyl-butanoate as yellow solid.

^{1}H-NMR ($CDCl_3$, δ in ppm): 1.09 (s, 9 H) 1.37 - 1.40 (m, 1 H) 1.39 (s, 8 H) 4.08 (s, 1 H)

2.2. tert-butyl 2-tert-butyl-4-phenyl-but-3-ynoate

2,7 ml 2,5 m (6,71 mmol) n-butyl-lithium solution in hexanes was added to a solution of 0,685 g (6,71 mmol) ethynylbenzene in 20 ml diethylether at 0°C upon stirring. 1,2 g (6,71 mmol) gallium trichloride was added and the reaction mixture was stirred 30 min at 0°C. Subsequently 1 g (3,36 mmol) tert-butyl 2-iodo-3,3-dimethyl-butanoate dissolved in diethylether and 1,3 ml (1,3 mmol) triethyl borane were added dropwise upon stirring at 20 °C. Then the reaction mixture was exposed to air and stirring was continued for further 2 h at 20°C. Afterwards the reaction mixture was quenched with 1 m HCl-solution and the aqueous layer was extracted with methyl-t-butyl ether. The combined organic layers were extracted with brine, dried over sodium sulfate and concentrated. The residue was purified by column chromatography with petrol ether/methyl-t-butyl ether mixtures. The reaction was performed in 6 batches to give 0,85 g (15 % of theory) tert-butyl 2-tert-butyl-4-phenyl-but-3-ynoate as colourless oil.

^{1}H-NMR ($CDCl_3$, δ in ppm): 1.17 (s, 9 H) 1.53 (s, 9 H) 3.24 - 3.26 (m, 1 H) 7.30 - 7.34 (m, 3 H) 7.46 (dd, *J*=6.65, 3.01 Hz, 2 H)

2.3. 2-tert-butyl-4-phenyl-but-3-ynoic acid

A solution of (850 mg, 3.1 mmol) tert-butyl 2-tert-butyl-4-phenyl-but-3-ynoate in 30 ml HCl\methyl-t-butyl ether was stirred for 16 h at 20° C. The reaction mixture was concentrated to give 2-tert-butyl-4-phenyl-but-3-ynoic acid (630 mg, crude) as yellow solid.

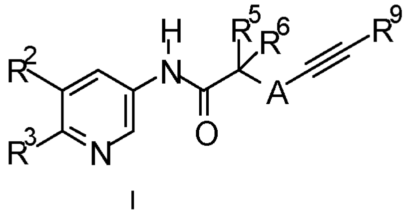
^{1}H-NMR ($CDCl_3$, δ in ppm): 1.12 (s, 9 H) 7.21 - 7.25 (m, 3 H) 7.36 - 7.41 (m, 2 H)

2.4 2-tert-butyl-N-(5,6-dimethyl-3-pyridyl)-4-phenyl-but-3-ynamide

A mixture of 0,430 g (2 mmol) 2-tert-butyl-4-phenyl-but-3-ynoic acid and 0,401 g (3 mmol) 1-chloro-*N*,*N*,2-trimethyl-1-propenylamine in 20 ml tetrahydrofuran was stirred for 2 h at 20°C. At 0°C this solution was added upon stirring to a mixture of 0,293 g (2,4 mmol) 5,6-dimethylpyridin-3-amine and 0,202 g (2 mmol) triethylamine in 10 ml tetrahydrofuran. After 3 h at 20 °C the reaction mixture was diluted with 50 ml water and the aqueous phase was extracted with ethyl acetate.. The combined organic layers were dried over sodium sulfate and concentrated. The residue was purified by column chromatography to give 0,34 g (53 % of theory) 2-tert-butyl-N-(5,6-dimethyl-3-pyridyl)-4-phenyl-but-3-ynamide as white solid.

^{1}H-NMR ($CDCl_3$, δ in ppm): 1.23 (s, 9 H) 2.51 (s, 3 H) 2.69 (s, 3 H) 3.52 (s, 1 H) 7.29 - 7.39 (m, 3 H) 7.45 (dd, *J*=6.69, 2.94 Hz, 2 H) 8.23 (s, 1 H) 9.13 (d, *J*=2.00 Hz, 1 H).

The compounds listed in Table I were prepared in an analogous manner.



I

Ex-Nr	RT	A	R^2	R^3	R^5	R^6	R^9
B-1	1,317	direct bond	CH_3	CHF_2	$C(CH_3)_3$	H	C_6H_5
B-2	1,079	direct bond	CH_3	CH_3	$CH_2CH(CH_3)_2$	CH_3	C_6H_5
B-3	1,431	direct bond	CH_3	CHF_2	$CH_2CH(CH_3)_2$	CH_3	C_6H_5
B-4	0,995	CH_2	CH_3	CH_3	$CH_2CH(CH_3)_2$	CH_3	C_3H_7
B-5	1,310	CH_2	CH_3	CHF_2	$CH_2CH(CH_3)_2$	CH_3	C_3H_7
B-6	1,003	direct bond	CH_3	CH_3	$C(CH_3)_3$	H	C_6H_5

Biological examples

Green House

The compound was dissolved in a mixture of acetone and/or dimethylsulfoxide and the wetting agent/emulsifier Wettol, which is based on ethoxylated alkylphenoles, in a ratio (volume) solvent-emulsifier of 99 to 1 to give a total volume of 5 ml. Subsequently, water was added to total volume of 100 ml.

