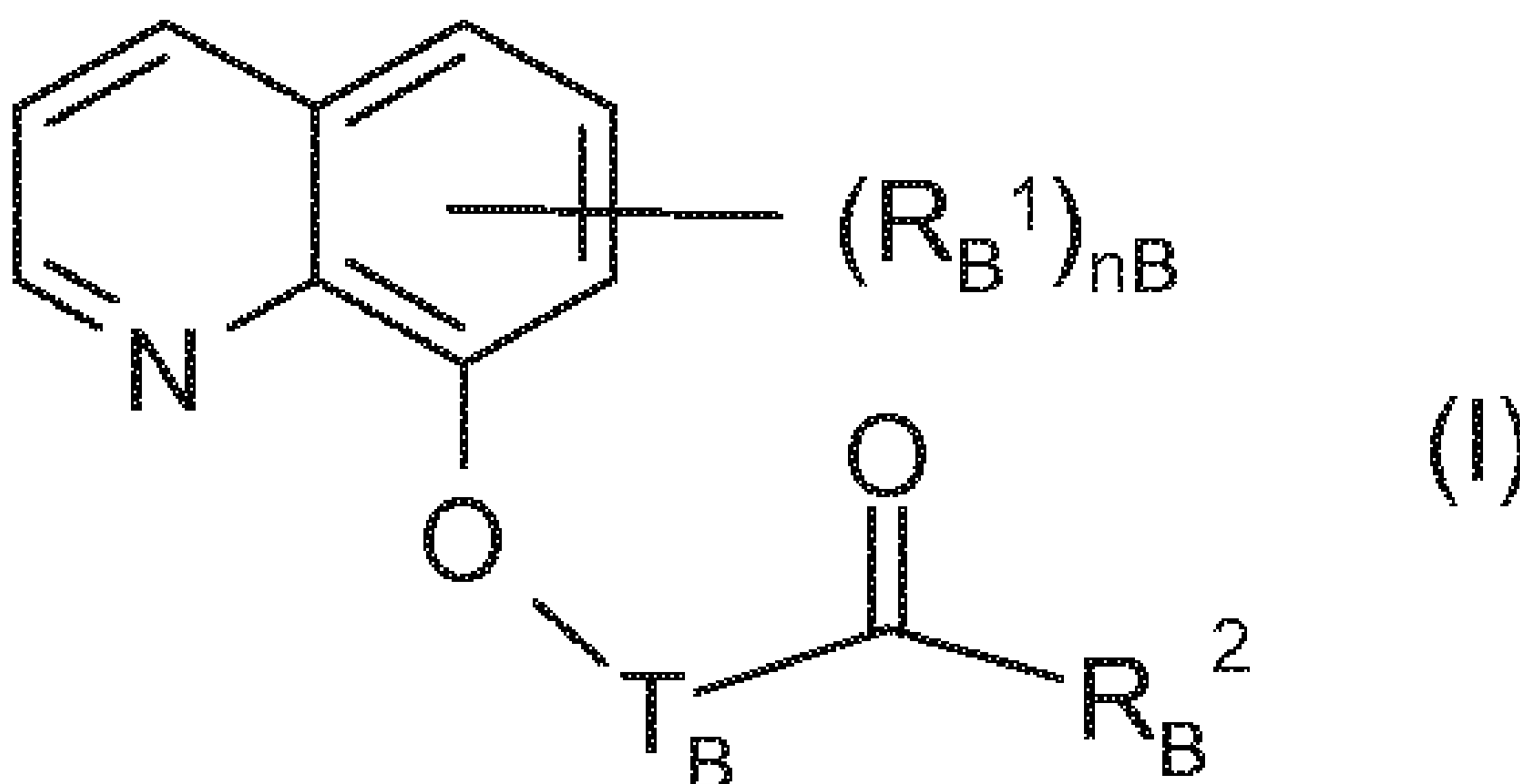




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(54) Titre : UTILISATION DE DERIVES DE QUINOLEINE POUR AMELIORER LE RENDEMENT AGRICOLE
(54) Title: USE OF QUINOLINE DERIVATIVES FOR IMPROVING PLANT YIELD



(57) **Abrégé/Abstract:**

Compounds (A) can be used for increasing the yield of useful plants or crop plants with respect to their harvested plant organs, wherein the Compound (A) is selected from compounds of the formula (I) and hydrates or salts thereof, in which R_B^1 is halogen, (C_1-C_4) -alkyl, (C_1-C_4) -alkoxy, nitro or (C_1-C_4) -haloalkyl; n_B is a natural number from 0 to 5, preferably 0 to 3; R_B^2 is OR_B^3 , SR_B^3 or $NR_B^3R_B^4$ or a saturated or unsaturated 3- to 7-membered heterocycle having at least one nitrogen atom and up to 3 heteroatoms, preferably from the group consisting of O and S, which 1 is attached via the nitrogen atom to the carbonyl group in (S2) and which is unsubstituted or substituted by radicals from the group consisting of (C_1-C_4) -alkyl, (C_1-C_4) -alkoxy and optionally substituted phenyl, preferably a radical of the formula OR_B^3 , NHR_B^4 or $N(CH_3)_2$, in particular of the formula OR_B^3 ; RB_3 is hydrogen or an unsubstituted or substituted aliphatic hydrocarbyl radical, preferably having a total of 1 to 18 carbon atoms; R_B^4 is hydrogen, (C_1-C_6) -alkyl, (C_1-C_6) -alkoxy or substituted or unsubstituted phenyl; T_B is a $(C_1-$ or $C_2)$ -alkanediyl chain which is unsubstituted or substituted by one or two (C_1-C_4) -alkyl radicals or by $[(C_1-C_3)$ -alkoxy]carbonyl; preferably 1-methylhexyl (5-chloro-8-



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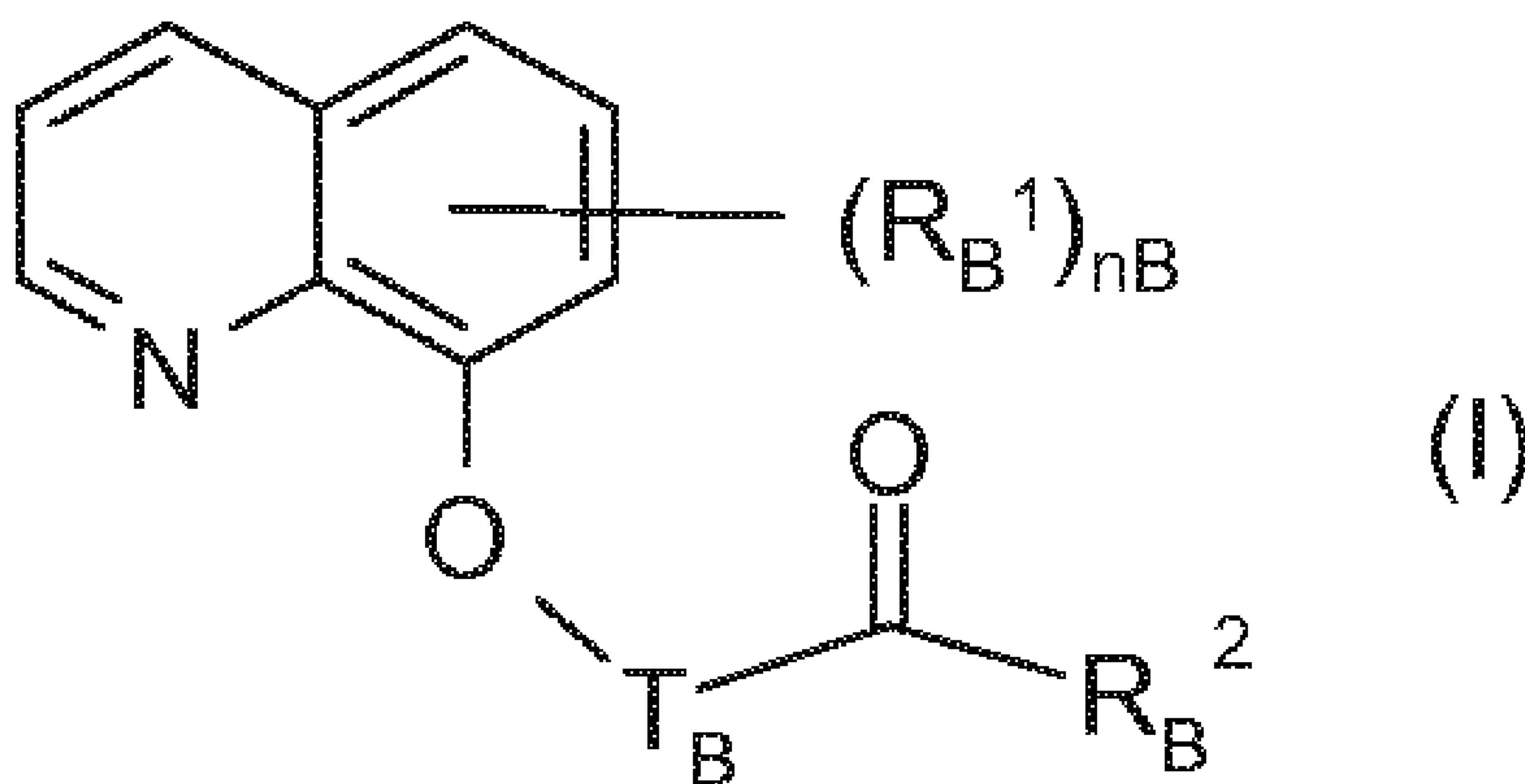
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(54) Title: USE OF QUINOLINE DERIVATIVES FOR IMPROVING PLANT YIELD



(57) Abstract: Compounds (A) can be used for increasing the yield of useful plants or crop plants with respect to their harvested plant organs, wherein the Compound (A) is selected from compounds of the formula (I) and hydrates or salts thereof, in which R_B^1 is halogen, (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy, nitro or (C₁-C₄)-haloalkyl; n_B is a natural number from 0 to 5, preferably 0 to 3; R_B^2 is OR_B^3 , SR_B^3 or $NR_B^3R_B^4$ or a saturated or unsaturated 3- to 7-membered heterocycle having at least one nitrogen atom and up to 3 heteroatoms, preferably from the group consisting of O and S, which 1 is attached via the nitrogen atom to the carbonyl group in (S2) and which is unsubstituted or substituted by radicals from the group consisting of (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy and optionally substituted phenyl, preferably a radical of the formula OR_B^3 , NHR_B^4 or $N(CH_3)_2$, in particular of the formula OR_B^3 ; R_B^3 is hydrogen or an unsubstituted or substituted aliphatic hydrocarbyl radical, preferably having a total of 1 to 18 carbon atoms; R_B^4 is hydrogen, (C₁-C₆)-alkyl, (C₁-C₆)-alkoxy or substituted or unsubstituted phenyl; T_B is a (C₁- or C₂)-alkanediyl chain which is unsubstituted or substituted by one or two (C₁-C₄)-alkyl radicals or by [(C₁-C₃)-alkoxy]carbonyl; preferably 1-methylhexyl (5-chloro-8-quinolinoxy)acetate ("cloquintocet-mexyl").



WO 2014/135481 A1

Use of quinoline derivatives for improving plant yield

5 Description

The present invention relates to the use of certain compounds [Compounds (A)] for the treatment of crop plants for inducing specific growth regulating responses on the plants, on seeds from which they grow or on the locus in which they grow in their
10 normal habitat, preferably in the absence of extraordinary environmental conditions.

The term “method for plant growth regulation” or the term “growth regulation process” or the use of the words “plant growth regulation” or other terms using the word “regulate” as used in instant specification relate to a variety of plant responses that
15 improve some characteristic of the plant. “Plant growth regulators” are compounds which possess activity in one or more growth regulation process(es) of a plant. Plant growth regulation is distinguished here from pesticidal action or growth reduction, sometimes also defined as a plant growth regulation, the intention of which, however, is to destroy or stunt the growth of a plant. For this reason, the compounds used in the
20 practice of this invention are used in amounts which are non-phytotoxic with respect to the plant being treated but which stimulate the growth of the plant or certain parts thereof. Therefore, such compounds may also be called “plant stimulants”, their action may be named “plant growth stimulation”.

25 Plant growth regulation is a desirable way to improve plants and their cropping so as to obtain improved plant growth and better conditions in agriculture practice compared to non-treated plants. These kinds of molecules can either inhibit or promote cellular activities. This means that plant growth regulators identified in plants most often regulate division, elongation and differentiation of plant cells in a way that, most often,
30 they have multiple effects in plants. The trigger event can be seen to be different in plants in comparison to the one known from animals.

On the molecular level, plant growth regulators may work by affecting membrane properties, controlling gene expression or affecting enzyme activity or being active in a
35 combination of at least two of the before mentioned types of interaction.

2

Plant growth regulators are chemicals either of natural origin, also called plant hormones (like non-peptide hormones e.g. auxins, gibberellins, cytokinins, ethylene, brassinosteroids or abscisic acid, and salicylic acid), lipooligosaccharides (e.g. Nod factors), peptides (e.g. systemin), fatty acid derivatives (e.g. jasmonates), and oligosaccharins (for review see: Biochemistry & Molecular Biology of the Plant (2000); eds. Buchanan, Gruissem, Jones, pp. 558-562; and 850-929) , or they can be synthetically produced compounds (like derivatives of naturally occurring plant growth hormones, ethephon). Plant growth regulators which work at very small concentrations can be found in many cells and tissues, but they seem to be concentrated in meristems and buds.

The mode of action of existing plant growth regulators is often not known. Various targets are discussed and among those, most of the affected molecules are involved in cell division regulation, like arresting the cell cycle in stage G1 or G2, respectively, others for signaling drought stress responses (Biochemistry & Molecular Biology of the Plant (2000); eds. Buchanan, Gruissem, Jones, pp. 558-560). In any case, the hormone control can be identified as an extremely complex cascade of up and down regulations which, for example, can lead to a growth stimulation of one organ or cell typus of a plant but also can lead to a repression in other organs or cell types of the same plant.

In many cases, kinases are involved either directly or indirectly in plant hormone control and among the kinases, protein kinases are central and highly specific control molecules in respect to cell cycle control. Such kinases are discussed as targets for several plant hormones, as it is the case for auxin and abscisic acid (Biochemistry & Molecular Biology of the Plant (2000); eds. Buchanan, Gruissem, Jones, pp. 542-565 and pp. 980-985; Morgan (1997), Annu. Rev. Cell. Dev. Biol., 13, 261-291; Amon et al. (1993), Cell, 74, pp. 993-1007; Dynlacht et al. (1997), Nature, 389, pp. 149-152; Hunt and Nasmyth (1997), Curr. Opin. Cell. Biol., 9, pp. 765-767; Thomas and Hall (1997), Curr. Opin. Cell Biol., 9, pp. 782-787). The preparation and use of 2-amino-6-oxypurine derivatives as plant growth regulators is described in WO20051117.

Since, however, the ecologic and economic demands on modern crop treatment compositions are increasing constantly, for example with respect to toxicity, selectivity,

application rate, formation of residues and favourable manufacture, there is a constant need to develop novel crop treatment compositions which have advantages over those known, at least in some areas. It was therefore an object of the present invention to provide further compounds to be applied on plants, on seeds from which they grow or
 5 on the locus in which they grow in their normal habitat, for growth regulating responses, preferably in the absence of abiotic stress conditions. In this regard it should be mentioned that the term "absence of abiotic stress conditions" is to be understood in the context of the present invention to mean that plants or seeds are not exposed to extraordinary environmental conditions such as extreme drought, cold and
 10 hot conditions, osmotic stress, waterlogging, elevated soil salinity, elevated exposure to minerals, ozone conditions, strong light conditions, limited availability of nitrogen nutrients or limited availability of phosphorus nutrients, particularly extraordinary environmental conditions beyond normal environmental fluctuations that may occur under normal plant growing conditions. Growing in the absence of abiotic stress
 15 conditions thus encompasses growing plants in field conditions whereby the growing conditions, including nutrient supply, temperature, water supply, and other conditions are considered average to optimal for the particular crop species. Growing in the absence of abiotic stress conditions also encompasses growing plants under greenhouse conditions which are considered average to optimal for the crop species.

20

Generally, a superior growth may result in an improvement of growth, for example, with respect to:

- germination,
- root growth
- 25 - shoot development,
- sprouting,
- flower development,
- photosynthesis performance of the plants,
- leaves growth, preferably growth of the area of leaves,
- 30 - plants per area (improved plant density).

Alternatively, the superior growth may result in an improvement of crop yield with respect to various parameters such as:

- bio mass,

- quantitative fruit yield,
 - size of fruits,
 - quantitative grain yield,
 - qualitative yield such as increase in content of desired components, e.g. sugar
- 5 content of sugar beet or protein content in cereal grains, gluten content of grains
for the production of glues).

While the improvement in some of the above growth characteristics may be effected together, some may be achieved very specifically with no or even adverse effects on

10 the other parameters.

It is thus desired to provide specific useful plant growth regulation effects on crop plants that result in superior growth of these treated plants, certain parts of these plants or specific crop yield.

15

Broader groups of quinoline derivatives as well as processes to produce such compounds are described in EP-A-86 750, EP-A-94 349 and EP-A-191 736 or EP-A-0 492 366, and EP-A-0 582 198, US 4902340, US 5102445 and references cited therein; the compounds hereinafter called "Compounds (A)". From said publications it

20 is known that the "Compounds (A)" have safener properties. Safeners are used in crops of useful plants together with pesticides, such as herbicides, insecticides or fungicides, preferably herbicides, to reduce phytotoxic effects of the pesticides on the crop plants. A good safener shall not reduce the desired effect of a pesticide on target organisms, for example the effect against weed plants in case of a herbicide as the

25 pesticide.

A commercial safener from Compounds (A) is cloquintocet-mexyl (common name) [CAS RN 99607-70-2], hereafter also called "Compound (A1)", for which it has been for example shown that it detoxifies clodinafop-propargyl and pinoxaden in cereals (Z. Naturforschung, 1991, 901-905).

30

It is further known from WO 2006/007981 that such quinoline safeners may be used to induce or enhance the defence of plants against damage of phytopathogenic organism.

It is further known from WO 2007/062737 that such quinolinesafeners may be used to reduce plant damage of crop plants against certain abiotic stress such as extraordinary drought, heat or chillness.

- 5 Additionally, effects were described for enhancing the action of some pesticides by the addition of such quinolinesafeners. WO 2006/040016 describes the enhancement of the microbiocidic action of certain fungicides by the addition of cloquintocet-mexyl.

10 It has now been found that, surprisingly, a Compound (A), preferably Compound (A1), can be used either solely or in combination with one or more other selected agrochemical compounds for increasing the yield of useful plants or crop plants with respect to their harvested plant organs.

15 Another object of the invention is a method for increasing the yield of useful plants or crop plants with respect to their harvested plant organs wherein a Compound (A), preferably Compound (A1), is applied in an effective, preferably non-phytotoxic amount either solely or in combination with one or more other selected agrochemical compound(s) to the crop plants, the seeds from which they grow, or to the locus in which they grow in their normal habitat, preferably in the absence of extraordinary
20 environmental conditions.

25 The term "useful plants" as used here refers to crop plants which are employed as plants for obtaining foods, animal feeds or for industrial purposes as well as horticultural plants.

30 In the context of the present invention, the term "increasing the yield" preferably means a specific yield enhanced by or more than 2%, more preferably by or more than 5%, more preferably by or more than 8%, more preferably by or more than 10%, of the harvested plant organs compared to the untreated control plants, it being possible for the effects to manifest themselves individually or else in any combination of effects.

In the context of the present invention, the term "with respect to their harvested plant organs" define the plant organs usually harvested depending on the specific plant to be

considered and products derived therefrom under harvesting. This includes the whole biomass of several plant organs if these are harvested together and then may indicate a rather unspecific general effect on plant growth. However, preferably it defines the harvested seed in case of seed producing plants, for example the seed of cereal plants including maize plants, the seed of oil plants such as oilseed rape or canola, the seed organs of legumes, for example beans, lentils, peas and soybeans.

Preferably the harvested plant organs encompass also the harvested seed organs of fiber plants such as cotton plants, preferably the lints of cotton plants taken from the seed capsules for fiber production.

10 Preferably the harvested plant organs encompass also the harvested organs of beet plants, such as for example sugar beet and fodder beet.

The term "with respect to their harvested plant organs" also encompasses the improvement as to specific parameters of the harvested plant organs, such as the starch content of seed kernels, the gluten content of seed kernels, the sugar content of sugar beets, the protein content of seed kernels.

Preferably, the plant organs are harvested at a mature stage of their growth or near their stage of maturity, as this is usual for harvesting.

20

A more preferred object of the invention is the use of or method of using Compound (A), specifically Compound (A1), either solely (i.e. as the only agrochemical compound) or in combination with one or more selected agrochemical compound(s), for increasing the grain yield of crop plants selected from group consisting of cereals, canola, soybean and cotton crops.

25

The term "agrochemical compound" is to be understood as meaning any compound selected from the group consisting of herbicides, fungicides, insecticides, bactericides, nematocides, acaricides, plant-growth regulators and safener.

30

Another preferred object of the invention is the use of or method of using Compound (A), specifically Compound (A1), either solely or in combination with one or more selected agrochemical compound(s), for increasing the protein content of seed kernels of crop plants selected from group consisting of cereals, canola and soybean crops.

Another preferred object of the invention is the use of or method of using Compound (A), specifically Compound (A1), either solely or in combination with one or more selected agrochemical compound(s), for increasing the gluten content of seed kernels
5 of crop plants selected from group consisting of cereals, canola and soybean crops.

Another preferred object of the invention is the use of or method of using Compound (A), specifically Compound (A1), either solely or in combination with one or more selected agrochemical compound(s), for increasing the gluten content of seed kernels
10 of crop plants selected from group consisting of cereal crops.

Another preferred object of the invention is the use of or method of using Compound (A), specifically Compound (A1), either solely or in combination with one or more selected agrochemical compound(s), for increasing the yield of the amount by weight
15 of beets of beet plants.

Another preferred object of the invention is the use of or method of using Compound (A), specifically Compound (A1), either solely or in combination with one or more selected agrochemical compound(s), for increasing the biomass yield of maize plants
20 growing in the absence of extraordinary environmental conditions.

Another preferred object of the invention is the use of or method of using Compound (A), specifically Compound (A1), either solely or in combination with one or more selected agrochemical compound(s), for increasing the sugar content of sugar plants.
25

Another preferred object of the invention is the use of or method of using Compound (A), specifically Compound (A1), either solely or in combination with one or more selected agrochemical compound(s), for increasing the sugar content of sugar beets.