This stock solution was then diluted with the described solvent-emulsifier-water mixture to the final concentration given in the table below.

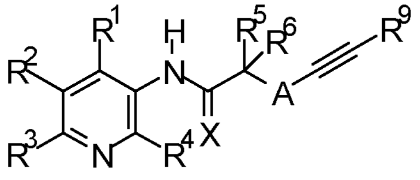
Example 1- Preventative fungicidal control of *Botrytis cinerea* on leaves of green pepper

Young seedlings of green pepper were grown in pots to the 4 to 5 leaf stage. These plants were sprayed to run-off with previously described spray solution, containing the concentration of active ingredient or mixture mentioned in the table below. Seven days later the plants were inoculated with an aqueous DOB solution (or a DOB solution containing 10 percent glycerine), containing the spore suspension of *Botrytis cinerea.* Then the plants were immediately transferred to a humid chamber. After 5 days at 22 to 24˚C and a saturated relative humidity, the extent of fungal attack on the leaves was visually assessed as % diseased leaf area.

In this test, the samples which had been treated with 250 ppm of the active substance from examples B-4 respectively, showed 18 % growth of the pathogen whereas the untreated plants were 90 % infected.

Claims

1. Use of the compounds of formula I



I

wherein

X is O or S;

R^1 is in each case independently selected from hydrogen, halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl, C_3-C_6-cycloalkyl, wherein the acyclic and cyclic moieties of R^1 are unsubstituted or substituted by one to six groups R^{1a} which independently of one another are selected from:
halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl;
and wherein the groups R^{1a} are unsubstituted or substituted by one to six halogen or CN;

R^2 is in each case independently selected from halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl, C_3-C_6-cycloalkyl, wherein the acyclic and cyclic moieties of R^2 are unsubstituted or substituted by one to six groups R^{2a} which independently of one another are selected from:
halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl;
and wherein the groups R^{2a} are unsubstituted or substituted by one to six halogen or CN;

R^3 is in each case independently selected from halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl, C_3-C_6-cycloalkyl, wherein the acyclic and cyclic moieties of R^3 are unsubstituted or substituted by one to six groups R^{3a} which independently of one another are selected from:
halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl;
and wherein the groups R^{3a} are unsubstituted or substituted by one to six halogen or CN;

R^4 is in each case independently selected from hydrogen, halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl, C_3-C_6-cycloalkyl, wherein the acyclic and cyclic moieties of R^4 are unsubstituted or substituted by one to six groups R^{4a} which independently of one another are selected from:

halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl;
and wherein the groups R^{4a} are unsubstituted or substituted by one to six halogen or CN;

A is direct bond or $C(R^7R^8)$;

R^5, R^6, R^7, R^8
are in each case independently selected from hydrogen, halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl, C_3-C_6-cycloalkyl, O-C_3-C_6-cycloalkyl, CH_2-C_3-C_6-cycloalkyl, C_3-C_6-cycloalkenyl, O-C_3-C_6-cycloalkenyl, CH_2-C_3-C_6-cycloalkenyl, wherein the acyclic moieties of R^5, R^6, R^7, R^8 are unsubstituted or substituted by one to six groups R^{5a}, R^{6a}, R^{7a}, R^{8a} which independently of one another are selected from:
halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl, C_3-C_6-cycloalkyl, O-C_3-C_6-cycloalkyl, CH_2-C_3-C_6-cycloalkyl, C_3-C_6-cycloalkenyl, O-C_3-C_6-cycloalkenyl, CH_2-C_3-C_6-cycloalkenyl, =N-OR`;
and wherein the groups R^{5a}, R^{6a}, R^{7a}, R^{8a} are unsubstituted or substituted by one to six halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, O-C_1-C_6-alkyl,=N-OR`;
or two moieties: R^5 and R^6 or R^7 and R^8 form together with the C atoms to which they are bound a group C=N-OR´; wherein

R´ is in each case independently selected from H, C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkynyl, C_3-C_6-cycloalkyl, phenyl, -CH_2-phenyl, a five- or six-membered heteroaryl, or -CH_2-heteroaryl; wherein the heteroaryl contains 1, 2 or 3 heteroatoms selected from N, O and S; and wherein in each case one or two CH_2 groups of the carbo- or heterocycle may be replaced by a group independently selected from C(=O) and C(=S);

wherein the cyclic and acyclic moieties of R´ are unsubstituted or substituted by one to six groups $R^{R´}$ independently of one another are selected from:

halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, O-C_1-C_6-alkyl, =N-OR`;