30 Another preferred object of the invention is the use of or method of using Compound (A), specifically Compound (A1), either solely or in combination with one or more selected agrochemical compound(s), for increasing the biomass yield of sugar plants.

Another preferred object of the invention is the use of or method of using Compound (A), specifically Compound (A1), either solely or in combination with one or more selected agrochemical compound(s), for increasing the biomass yield of sugar beet or sugar plants growing in the absence of extraordinary environmental conditions.

5

A more preferred object of the invention is the use of or method of using Compound (A), specifically Compound (A1), either solely or in combination with one or more selected agrochemical compound(s), for increasing the grain yield of cereal crops, preferably wheat, barley, rye, triticale, rice, sorghum, sugarcane or maize crops.

10

A more preferred object of the invention is the use of or method of using Compound (A), specifically Compound (A1), either solely or in combination with one or more selected agrochemical compound(s), for increasing the grain yield of wheat, barley, rye or triticale plants.

15

A more preferred object of the invention is also the use of or method of using Compound (A), specifically Compound (A1), either solely or in combination with one or more selected agrochemical compound(s), for increasing the germination and emergence of cereal plants.

20

A more preferred object of the invention is also the use of or method of using Compound (A), specifically Compound (A1), either solely or in combination with one or more selected agrochemical compound(s), for increasing the germination and emergence of rice plants.

25

A more preferred object of the invention is also the use of or method of using Compound (A), specifically Compound (A1), either solely or in combination with one or more selected agrochemical compound(s), for increasing the grain yield of oil crops such as canola crops.

30

A more preferred object of the invention is also the use of or method of using Compound (A), specifically Compound (A1), either solely or in combination with one or more selected agrochemical compound(s), for increasing the bean yield of legume crops such as soybean crops.

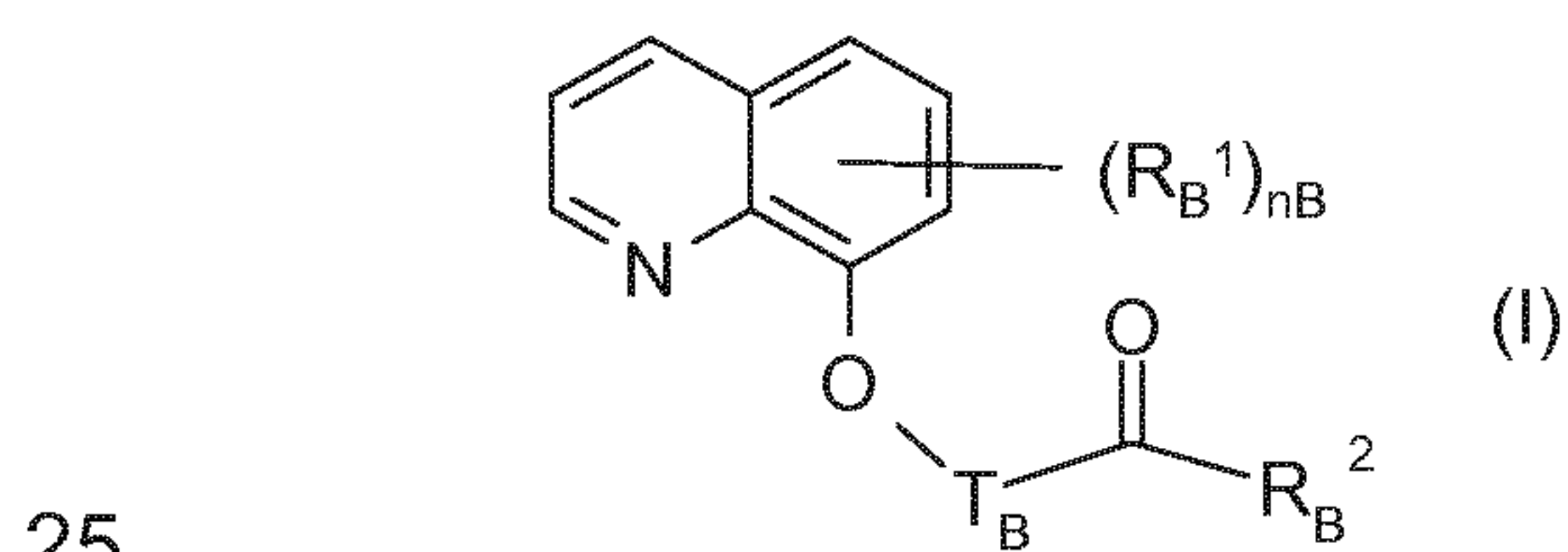
A more preferred object of the invention is also the use of or method of using Compound (A), specifically Compound (A1), either solely or in combination with one or more selected agrochemical compound(s), for increasing the grain yield of fiber crops
5 such as cotton crops.

A more preferred object of the invention is also the use of or method of using Compound (A), specifically Compound (A1), either solely or in combination with one or more selected agrochemical compound(s), for increasing the lints yield of fiber crops
10 such as cotton crops.

A more preferred object of the invention is also the use of or method of using Compound (A), specifically Compound (A1), either solely or in combination with one or more selected agrochemical compound(s), for increasing the beet yield of beet crops
15 such as sugar beet crops.

Another preferred object of the invention is the use of or method of using Compound (A), specifically Compound (A1), either solely or in combination with one or more selected agrochemical compound(s), for increasing the biomass yield of sugar beet or
20 sugarcane plants.

Compound (A) according to the present invention is understood as being selected from compounds of the formula (I) or salts thereof,



where the symbols and indices are each defined as follows:

R_B^1 is halogen, (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy, nitro or (C₁-C₄)-haloalkyl;
30 n_B is a natural number from 0 to 5, preferably 0 to 3;

R_B^2 is OR_B^3 , SR_B^3 or $NR_B^3R_B^4$ or a saturated or unsaturated 3- to 7-membered heterocycle having at least one nitrogen atom and up to 3 heteroatoms, preferably from the group consisting of O and S, which is attached via the nitrogen atom to the carbonyl group in (S2) and which is

5 unsubstituted or substituted by radicals from the group consisting of (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy and optionally substituted phenyl, preferably a radical of the formula OR_B^3 , NHR_B^4 or $N(CH_3)_2$, in particular of the formula OR_B^3 ;

R_B^3 is hydrogen or an unsubstituted or substituted aliphatic hydrocarbyl radical, preferably having a total of 1 to 18 carbon atoms;

10 R_B^4 is hydrogen, (C₁-C₆)-alkyl, (C₁-C₆)-alkoxy or substituted or unsubstituted phenyl;

T_B is a (C₁- or C₂)-alkanediyl chain which is unsubstituted or substituted by one or two (C₁-C₄)-alkyl radicals or by [(C₁-C₃)-alkoxy]carbonyl;

preferably

15 1-methylhexyl (5-chloro-8-quinolinoxy)acetate ("cloquintocet-mexyl") (A1),
1,3-dimethylbut-1-yl (5-chloro-8-quinolinoxy)acetate (A2),
4-allyloxybutyl (5-chloro-8-quinolinoxy)acetate (A3),
1-allyloxyprop-2-yl (5-chloro-8-quinolinoxy)acetate (A4),
ethyl (5-chloro-8-quinolinoxy)acetate (A5),
20 methyl (5-chloro-8-quinolinoxy)acetate (A6),
allyl (5-chloro-8-quinolinoxy)acetate (A7),
2-(2-propylideneiminoxy)-1-ethyl (5-chloro-8-quinolinoxy)acetate (A8),
2-oxoprop-1-yl (5-chloro-8-quinolinoxy)acetate (A9)
(5-chloro-8-quinolinoxy)acetic acid (A10)

25

or hydrates and salts thereof, for example the lithium, sodium, potassium, calcium, magnesium, aluminum, iron, ammonium, quaternary ammonium, sulfonium or phosphonium salts of the before

30 The most preferred compound is 1-methylhexyl (5-chloro-8-quinolinoxy)acetate ("cloquintocet-mexyl") (A1), see "The Pesticide Manual", 16th edition 2012, pp. 222-223,

By the addition of a suitable inorganic or organic bases salts may be formed by

replacing the hydrogen of suitable substituents, such as carboxy groups. These salts are, for example, metal salts, in particular alkali metal salts or alkaline earth metal salts, especially sodium salts and potassium salts, or else ammonium salts, salts with organic amines or quaternary ammonium salts.

5

The compounds of the formula (I) and agriculturally acceptable salts thereof used in accordance with the invention are also referred to hereinafter as "compounds of the formula (I)", or also "Compounds (A)" for short.

10 In the description of the formulae, including the accompanying claims, the aforementioned substituents have the following meanings:

Halogen means fluorine, chlorine, bromine or iodine.

The term "halo" before the name of a radical means that this radical is partially or completely halogenated, that is to say substituted by F, Cl, Br or I in any combination.

15 The expression "(C₁-C₆)alkyl" means an unbranched or branched non-cyclic saturated hydrocarbon radical having 1, 2, 3, 4, 5 or 6 carbon atoms (indicated by a range of C-atoms in the parenthesis), such as, for example a methyl, ethyl, propyl, isopropyl, 1-butyl, 2-butyl, 2-methylpropyl or tert-butyl radical. The same applies to alkyl groups in composite radicals such as "alkoxyalkyl".

20 Alkyl radicals and also in composite groups, unless otherwise defined, preferably have 1 to 4 carbon atoms.

"(C₁-C₆)Haloalkyl" means an alkyl group mentioned under the expression "(C₁-C₆)alkyl" in which one or more hydrogen atoms are replaced by the same number of identical or different halogen atoms, such as monohaloalkyl, perhaloalkyl, CF₃, CHF₂, CH₂F,

25 CHFCH₃, CF₃CH₂, CF₃CF₂, CHF₂CF₂, CH₂FCHCl, CH₂Cl, CCl₃, CHCl₂ or CH₂CH₂Cl.

"[(C₁-C₄)alkoxy](C₁-C₆)alkyl" means (C₁-C₆)alkyl which is substituted by one or more (C₁-C₄)alkoxy groups, preferably by one (C₁-C₄)alkoxy group.

"(C₁-C₆)Alkoxy" means an alkoxy group whose carbon chain has the meaning given under the expression "(C₁-C₆)alkyl". "Haloalkoxy" is, for example, OCF₃, OCHF₂,

30 OCH₂F, CF₃CF₂O, OCH₂CF₃ or OCH₂CH₂Cl.

"(C₂-C₆)Alkenyl" means an unbranched or branched non-cyclic carbon chain having a number of carbon atoms which corresponds to this stated range and which contains at least one double bond which can be located in any position of the respective

unsaturated radical. "(C₂-C₆)alkenyl" accordingly denotes, for example, the vinyl, allyl, 2-methyl-2-propenyl, 2-butenyl, pentenyl, 2-methylpentenyl or the hexenyl group.

"(C₂-C₆)alkynyl" means an unbranched or branched non-cyclic carbon chain having a number of carbon atoms which corresponds to this stated range and which contains
5 one triple bond which can be located in any position of the respective unsaturated radical. "(C₂-C₆)alkynyl" accordingly denotes, for example, the propargyl, 1-methyl-2-propynyl, 2-butynyl or 3-butynyl group.

"(C₃-C₆)cycloalkyl" denotes monocyclic alkyl radicals, such as the cyclopropyl, cyclobutyl, cyclopentyl or cyclohexyl radical.

10 "(C₄-C₆)cycloalkenyl" denotes a carbocyclic, nonaromatic, partially unsaturated ring having 4 to 6 carbon atoms, for example 1-cyclobutenyl, 2-cyclobutenyl, 1-cyclopentenyl, 2-cyclopentenyl, 3-cyclopentenyl, or 1-cyclohexenyl, 2-cyclohexenyl, 3-cyclohexenyl, 1,3-cyclohexadienyl or 1,4-cyclohexadienyl.

15 The expression "one or more radicals selected from the group consisting of" in the definition is to be understood as meaning in each case one or more identical or different radicals selected from type of radicals defined, unless specific limitations are defined expressly.

20 According to the type and linkage of the substituents, the compounds of the formula (I) may be present as stereoisomers. The possible stereoisomers defined by the specific three-dimensional form thereof, such as enantiomers, diastereomers, Z and E isomers, are all encompassed by the formula (I). When, for example, one or more alkenyl groups are present, diastereomers (Z and E isomers) may occur. When, for example,
25 one or more asymmetric carbon atoms are present, enantiomers and diastereomers may occur. Stereoisomers can be obtained from the mixtures obtained in the preparation by customary separation methods. The chromatographic separation can be effected either on the analytical scale to find the enantiomeric excess or the diastereomer excess, or else on the preparative scale to produce test specimens for
30 biological testing. It is likewise possible to selectively prepare stereoisomers by using stereoselective reactions with use of optically active starting materials and/or assistants. The invention thus also relates to all stereoisomers which are encompassed by the formula (I) but are not shown with their specific stereoisomeric form, and mixtures thereof.

The radical definitions stated above, in general terms or listed within areas of preference, apply both to the end products of the formula (I) and correspondingly to the starting materials and intermediates required for the preparation in each case. These
5 radical definitions can be exchanged with one another, i.e. including combinations between the preferred ranges stated.

The term “useful plants” as used here refers to crop plants which are employed as plants for obtaining foods, animal feeds or for industrial purposes as well as
10 horticultural plants.

The present invention further provides a method for treatment of plants, preferably growing in the absence extraordinary environmental conditions. With “absence of any kind of extraordinary environmental conditions” is to be understood in the context of
15 the present invention to mean that plants or seeds are not exposed to extraordinary environmental conditions such as extreme drought, cold and hot conditions, osmotic stress, waterlogging, elevated soil salinity, elevated exposure to minerals, ozone conditions, strong light conditions, limited availability of nitrogen nutrients or limited availability of phosphorus nutrients, particularly extraordinary environmental conditions
20 beyond normal environmental fluctuations that may occur under normal plant growing conditions.

The Compound (A), specifically Compound (A1), may be applied either solely or in combination with one or more agrochemical compound(s) by seed treatment or by
25 preemergence or postemergence applications, for example under conditions which are known in the art.

The pre-emergence or post-emergence applications may use spray techniques applying spray solutions of Compound (A), specifically Compound (A1), either solely or
30 in combination with one or more agrochemical compound(s). Such spray solutions may comprise other customary constituents, such as solvents, formulation aids, especially water. Further constituents may include active agrochemical ingredients described below.

The present invention further provides for the use of corresponding spray solutions for increasing the yield of useful plants or crop plants with respect to their harvested plant organs. The remarks which follow apply both to the inventive use of the compounds of the formula (I) per se and to the corresponding spray solutions.

5

When using Compound (A), specifically Compound (A1), either solely or in combination with one or more agrochemical compound(s), as a plant growth regulator for increasing the yield of useful plants with respect to their harvested plant organs, for example for increasing the grain yield of crop plants like those mentioned above,

10

preferably cereal plants, such as wheat, barley, rye, triticale, millet, rice or corn (maize), the application rate of Compound (A), specifically Compound (A1), is, for example, in the range of from 0.005 (5 mg) to 5000 g active substance per hectare of soil surface, preferably in the range of from 0.01 (10 mg) to 2000 g/ha, in particular in the range of from 0.05 (50 mg) to 1000 g/ha of active substance, very particularly from 15 10 to 1000 g/ha of active substance, more preferred from 20 to 500 g/ha of active substance, mostly preferred from 25 to 100 g/ha of active substance.

20

A Compound (A), specifically Compound (A1), either solely or in combination with one or more agrochemical compound(s), can be applied to the plants by spraying spray solutions containing the Compound (A), specifically Compound (A1), by distributing granules containing the Compound (A), specifically Compound (A1), on the soil of the cultivated area, by pouring solutions or dispersions or granules containing Compound (A), specifically Compound (A1), into the field water (e.g. paddy-rice).

25

A Compound (A), specifically Compound (A1), either solely or in combination with one or more agrochemical compound(s), can be applied the pre-emergence method (pre-sown or simultaneous with sowing, e. g. pre-plant incorporated or in-furrow treatment, or after sowing) or the early post-emergence method or later in the post-emergence period, generally up to full bloom of the useful plants.

30

As an alternative, application as plant growth regulator is also possible by treating the seed, which includes various techniques for dressing and coating seed. Here, the application rate depends on the particular techniques and can be determined in preliminary tests. Generally, the application rate of Compound (A), specifically

Compound (A1), as active substance in case of a seed treatment is from 0.001 (1 mg) to 10 grammes active substance (a. i.) per kilogramme seed, preferably 0.01 (10 mg) to 5 g a. i. per kg seed, in particular 0.1 (100 mg) to 2 g a. i. per kilogramme seed.

- 5 If solutions of Compounds (A), preferably Compound (A1), either solely or in combination with one or more agrochemical compound(s), are used in the seed treatment method wherein the seeds are soaked in the active substance's solution, the concentration of the active substance (a. i.) in the solution is for example from 1 to 15000 ppm, preferably 10 to 10000 ppm, more preferably 100 to 5000 ppm based on
10 weight.

The plant growth regulator is generally applied in a plant-growth-regulating non-phytotoxic effective amount. By "non-phytotoxic" is meant an amount of the plant growth regulator which causes at most minor or no injury to the desired crop species
15 as regards yield of harvested product.

When applying the Compound (A), specifically Compound (A1), either solely or in combination with other agrochemical compounds, it can be applied once or by split application in two or more instances while the single application can be by seed
20 treatment, pre- or post-emergence. Therefore, it is possible to have combined applications such as by seed treatment followed by one or more pre- and/or post-emergence treatments.

Preferred application is by seed treatment.

Also preferred is single pre-emergence treatment.

- 25 Also preferred is a single post-emergence treatment.

Also preferred is a pre-emergence treatment followed by 1, 2 or 3 post-emergence treatments.

Also preferred is a seed treatment followed by 1, 2 or 3 post-emergence treatments.

- Also preferred is a post-emergence treatment in the stage between early earing and 8
30 leaves stage.

Also preferred is a post-emergence treatment of the plants producing seed in the late vegetation stage up to the generative stage (between end of shooting and early bloom).

The Compounds (A) can be used as stand alone product or in combination with one or more other agrochemical compounds, preferably a pesticide or plant-growth regulator more preferably a pesticide for which the plant growth regulator can effectively be used also as a safener. Of particular interest are combinations of Compounds (A), preferably

5 Compound (A1) with herbicides, fungicides, insecticides, or plant-growth regulators especially preferred is the combination with one or more, preferably one or two agrochemically active compounds belonging to the class of fungicides.

The application rate of the pesticides/agrochemical compounds, are in the range used

10 for the pesticides/agrochemical compounds alone and are thus known per se.

A further preferred object of present invention is the combined use of Compound (A), specifically Compound (A1), in combination with one or more fungicides, one or more insecticides, and/or one or more plant growth regulators.

15

More specifically, the fungicides to be combined with Compound (A) or Compound A1) according to present invention, preferably to be combined with Compound (A1), are selected from the group consisting of:

benalaxyl [=F-1], benalaxyl-M [=F-2], bupirimate [=F-3], chiralaxyl [=F-4], clozylacon

20 [=F-5], dimethirimol [=F-6], ethirimol [=F-7], furalaxyl [=F-8], hymexazole [=F-9], metalaxyl [=F-10], metalaxyl-M [=F-11], ofurace [=F-12], oxadixyl [=F-13], oxolinic acid [=F-14], benomyl [=F-15], carbendazim [=F-16], diethofencarb [=F-17], fuberidazole [=F-18], fluopicolide [=F-19], pencycuron [=F-20], thiabendazole [F-21], thiophanate-methyl [=F-22], zoxamide [F-23], chloro-7-(4-methylpiperidin-1-yl)-6-(2,4,6-

25 trifluorophenyl)[1,2,4]triazolo[1,5-a]pyrimidine [=F-24], diflumetorim [=F-25], bixafen [=F-26], boscalid [=F-27], carboxin [=F-28], diflumethorim [=F-29], fenfuram [=F-30], fluopyram [=F-31], flutolanil [=F-32], furametpyr [=F-33], mepronil [=F-34], oxycarboxin [=F-35], penflufen [=F-36], penthiopyrad [F-37], thifluzamid [=F-38], N-[2-(1,3-dimethylbutyl)phenyl]-5-fluoro-1,3-dimethyl-1H-pyrazole-4-carboxamide [=F-39],

30 isopyrazam [=F-40], sedaxane [=F-41], 3-(difluoromethyl)-1-methyl-N-(3',4',5'-trifluorobiphenyl-2-yl)-1H-pyrazole-4-carboxamide [=F-42], 3-(difluoromethyl)-1-methyl-N-[2-(1,1,2,2-tetrafluoroethoxy)phenyl]-1H-pyrazole-4-carboxamide [=F-43], 3-(difluoromethyl)-N-[4-fluoro-2-(1,1,2,3,3,3-hexafluoropropoxy)phenyl]-1-methyl-1H-pyrazole-4-carboxamide [F-44], N-[1-(2,4-dichlorophenyl)-1-methoxypropan-2-yl]-3-

(difluoromethyl)-1-methyl-1H-pyrazole-4-carboxamide [=F-45] and corresponding salts, amisulbrom [=F-46], azoxystrobin [=F-47], cyazofamid [=F-48], dimoxystrobin [=F-49], enestrobin [=F-50], famoxadon [=F-51], fenamidone [=F-52], fluoxastrobin [=F-53], kresoxim-methyl [=F-54], metominostrobin [=F-55], orysastrobin [=F-56], pyraclostrobin