R^9 is in each case independently selected from C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, C_3-C_6-cycloalkyl, C_3-C_6-cycloalkenyl, saturated or partially unsaturated bicyclic carbocycle, a five- or six-membered heterocycle, aryl, heteroaryl; wherein the heterocycle and heteroaryl contain 1, 2 or 3 heteroatoms selected from N, O and S; and wherein in each case one or two CH_2 groups of the carbo- or heterocycle may be replaced by a group independently selected from C(=O) and C(=S);

wherein R´ is as defined above;

wherein the cyclic and acyclic moieties of R^9 are unsubstituted or substituted by one to six groups R^{9a} independently of one another are selected from:

halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, C_2-C_6-alkynyl, C_2-C_6-halogenalkynyl, O-C_1-C_6-alkyl, O-C_2-C_6-alkenyl, O-C_2-C_6-alkynyl, =N-OR`;

and wherein the groups R^{9a} are unsubstituted or substituted by one to six halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, O-C_1-C_6-alkyl,~~;~~

wherein

when A is $C(R^7R^8)$ R^9 can be also H;

wherein R^5, R^6, R^7 or R^8 can not all be H;

and the N-oxides and the agriculturally acceptable salts thereof as fungicides.

2. The use of claim 1, wherein R^1 is H.

3. The use of claims 1 or 2, wherein R^2 is selected from C_1-C_6-alkyl, C_1-C_6-halogenalkyl, O-C_1-C_6-alkyl, C_3-C_4-cycloalkyl.

4. The use of any one of claims 1 to 3, wherein R^3 is selected from C_1-C_6-alkyl, C_1-C_6-halogenalkyl, O-C_1-C_6-alkyl, C_3-C_4-cycloalkyl.

5. The use of any one of claims 1 to 4, wherein R^4 is H.

6. The use of any one of claims 1 to 5, wherein R^5, R^6, R^7, R^8 are independently selected from H, halogen, CN, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_2-C_6-alkenyl, C_2-C_6-halogenalkenyl, O-C_1-C_6-alkyl, C_3-C_6-cycloalkyl, O-C_3-C_6-cycloalkyl, CH_2-C_3-C_6-cycloalkyl, C_3-C_6-cycloalkenyl, O-C_3-C_6-cycloalkenyl, CH_2-C_3-C_6-cycloalkenyl.

7. The use of any one of claims 1 to 6, wherein R^9 is selected from C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_3-C_6-cycloalkyl, a five- or six-membered aryl, heteroaryl; wherein the heteroaryl contain 1, 2 or 3 heteroatoms selected from N, O and S; and wherein in each case one or two CH_2 groups of the carbo- or heterocycle may be replaced by a group independently selected from C(=O) and C(=S).

8. The use of any one of claims 1 to 7, wherein A is $C(R^7R^8)$. R^9 is selected from H, C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_3-C_6-cycloalkyl, a five- or six-membered aryl, heteroaryl; wherein the heteroaryl contain 1, 2 or 3 heteroatoms selected from N, O and S; and wherein in each case one or two CH_2 groups of the carbo- or heterocycle may be replaced by a group independently selected from C(=O) and C(=S).

9. The use of any one of claims 1 to 7, wherein when A is a single bond, R^9 is selected from C_1-C_6-alkyl, C_1-C_6-halogenalkyl, C_3-C_6-cycloalkyl, a five- or six-membered aryl, heteroaryl; wherein the heteroaryl contain 1, 2 or 3 heteroatoms selected from N, O and S; and wherein in each case one or two CH_2 groups of the carbo- or heterocycle may be replaced by a group independently selected from C(=O) and C(=S).

10. Compounds of the formula I as defined in claims 1 to 8, wherein R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8 and R^9 are as defined above.

11. A composition, comprising one compound of formula I, as defined in any of the claims 1 to 9, an N-oxide or an agriculturally acceptable salt thereof.

12. A method for combating phytopathogenic fungi, comprising treating the fungi or the materials, plants, the soil or seeds to be protected against fungal attack with an effective amount of at least one compound of formula I, as defined in any of the claims 1 to 9 or with a composition, as defined in any of the claim 10.

13. Seed, coated with at least one compound of the formula I, as defined in any of the claims 1 to 9 or an agriculturally acceptable salt thereof or with a composition, as defined in any of the claim 10, in an amount of from 0.1 to 10 kg per 100 kg of seed.

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2020/064576

A. CLASSIFICATION OF SUBJECT MATTER

INV. C07D213/75 A01N43/40

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, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2019/053010 A1 (SYNGENTA PARTICIPATIONS AG) 21 March 2019 (2019-03-21) abstract; claims; examples -----	1-13
Y	WO 2019/053027 A1 (SYNGENTA PARTICIPATIONS AG) 21 March 2019 (2019-03-21) abstract; claims; examples -----	1-13
Y	WO 2018/055135 A1 (SYNGENTA PARTICIPATIONS AG) 29 March 2018 (2018-03-29) abstract; claims Entry 1.47; page 77 -----	1-13

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

☒ See patent family annex.

* Special categories of cited documents :

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

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"&" document member of the same patent family

Date of the actual completion of the international search

29 May 2020

Date of mailing of the international search report

12/06/2020

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2020/064576

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