5 [=F-57], pyribencarb [=F-58], picoxystrobin [=F-59], trifloxystrobin [=F-60], (2E)-2-(2-
 {[6-(3-chloro-2-methylphenoxy)-5-fluoropyrimidin-4-yl]oxy}phenyl)-2-(methoxyimino)-N-
 methylethanamide [=F-61], (2E)-2-(ethoxyimino)-N-methyl-2-(2-[[{(1E)-1-[3-
 (trifluoromethyl)-phenyl]ethylidene}amino]oxy)methyl]phenyl)ethanamide [=F-62] and
 corresponding salts, (2E)-2-(methoxyimino)-N-methyl-2-{2-[(E)-{1-[3-
 10 (trifluoromethyl)-phenyl]-ethoxy}-imino)methyl]phenyl}ethanamide [=F-63], (2E)-2-{2-
 [[{(1E)-1-(3-[(E)-1-fluoro-2-phenylethenyl]oxy}phenyl)ethylidene]-
 amino]oxy)methyl]phenyl}-2-(methoxyimino)-N-methyl-ethanamide [=F-64], (2E)-2-{2-
 [[{(2E,3E)-4-(2,6-dichlorophenyl)but-3-en-2-ylidene]amino]oxy)methyl]phenyl}-2-
 (methoxyimino)-N-methylethanamide, 2-chloro-N-(1,1,3-trimethyl-2,3-dihydro-1H-
 15 inden-4-yl)pyridine-3-carboxamide [F-65], 5-methoxy-2-methyl-4-(2-[[{(1E)-1-[3-
 (trifluoromethyl)-phenyl]-ethylidene}-amino]-oxy]-methyl)-phenyl)-2,4-dihydro-3H-
 1,2,4-triazol-3-one [=F-66], 2-methyl {2-[[{cyclopropyl}[(4-
 methoxyphenyl)-imino]methyl]sulfanyl)methyl]phenyl}-3-methoxyacrylate [=F-67], N-
 (3-ethyl-3,5,5-trimethylcyclohexyl)-3-(formylamino)-2-hydroxybenzamide [=F-68] and
 20 corresponding salts, dinocap [=F-69], fluazinam [=F-70], fentin acetate [=F-71], fentin
 chloride [=F-72], fentin hydroxide [=F-73], silthiofam [=F-74], andoprim [=F-75],
 blasticidin-S [=F-76], cyprodinil [=F-77], kasugamycin [=F-78], kasugamycin
 hydrochloride hydrate [=F-79], mepanipyrim [=F-80], pyrimethanil [=F-81], fenpiclonil
 [=F-82], fludioxonil [=F-83], quinoxifen [=F-84], chlozolate [=F-85], iprodione [=F-86],
 25 procymidone [=F-87], vinclozolin [=F-88], ampropylfos [=F-89], potassium-ampropylfos
 [=F-90], edifenphos [=F-91], iprobenfos (IBP) [=F-92], isoprothiolane [=F-93],
 pyrazophos [=F-94], tolclofos-methyl [=F-95], biphenyl [=F-96], iodocarb [=F-97],
 propamocarb [F-98], propamocarb hydrochloride [=F-99], fenhexamid [=F-100],
 azaconazole [=F-101], bitertanol [=F-102], bromuconazole [=F-103], diclobutrazole
 30 [=F-104], difenoconazole [=F-105], diniconazole [=F-106], diniconazole-M [=F-107],
 epoxiconazole [=F-108], etaconazole [=F-109], fenbuconazole [=F-110],
 fluquinconazole [=F-111], flusilazole [=F-112], flutriafol [=F-113], furconazole [=F-114],
 furconazole-cis [=F-115], hexaconazole [=F-116], imibenconazole [=F-117], ipconazole
 [=F-118], metconazole [=F-119], myclobutanil [=F-120], paclobutrazole [=F-121],

penconazole [=F-122], propiconazole [=F-123], prothioconazole [=F-124],
 simeconazole [=F-125], spiroxamine [=F-126], tebuconazole [=F-127], triadimefon [=F-
 128], triadimenol [=F-129], triticonazole [=F-130], uniconazole [=F-131], voriconazole
 [=F-132], imazalil [=F-133], imazalil sulphate [=F-134], oxpoconazole [=F-135],
 5 fenarimol [=F-136], flurprimidol [=F-137], nuarimol [=F-138], pyrifenox [=F-139], triforin
 [=F-140], pefurazoat [=F-141], prochloraz [=F-142], triflumizole [=F-143], viniconazole
 [=F-144], aldimorph [=F-145], dodemorph [=F-146], dodemorph acetate [=F-147],
 fenpropimorph [=F-148], tridemorph [=F-149], fenpropidin [=F-150], naftifin [=F-151],
 pyributicarb [=F-152], terbinafin [=F-153], 1-(4-chlorophenyl)-2-(1H-1,2,4-triazol-1-
 10 yl)cycloheptanol [=F-154], methyl 1-(2,2-dimethyl-2,3-dihydro-1H-inden-1-yl)-1H-
 imidazole-5-carboxylate [=F-155], N'-{5-(difluoromethyl)-2-methyl-4-[3-(trimethyl-
 silyl)propoxy]phenyl}-N-ethyl-N-methylimidoformamide [=F-156], N-ethyl-N-methyl-N'-
 {2-methyl-5-(trifluoromethyl)-4-[3-(trimethylsilyl)propoxy]phenyl}imidoformamide [=F-
 157], O-{1-[(4-methoxyphenoxy)methyl]-2,2-dimethylpropyl}-1H-imidazole-1-
 15 carbothioate [=F-158], benthiavalicarb [=F-159], bialaphos [=F-160], dimethomorph
 [=F-161], flumorph [=F-162], iprovalicarb [=F-163], polyoxins [=F-164], polyoxorim [=F-
 165], validamycin A [=F-166], capropamide [=F-167], diclocymet [=F-168], fenoxanil
 [=F-169], phthalide [=F-170], pyroquilon [=F-171], tricyclazole [=F-172], acibenzolar-S-
 methyl [=F-173], probenazole [=F-174], tiadinil [=F-175], isotianil [=F-176], captafol
 20 [=F-177], captan [=F-178], chlorothalonil [=F-179], copper salts such as: copper
 hydroxide [=F-180], copper naphthenate [=F-181], copper oxychloride [=F-182], copper
 sulphate [=F-183], copper oxide [=F-184], oxine-copper [=F-185], Bordeaux mixture
 [=F-186], dichlofluanid [=F-187], dithianon [=F-188], dodine [=F-189], dodine free base
 [=F-190], ferbam [=F-191], folpet [=F-192], fluorofolpet [=F-193], guazatine [=F-194],
 25 guazatine acetate [=F-195], iminoctadine [=F-196], iminoctadine albesilate [=F-197],
 iminoctadine triacetate [=F-198], mancopper [=F-199], mancozeb [=F-200], maneb
 [=F-201], metiram [=F-202], metiram zinc [=F-203], propineb [=F-204], sulfur and sulfur
 preparations containing calcium polysulfide [=F-205], thiram [=F-206], tolylfluanid [=F-
 207], zineb [=F-208], ziram [=F-209], amibromdol [=F-210], benthiazole [=F-211],
 30 bethoxazin [=F-212], capsimycin [=F-213], carvone [=F-214], chinomethionat [=F-215],
 chloropicrin [=F-216], cufraneb [=F-217], cyflufenamid [=F-218], cymoxanil [=F-219],
 dazomet [=F-220], debacarb [=F-221], diclomezine [=F-222], dichlorophen [=F-223],
 dicloran [=F-224], difenzoquat [=F-225], difenzoquat methyl sulphate [=F-226],
 diphenylamine [=F-227], ethaboxam [=F-228], ferimzone [=F-229], flumetover [=F-

230], flusulfamide [=F-231], fluopicolid [=F-232], fluoroimid [=F-233], fosatyl-Al [=F-234], hexachlorobenzene [=F-235], 8 hydroxy-quinoline sulphate [=F-236], iprodione [=F-237], irumamycin [=F-238], isotianil [=F-239], methasulfocarb [=F-240], metrafenone [=F-250], methyl isothiocyanate [=F-251], mildiomyacin [=F-252],

5 natamycin [=F-253], nickel dimethyl dithiocarbamate [=F-254], nitrothal-isopropyl [=F-255], octhilinone [=F-256], oxamocarb [=F-257], oxyfenthiin [=F-258], pentachlorophenol [=F-259] and salts, 2-phenylphenol [=F-260] and salts, piperalin [=F-261], propanosine-sodium [=F-262], proquinazid [=F-263], pyrrolnitrin [=F-264], quintozone [=F-265], tecloftalam [=F-266], tecnazene [=F-267], triazoxide [=F-268],

10 trichlamide [=F-269], zarilamid [=F-270], 2,3,5,6-tetrachloro-4-(methylsulfonyl)pyridine [=F-271], N-(4-chloro-2-nitrophenyl)-N-ethyl-4-methylbenzenesulfonamide [=F-272], 2-amino-4-methyl-N-phenyl-5-thiazolecarboxamide [=F-273], 2-chloro-N-(2,3-dihydro-1,1,3-trimethyl-1H-inden-4-yl)-3-pyridine-carboxamide [=F-274], 3-[5-(4-chlorophenyl)-2,3-dimethylisoxazolidin-3-yl]pyridine [=F-275], cis-1-(4-chloro-phenyl)-2-(1H-1,2,4-

15 triazol-1-yl)cycloheptanol [=F-276], 2,4-dihydro-5-methoxy-2-methyl-4-[[[1-[3-(trifluoromethyl)phenyl]ethylidene]amino]-oxy]methyl]phenyl]-3H-1,2,3-triazol-3-one (185336-79-2) [=F-277], methyl 1-(2,3-dihydro-2,2-dimethyl-1H-inden-1-yl)-1H-imidazole-5-carboxylate, 3,4,5-trichloro-2,6-pyridinedicarbonitrile, methyl 2-[[[cyclopropyl[(4-methoxy-phenyl)imino]methyl]thio]methyl]-alpha-

20 (methoxymethylene)benzacetate [=F-278], 4-chloro-alpha-propynyloxy-N-[2-[3-methoxy-4-(2-propynyloxy)phenyl]ethyl]benz-acet-amide [=F-279], (2S)-N-[2-[4-[[3-(4-chlorophenyl)-2-propynyl]oxy]-3-methoxyphenyl]ethyl]-3-methyl-2-[(methylsulfonyl)amino]butanamide [=F-280], 5-chloro-7-(4-methylpiperidin-1-yl)-6-(2,4,6-trifluorophenyl)[1,2,4]-triazolo[1,5-a]pyrimidine [=F-281], 5-chloro-6-(2,4,6-trifluoro-

25 phenyl)-N-[(1R)-1,2,2-trimethylpropyl]-[1,2,4]triazolo[1,5-a]pyrimidine-7-amine, 5-chloro-N-[(1R)-1,2-dimethylpropyl]-6-(2,4,6-trifluorophenyl)[1,2,4]triazolo[1,5-a]pyrimidine-7-amine [=F-282], N-[1-(5-bromo-3-chloropyridin-2-yl)ethyl]-2,4-dichloronicotinamide [=F-283], N-(5-bromo-3-chloro-pyridin-2-yl)methyl-2,4-dichloronicotinamide [=F-284], 2-butoxy-6-iodo-3-propylbenzopyranon-4-one [=F-285], N-(3-

30 ethyl-3,5,5-trimethylcyclohexyl)-3-formylamino-2-hydroxybenzamide, 2-[[[1-[3(1-fluoro-2-phenyl-ethyl)oxy]phenyl]ethylidene]-amino]oxy]-methyl]-alpha-(methoxyimino)-N-methyl-alphaE-benzacetamide [=F-286], N-{2-[3-chloro-5-(tri-fluoromethyl)pyridin-2-yl]ethyl}-2-(trifluoro-methyl)benzamide, N-(3',4'-dichloro-5-fluoro-biphenyl-2-yl)-3-(difluoromethyl)-1-methyl-1H-pyrazole-4-carboxamide [=F-287], N-(6-methoxy-3-

pyridinyl)cyclopropanecarboxamide, 1-[(4-methoxyphenoxy)methyl]-2,2-dimethylpropyl-1H-imidazole-1-carboxylic acid [=F-288], O-[1-[(4-methoxyphenoxy)methyl]-2,2-dimethylpropyl]-1H-imidazole-1-carbothioic acid [=F-289], 2-(2-[[6-(3-chloro-2-methylphenoxy)-5-fluoropyrimidin-4-yl]oxy}phenyl)-2-(methoxyimino)-N-methyl- γ -acetamide [=F-290], N-{(Z)-[(cyclopropylmethoxy)- γ -imino][6-(difluoromethoxy)-2,3-difluorophenyl]- γ -methyl}-2-benzacetamide [=F-291].

An even more preferred object of present invention, is the combined use of
 (A1) + (F-1), (A1) + (F-2), (A1) + (F-3), (A1) + (F-4), (A1) + (F-5),
 10 (A1) + (F-6), (A1) + (F-7), (A1) + (F-8), (A1) + (F-9), (A1) + (F-10),
 (A1) + (F-11), (A1) + (F-12), (A1) + (F-13), (A1) + (F-14), (A1) + (F-15),
 (A1) + (F-16), (A1) + (F-17), (A1) + (F-18), (A1) + (F-19), (A1) + (F-20),
 (A1) + (F-21), (A1) + (F-22), (A1) + (F-23), (A1) + (F-24), (A1) + (F-25),
 (A1) + (F-26), (A1) + (F-27), (A1) + (F-28), (A1) + (F-29), (A1) + (F-30),
 15 (A1) + (F-31), (A1) + (F-32), (A1) + (F-33), (A1) + (F-34), (A1) + (F-35),
 (A1) + (F-36), (A1) + (F-37), (A1) + (F-38), (A1) + (F-39), (A1) + (F-40),
 (A1) + (F-41), (A1) + (F-42), (A1) + (F-43), (A1) + (F-44), (A1) + (F-45),
 (A1) + (F-46), (A1) + (F-47), (A1) + (F-48), (A1) + (F-49), (A1) + (F-50),
 (A1) + (F-51), (A1) + (F-52), (A1) + (F-53), (A1) + (F-54), (A1) + (F-55),
 20 (A1) + (F-56), (A1) + (F-57), (A1) + (F-58), (A1) + (F-59), (A1) + (F-60),
 (A1) + (F-61), (A1) + (F-62), (A1) + (F-63), (A1) + (F-64), (A1) + (F-65),
 (A1) + (F-66), (A1) + (F-67), (A1) + (F-68), (A1) + (F-69), (A1) + (F-70),
 (A1) + (F-71), (A1) + (F-72), (A1) + (F-73), (A1) + (F-74), (A1) + (F-75),
 (A1) + (F-76), (A1) + (F-77), (A1) + (F-78), (A1) + (F-79), (A1) + (F-80),
 25 (A1) + (F-81), (A1) + (F-82), (A1) + (F-83), (A1) + (F-84), (A1) + (F-85),
 (A1) + (F-86), (A1) + (F-87), (A1) + (F-88), (A1) + (F-89), (A1) + (F-90),
 (A1) + (F-91), (A1) + (F-92), (A1) + (F-93), (A1) + (F-94), (A1) + (F-95),
 (A1) + (F-96), (A1) + (F-97), (A1) + (F-98), (A1) + (F-99), (A1) + (F-100),
 (A1) + (F-101), (A1) + (F-102), (A1) + (F-103), (A1) + (F-104), (A1) + (F-105),
 30 (A1) + (F-106), (A1) + (F-107), (A1) + (F-108), (A1) + (F-109), (A1) + (F-110),
 (A1) + (F-111), (A1) + (F-112), (A1) + (F-113), (A1) + (F-114), (A1) + (F-115),
 (A1) + (F-116), (A1) + (F-117), (A1) + (F-118), (A1) + (F-119), (A1) + (F-120),
 (A1) + (F-121), (A1) + (F-122), (A1) + (F-123), (A1) + (F-124), (A1) + (F-125),
 (A1) + (F-126), (A1) + (F-127), (A1) + (F-128), (A1) + (F-129), (A1) + (F-130),

(A1) + (F-131), (A1) + (F-132), (A1) + (F-133), (A1) + (F-134), (A1) + (F-135),
 (A1) + (F-136), (A1) + (F-137), (A1) + (F-138), (A1) + (F-139), (A1) + (F-140),
 (A1) + (F-141), (A1) + (F-142), (A1) + (F-143), (A1) + (F-144), (A1) + (F-145),
 (A1) + (F-146), (A1) + (F-147), (A1) + (F-148), (A1) + (F-149), (A1) + (F-150),
 5 (A1) + (F-151), (A1) + (F-152), (A1) + (F-153), (A1) + (F-154), (A1) + (F-155),
 (A1) + (F-156), (A1) + (F-157), (A1) + (F-158), (A1) + (F-159), (A1) + (F-160),
 (A1) + (F-161), (A1) + (F-162), (A1) + (F-163), (A1) + (F-164), (A1) + (F-165),
 (A1) + (F-166), (A1) + (F-167), (A1) + (F-168), (A1) + (F-169), (A1) + (F-170),
 (A1) + (F-171), (A1) + (F-172), (A1) + (F-173), (A1) + (F-174), (A1) + (F-175),
 10 (A1) + (F-176), (A1) + (F-177), (A1) + (F-178), (A1) + (F-179), (A1) + (F-180),
 (A1) + (F-181), (A1) + (F-182), (A1) + (F-183), (A1) + (F-184), (A1) + (F-185),
 (A1) + (F-186), (A1) + (F-187), (A1) + (F-188), (A1) + (F-189), (A1) + (F-190),
 (A1) + (F-191), (A1) + (F-192), (A1) + (F-193), (A1) + (F-194), (A1) + (F-195),
 (A1) + (F-196), (A1) + (F-197), (A1) + (F-198), (A1) + (F-199), (A1) + (F-200),
 15 (A1) + (F-201), (A1) + (F-202), (A1) + (F-203), (A1) + (F-204), (A1) + (F-205),
 (A1) + (F-206), (A1) + (F-207), (A1) + (F-208), (A1) + (F-209), (A1) + (F-210),
 (A1) + (F-211), (A1) + (F-212), (A1) + (F-213), (A1) + (F-214), (A1) + (F-215),
 (A1) + (F-216), (A1) + (F-217), (A1) + (F-218), (A1) + (F-219), (A1) + (F-220),
 (A1) + (F-221), (A1) + (F-222), (A1) + (F-223), (A1) + (F-224), (A1) + (F-225),
 20 (A1) + (F-226), (A1) + (F-227), (A1) + (F-228), (A1) + (F-229), (A1) + (F-230),
 (A1) + (F-231), (A1) + (F-232), (A1) + (F-233), (A1) + (F-234), (A1) + (F-235),
 (A1) + (F-236), (A1) + (F-237), (A1) + (F-238), (A1) + (F-239), (A1) + (F-240),
 (A1) + (F-241), (A1) + (F-242), (A1) + (F-243), (A1) + (F-244), (A1) + (F-245),
 (A1) + (F-246), (A1) + (F-247), (A1) + (F-248), (A1) + (F-249), (A1) + (F-250),
 25 (A1) + (F-251), (A1) + (F-252), (A1) + (F-253), (A1) + (F-254), (A1) + (F-255),
 (A1) + (F-256), (A1) + (F-257), (A1) + (F-258), (A1) + (F-259), (A1) + (F-260),
 (A1) + (F-261), (A1) + (F-262), (A1) + (F-263), (A1) + (F-264), (A1) + (F-265),
 (A1) + (F-266), (A1) + (F-267), (A1) + (F-268), (A1) + (F-269), (A1) + (F-270),
 (A1) + (F-271), (A1) + (F-272), (A1) + (F-273), (A1) + (F-274), (A1) + (F-275),
 30 (A1) + (F-276), (A1) + (F-277), (A1) + (F-278), (A1) + (F-279), (A1) + (F-280),
 (A1) + (F-281), (A1) + (F-282), (A1) + (F-283), (A1) + (F-284), (A1) + (F-285),
 (A1) + (F-286), (A1) + (F-287), (A1) + (F-288), (A1) + (F-289), (A1) + (F-290), or
 (A1) + (F-291),

for inducing specific growth regulating responses on plants, on seeds from which they grow and/or on the locus in which they grow in their normal habitat, preferably in the absence of extraordinary environmental conditions and, thereby, increasing the yield in such treated plants

5

An even more preferred object of present invention is the combined use of Compound (A), preferably Compound (A1), and one or more, preferably one or two fungicides selected from the group consisting of:

bixafen [=F-26], fluopyram [=F-31], penflufen [F-36], isopyrazam [F-40], sedaxane
10 [=F41], 3-(difluoromethyl)-1-methyl-N-(3',4',5'-trifluorobiphenyl-2-yl)-1H-pyrazole-4-carboxamide [=F-42], azoxystrobin [F-47], fluoxastrobin [=F-53], pyraclostrobin [F-57], trifloxystrobin [=F-60], epoxiconazole [=F-108], metconazole [=F-119], propiconazole [=F-123], prothioconazole [=F-124], tebuconazole [=F-127],

for inducing specific growth regulating responses on plants, on seeds from which they
15 grow and/or on the locus in which they grow in their normal habitat, preferably in the absence of extraordinary environmental conditions and, thereby, increasing the yield in such treated plants.

An even more preferred object of present invention is the combined use of
20 (A1) + (F-26), (A1) + (F31), (A1) + (F-36), (A1) + (F-40), (A1) + (F-41), (A1) + (F-42), (A1) + (F-47), (A1) + (F-53), (A1) + (F-57), (A1) + (F-60), (A1) + (F-108), (A1) + (F-119), (A1) + (F-123), (A1) + (F-124), (A1) + (F-127),

25 (A1) + (F-26) + (F31), (A1) + (F-26) + (F-36), (A1) + (F-26) + (F-40), (A1) + (F-26) + (F-41), (A1) + (F-26) + (F-42), (A1) + (F-26) + (F-47), (A1) + (F-26) + (F-53), (A1) + (F-26) + (F-57), (A1) + (F-26) + (F-60), (A1) + (F-26) + (F-108), (A1) + (F-26) + (F-119), (A1) + (F-26) + (F-123), (A1) + (F-26) + (F-124), (A1) + (F-26) + (F-127),

30

(A1) + (F-36) + (F-40), (A1) + (F-36) + (F-41), (A1) + (F-36) + (F-42), (A1) + (F-36) + (F-47), (A1) + (F-36) + (F-53), (A1) + (F-36) + (F-57), (A1) + (F-36) + (F-60), (A1) + (F-36) + (F-108), (A1) + (F-36) + (F-119), (A1) + (F-36) + (F-123), (A1) + (F-36) + (F-124), (A1) + (F-36) + (F-127),

(A1) + (F-40) + (F-41), (A1) + (F-40) + (F-42), (A1) + (F-40) + (F-47),
 (A1) + (F-40) + (F-53), (A1) + (F-40) + (F-57), (A1) + (F-40) + (F-60),
 (A1) + (F-40) + (F-108), (A1) + (F-40) + (F-119), (A1) + (F-40) + (F-123),
 5 (A1) + (F-40) + (F-124), or (A1) + (F-40) + (F-127),

(A1) + (F-41) + (F-42), (A1) + (F-41) + (F-47), (A1) + (F-41) + (F-53),
 (A1) + (F-41) + (F-57), (A1) + (F-41) + (F-60), (A1) + (F-41) + (F-108),
 (A1) + (F-41) + (F-119), (A1) + (F-41) + (F-123), (A1) + (F-41) + (F-124),
 10 (A1) + (F-41) + (F-127),

(A1) + (F-42) + (F-47), (A1) + (F-42) + (F-53), (A1) + (F-42) + (F-57),
 (A1) + (F-42) + (F-60), (A1) + (F-42) + (F-108), (A1) + (F-42) + (F-119),
 (A1) + (F-42) + (F-123), (A1) + (F-42) + (F-124), (A1) + (F-42) + (F-127),
 15

(A1) + (F-47) + (F-53), (A1) + (F-47) + (F-57), (A1) + (F-47) + (F-60),
 (A1) + (F-47) + (F-108), (A1) + (F-47) + (F-119), (A1) + (F-47) + (F-123),
 (A1) + (F-47) + (F-124), (A1) + (F-47) + (F-127),

20 (A1) + (F-53) + (F-57), (A1) + (F-53) + (F-60), (A1) + (F-53) + (F-108),
 (A1) + (F-53) + (F-119), (A1) + (F-53) + (F-123), (A1) + (F-53) + (F-124),
 (A1) + (F-53) + (F-127),

(A1) + (F-57) + (F-60), (A1) + (F-57) + (F-108), (A1) + (F-57) + (F-119),
 25 (A1) + (F-57) + (F-123), (A1) + (F-57) + (F-124), (A1) + (F-57) + (F-127),

(A1) + (F-60) + (F-108), (A1) + (F-60) + (F-119), (A1) + (F-60) + (F-123),
 (A1) + (F-60) + (F-124), or (A1) + (F-60) + (F-127),

30 (A1) + (F-108) + (F-119), (A1) + (F-108) + (F-123), (A1) + (F-108) + (F-124),
 (A1) + (F-108) + (F-127),

(A1) + (F-119) + (F-123), (A1) + (F-119) + (F-124), (A1) + (F-119) + (F-127),
 (A1) + (F-123) + (F-124), (A1) + (F-123) + (F-127), or (A1) + (F-124) + (F-127),

for inducing specific growth regulating responses on plants, on seeds from which they grow and/or on the locus in which they grow in their normal habitat, preferably in the absence of extraordinary environmental conditions and, thereby, increasing the yield in such treated plants.

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An even more preferred object of present invention is the combined use of (A1) + (F-108), (A1) + (F-127), (A1) + (F-26) + (F-124), (A1) + (F-26) + (F-127), (A1) + (F-42) + (F-124), (A1) + (F-53) + (F-124), (A1) + (F-57) + (F-119), (A1) + (F-57) + (F-124), (A1) + (F-60) + (F-123), (A1) + (F-60) + (F-124), or

10

(A1) + (F-124) + (F-127),

for inducing specific growth regulating responses on plants, on seeds from which they grow and/or on the locus in which they grow in their normal habitat, preferably in the absence of extraordinary environmental conditions and, thereby, increasing the yield in such treated plants.

15

An even more preferred object of present invention is the combined use of (A1) + (F-108), (A1) + (F-127), or (A1) + (F-124) + (F-127),

for inducing specific growth regulating responses on plants, on seeds from which they grow and/or on the locus in which they grow in their normal habitat, preferably in the

20

absence of extraordinary environmental conditions and, thereby, increasing the yield in such treated plants.

Plant yield increasing compositions comprising

(A1) + (F-3), (A1) + (F-4), (A1) + (F-5), (A1) + (F-6), (A1) + (F-7),

25

(A1) + (F-9), (A1) + (F-12), (A1) + (F-14), (A1) + (F-15), (A1) + (F-18),

(A1) + (F-19), (A1) + (F-21), (A1) + (F-24), (A1) + (F-25),

(A1) + (F-28), (A1) + (F-29), (A1) + (F-30), (A1) + (F-31), (A1) + (F-32),

(A1) + (F-33), (A1) + (F-34), (A1) + (F-35), (A1) + (F-36), (A1) + (F-38),

(A1) + (F-39), (A1) + (F-40), (A1) + (F-41), (A1) + (F-42), (A1) + (F-43),

30

(A1) + (F-44), (A1) + (F-45), (A1) + (F-46), (A1) + (F-50), (A1) + (F-56),

(A1) + (F-58), (A1) + (F-62), (A1) + (F-65), (A1) + (F-67), (A1) + (F-68),

(A1) + (F-69), (A1) + (F-71), (A1) + (F-72), (A1) + (F-73), (A1) + (F-74),

(A1) + (F-75), (A1) + (F-76), (A1) + (F-78), (A1) + (F-79), (A1) + (F-82),

(A1) + (F-84), (A1) + (F-85), (A1) + (F-86), (A1) + (F-88), (A1) + (F-89),

(A1) + (F-90), (A1) + (F-91), (A1) + (F-92), (A1) + (F-93), (A1) + (F-94),
 (A1) + (F-95), (A1) + (F-96), (A1) + (F-97), (A1) + (F-101), (A1) + (F-103),
 (A1) + (F-104), (A1) + (F-106), (A1) + (F-107), (A1) + (F-108),
 (A1) + (F-109), (A1) + (F-110), (A1) + (F-113), (A1) + (F-114),
 5 (A1) + (F-115), (A1) + (F-117), (A1) + (F-118), (A1) + (F-121),
 (A1) + (F-125), (A1) + (F-130), (A1) + (F-131), (A1) + (F-132),
 (A1) + (F-133), (A1) + (F-134), (A1) + (F-135), (A1) + (F-136),
 (A1) + (F-137), (A1) + (F-138), (A1) + (F-139), (A1) + (F-140),
 (A1) + (F-141), (A1) + (F-143), (A1) + (F-144), (A1) + (F-145),
 10 (A1) + (F-146), (A1) + (F-147), (A1) + (F-149), (A1) + (F-150),
 (A1) + (F-151), (A1) + (F-152), (A1) + (F-153), (A1) + (F-154),
 (A1) + (F-155), (A1) + (F-156), (A1) + (F-157), (A1) + (F-158),
 (A1) + (F-160), (A1) + (F-161), (A1) + (F-162), (A1) + (F-164),
 (A1) + (F-165), (A1) + (F-166), (A1) + (F-168), (A1) + (F-169),
 15 (A1) + (F-170), (A1) + (F-171), (A1) + (F-172), (A1) + (F-173),
 (A1) + (F-174), (A1) + (F-175), (A1) + (F-176), (A1) + (F-177),
 (A1) + (F-180), (A1) + (F-181), (A1) + (F-183), (A1) + (F-184),
 (A1) + (F-185), (A1) + (F-186), (A1) + (F-188), (A1) + (F-190),
 (A1) + (F-191), (A1) + (F-193), (A1) + (F-195), (A1) + (F-196),
 20 (A1) + (F-197), (A1) + (F-199), (A1) + (F-202), (A1) + (F-203),
 (A1) + (F-205), (A1) + (F-209), (A1) + (F-210), (A1) + (F-211),
 (A1) + (F-212), (A1) + (F-213), (A1) + (F-214), (A1) + (F-215),
 (A1) + (F-216), (A1) + (F-217), (A1) + (F-218), (A1) + (F-220),
 (A1) + (F-221), (A1) + (F-222), (A1) + (F-223), (A1) + (F-224),
 25 (A1) + (F-225), (A1) + (F-226), (A1) + (F-227), (A1) + (F-229),
 (A1) + (F-230), (A1) + (F-231), (A1) + (F-232), (A1) + (F-233),
 (A1) + (F-234), (A1) + (F-235), (A1) + (F-236), (A1) + (F-238),
 (A1) + (F-239), (A1) + (F-240), (A1) + (F-241), (A1) + (F-242),
 (A1) + (F-243), (A1) + (F-244), (A1) + (F-245), (A1) + (F-246),
 30 (A1) + (F-247), (A1) + (F-248), (A1) + (F-249), (A1) + (F-250),
 (A1) + (F-251), (A1) + (F-252), (A1) + (F-253), (A1) + (F-254),
 (A1) + (F-255), (A1) + (F-256), (A1) + (F-257), (A1) + (F-258),
 (A1) + (F-259), (A1) + (F-260), (A1) + (F-261), (A1) + (F-262),
 (A1) + (F-263), (A1) + (F-264), (A1) + (F-265), (A1) + (F-266),

(A1) + (F-267), (A1) + (F-269), (A1) + (F-270), (A1) + (F-271),
 (A1) + (F-272), (A1) + (F-273), (A1) + (F-274), (A1) + (F-275),
 (A1) + (F-276), (A1) + (F-277), (A1) + (F-278), (A1) + (F-279),
 (A1) + (F-280), (A1) + (F-281), (A1) + (F-282), (A1) + (F-283),
 5 (A1) + (F-284), (A1) + (F-286), (A1) + (F-288), (A1) + (F-289),
 (A1) + (F-290), (A1) + (F-291), and

(A1) + (F-26) + (F31), (A1) + (F-26) + (F-36), (A1) + (F-26) + (F-40),
 (A1) + (F-26) + (F-41), (A1) + (F-26) + (F-42), (A1) + (F-26) + (F-47),
 10 (A1) + (F-26) + (F-53), (A1) + (F-26) + (F-57), (A1) + (F-26) + (F-60),
 (A1) + (F-26) + (F-108), (A1) + (F-26) + (F-119), (A1) + (F-26) + (F-123),
 (A1) + (F-26) + (F-124), (A1) + (F-26) + (F-127);

(A1) + (F-36) + (F-40), (A1) + (F-36) + (F-41), (A1) + (F-36) + (F-42),
 15 (A1) + (F-36) + (F-47), (A1) + (F-36) + (F-53), (A1) + (F-36) + (F-57),
 (A1) + (F-36) + (F-60), (A1) + (F-36) + (F-108), (A1) + (F-36) + (F-119),
 (A1) + (F-36) + (F-123), (A1) + (F-36) + (F-124), (A1) + (F-36) + (F-127);

(A1) + (F-40) + (F-41), (A1) + (F-40) + (F-42), (A1) + (F-40) + (F-47),
 20 (A1) + (F-40) + (F-53), (A1) + (F-40) + (F-57), (A1) + (F-40) + (F-60),
 (A1) + (F-40) + (F-108), (A1) + (F-40) + (F-119), (A1) + (F-40) + (F-123),
 (A1) + (F-40) + (F-124), (A1) + (F-40) + (F-127);

(A1) + (F-41) + (F-42), (A1) + (F-41) + (F-47), (A1) + (F-41) + (F-53),
 25 (A1) + (F-41) + (F-57), (A1) + (F-41) + (F-60), (A1) + (F-41) + (F-108),
 (A1) + (F-41) + (F-119), (A1) + (F-41) + (F-123), (A1) + (F-41) + (F-124),
 (A1) + (F-41) + (F-127),

(A1) + (F-42) + (F-53), (A1) + (F-42) + (F-57), (A1) + (F-42) + (F-60),
 30 (A1) + (F-42) + (F-108), (A1) + (F-42) + (F-119), (A1) + (F-42) + (F-123),
 (A1) + (F-42) + (F-124), (A1) + (F-42) + (F-127),

(A1) + (F-47) + (F-53), (A1) + (F-47) + (F-57), (A1) + (F-47) + (F-60),
 (A1) + (F-47) + (F-108), (A1) + (F-47) + (F-119), (A1) + (F-47) + (F-123),

(A1) + (F-47) + (F-124), (A1) + (F-47) + (F-127);

(A1) + (F-53) + (F-57), (A1) + (F-53) + (F-60), (A1) + (F-53) + (F-108),
 (A1) + (F-53) + (F-119), (A1) + (F-53) + (F-123), (A1) + (F-53) + (F-124),
 5 (A1) + (F-53) + (F-127);

(A1) + (F-57) + (F-60), (A1) + (F-57) + (F-108), (A1) + (F-57) + (F-119),
 (A1) + (F-57) + (F-123), (A1) + (F-57) + (F-124), (A1) + (F-57) + (F-127);

10 (A1) + (F-60) + (F-108), (A1) + (F-60) + (F-119), (A1) + (F-60) + (F-123),
 (A1) + (F-60) + (F-124), (A1) + (F-60) + (F-127);

(A1) + (F-108) + (F-119), (A1) + (F-108) + (F-123), (A1) + (F-108) + (F-124),
 (A1) + (F-108) + (F-127);

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(A1) + (F-119) + (F-123), (A1) + (F-119) + (F-124), (A1) + (F-119) + (F-127);

(A1) + (F-123) + (F-124), or (A1) + (F-123) + (F-127), or

20 (A1) + (F-124) + (F-127)

are not yet known in the art.

Therefore, above defined plant yield increasing compositions, preferably those
 25 comprising as a mixture partners to Compound (A1) a combination selected from the
 group consisting of (i) pyraclostrobin (F-57) and metconazole (F-119), (ii) trifloxystrobin
 (F-60) and propiconazole (F-123), (iii) prothioconazole (F-124) and tebuconazole (F-
 127), (iv) fluoxastrobin (F-53) and prothioconazole (F-124), and (v) trifloxystrobin (F-
 60) and prothioconazole (F-124), (vi) bixafen (F-26) and prothioconazole (F-124), (vii)
 30 bixafen (F-26) and tebuconazole (F127), (viii) bixafen (F-26) and trifloxystrobin (F-60),
 more preferably those comprising as a mixture partners to Compound (A1) a
 combination selected from the group consisting of, (i) pyraclostrobin (F-57) and
 metconazole (F-119), (ii) trifloxystrobin (F-60) and propiconazole (F-123), (iii) bixafen
 (F-26) and prothioconazole (F-124), are also a further object of the present invention.

Also more specifically, the insecticides to be combined with Compound (A) or Compound A1) according to present invention, preferably to be combined with Compound (A1), are selected from the group consisting of:

- 5 abamectin [= I-1], chlorpyrifos [= I-2], clothianidin [= I-3], cyazypyr [= I-4], deltamethrin [= I-5], emamectin-benzoate [= I-6], ethiprole [= I-7], fipronil [= I-8], flubendiamide [= I-9], flupyradifurone [= I-10], imidacloprid [= I-11], lambda-cyhalothrin [= I-12], lufenuron [= I-13], rynaxypyr [= I-14], spinosad [= I-15], spinoteram [= I-16], spirotetramate [= I-17], sulfoxaflor [= I-18], thiamethoxam [= I-19], thiodicarb [= I-20], triflumuron [= I-21],
10 votivo [= I-22].

- An even more preferred object of present invention, is the combined use of (A1) + (I-1), (A1) + (I-2), (A1) + (I-3), (A1) + (I-4), (A1) + (I-5), (A1) + (I-6) (A1) + (I-7), (A1) + (I-8), (A1) + (I-9), (A1) + (I-10), (A1) + (I-11), (A1) + (I-12)
15 (A1) + (I-13), (A1) + (I-14), (A1) + (I-15), (A1) + (I-16), (A1) + (I-17), (A1) + (I-18) (A1) + (I-19), (A1) + (I-20), (A1) + (I-3), (A1) + (I-21), (A1) + (I-22),
for inducing specific growth regulating responses on plants, on seeds from which they grow or on the locus in which they grow in their normal habitat, preferably in the absence of extraordinary environmental conditions and, thereby, increasing the yield in
20 such treated plants.

- Even more specifically, the combination partners concerning the class of insecticides are selected from the group consisting of:
abamectin [= I-1], chlorpyrifos [= I-2], clothianidin [= I-3], fipronil [= I-8], flupyradifurone
25 [= I-10], imidacloprid [= I-11], lambda-cyhalothrin [= I-12], lufenuron [= I-13], rynaxypyr [= I-14], spinoteram [= I-16], spirotetramate [= I-17], sulfoxaflor [= I-18], thiamethoxam [I=19], thiodicarb [= I-20], votivo [= I-22]
for inducing specific growth regulating responses on plants, on seeds from which they grow and/or on the locus in which they grow in their normal habitat, preferably in the
30 absence of extraordinary environmental conditions and, thereby, increasing the yield in such treated plants...

An even more preferred object of present invention is the combined use of (A1) + (I-1) + (I-2), (A1) + (I-1) + (I-3), (A1) + (I-1) + (I-8),

(A1) + (I-1) + (I-10), (A1) + (I-1) + (I-11), (A1) + (I-1) + (I-12),
 (A1) + (I-1) + (I-13), (A1) + (I-1) + (I-14), (A1) + (I-1) + (I-16),
 (A1) + (I-1) + (I-17), (A1) + (I-1) + (I-18), (A1) + (I-1) + (I-19),
 (A1) + (I-1) + (I-20), (A1) + (I-1) + (I-22),

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(A1) + (I-2) + (I-3), (A1) + (I-2) + (I-8), (A1) + (I-2) + (I-10),
 (A1) + (I-2) + (I-11), (A1) + (I-2) + (I-12), (A1) + (I-2) + (I-13),
 (A1) + (I-2) + (I-14), (A1) + (I-2) + (I-16), (A1) + (I-2) + (I-17),
 (A1) + (I-2) + (I-18), (A1) + (I-2) + (I-19), (A1) + (I-2) + (I-20),

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(A1) + (I-2) + (I-22),

(A1) + (I-3) + (I-8), (A1) + (I-3) + (I-10), (A1) + (I-3) + (I-11),
 (A1) + (I-3) + (I-12), (A1) + (I-3) + (I-13), (A1) + (I-3) + (I-14),
 (A1) + (I-3) + (I-16), (A1) + (I-3) + (I-17), (A1) + (I-3) + (I-18),

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(A1) + (I-3) + (I-19), (A1) + (I-3) + (I-20), (A1) + (I-3) + (I-22),

(A1) + (I-8) + (I-10), (A1) + (I-8) + (I-11), (A1) + (I-8) + (I-12),
 (A1) + (I-8) + (I-13), (A1) + (I-8) + (I-14), (A1) + (I-8) + (I-16),
 (A1) + (I-8) + (I-17), (A1) + (I-8) + (I-18), (A1) + (I-8) + (I-19),

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(A1) + (I-8) + (I-20), (A1) + (I-8) + (I-22),

(A1) + (I-10) + (I-11), (A1) + (I-10) + (I-12), (A1) + (I-10) + (I-13),
 (A1) + (I-10) + (I-14), (A1) + (I-10) + (I-16), (A1) + (I-10) + (I-17),
 (A1) + (I-10) + (I-18), (A1) + (I-10) + (I-19), (A1) + (I-10) + (I-20),

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(A1) + (I-10) + (I-22),

(A1) + (I-11) + (I-12), (A1) + (I-11) + (I-13), (A1) + (I-11) + (I-14),
 (A1) + (I-11) + (I-16), (A1) + (I-11) + (I-17), (A1) + (I-11) + (I-18),
 (A1) + (I-11) + (I-19), (A1) + (I-11) + (I-20), (A1) + (I-11) + (I-22),

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(A1) + (I-12) + (I-13), (A1) + (I-12) + (I-14), (A1) + (I-12) + (I-16),
 (A1) + (I-12) + (I-17), (A1) + (I-12) + (I-18), (A1) + (I-12) + (I-19),
 (A1) + (I-12) + (I-20), (A1) + (I-12) + (I-22),

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(A1) + (I-13) + (I-14), (A1) + (I-13) + (I-16), (A1) + (I-13) + (I-17),
 (A1) + (I-13) + (I-18), (A1) + (I-13) + (I-19), (A1) + (I-13) + (I-20),
 (A1) + (I-13) + (I-22),

5 (A1) + (I-14) + (I-16), (A1) + (I-14) + (I-17), (A1) + (I-14) + (I-18),
 (A1) + (I-14) + (I-19), (A1) + (I-14) + (I-20), (A1) + (I-14) + (I-22),

(A1) + (I-16) + (I-17), (A1) + (I-16) + (I-18), (A1) + (I-16) + (I-19),
 (A1) + (I-16) + (I-20), (A1) + (I-16) + (I-22),

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(A1) + (I-17) + (I-18), (A1) + (I-17) + (I-19), (A1) + (I-17) + (I-20),
 (A1) + (I-17) + (I-22),

(A1) + (I-18) + (I-19), (A1) + (I-18) + (I-20), (A1) + (I-18) + (I-22),

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(A1) + (I-19) + (I-20), (A1) + (I-19) + (I-22), or

(A1) + (I-20) + (I-22),

for inducing specific growth regulating responses on plants, on seeds from which they

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grow and/or on the locus in which they grow in their normal habitat, preferably in the
 absence of extraordinary environmental conditions and, thereby, increasing the yield in
 such treated plants.

25 Plant yield increasing compositions comprising

(A1) + (I-1) + (I-2), (A1) + (I-1) + (I-3), (A1) + (I-1) + (I-8),
 (A1) + (I-1) + (I-10), (A1) + (I-1) + (I-11), (A1) + (I-1) + (I-12),
 (A1) + (I-1) + (I-13), (A1) + (I-1) + (I-14), (A1) + (I-1) + (I-16),
 (A1) + (I-1) + (I-17), (A1) + (I-1) + (I-18), (A1) + (I-1) + (I-20),

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(A1) + (I-1) + (I-22),

(A1) + (I-2) + (I-3), (A1) + (I-2) + (I-8), (A1) + (I-2) + (I-10),
 (A1) + (I-2) + (I-11), (A1) + (I-2) + (I-12), (A1) + (I-2) + (I-13),
 (A1) + (I-2) + (I-14), (A1) + (I-2) + (I-16), (A1) + (I-2) + (I-17),

(A1) + (I-2) + (I-18), (A1) + (I-1) + (I-19), (A1) + (I-2) + (I-20),
(A1) + (I-2) + (I-22),

(A1) + (I-3) + (I-8), (A1) + (I-3) + (I-10), (A1) + (I-3) + (I-11),
5 (A1) + (I-3) + (I-12), (A1) + (I-3) + (I-13), (A1) + (I-3) + (I-14),
(A1) + (I-3) + (I-16), (A1) + (I-3) + (I-17), (A1) + (I-3) + (I-18),
(A1) + (I-3) + (I-19), (A1) + (I-3) + (I-20), (A1) + (I-3) + (I-22),

(A1) + (I-8) + (I-10), (A1) + (I-8) + (I-11), (A1) + (I-8) + (I-12),
10 (A1) + (I-8) + (I-13), (A1) + (I-8) + (I-14), (A1) + (I-8) + (I-16),
(A1) + (I-8) + (I-17), (A1) + (I-8) + (I-18), (A1) + (I-8) + (I-19),
(A1) + (I-8) + (I-20), (A1) + (I-8) + (I-22),

(A1) + (I-10) + (I-11), (A1) + (I-10) + (I-12), (A1) + (I-10) + (I-13),
15 (A1) + (I-10) + (I-14), (A1) + (I-10) + (I-16), (A1) + (I-10) + (I-17),
(A1) + (I-10) + (I-18), (A1) + (I-10) + (I-19), (A1) + (I-10) + (I-20),
(A1) + (I-10) + (I-22),

(A1) + (I-11) + (I-12), (A1) + (I-11) + (I-13), (A1) + (I-11) + (I-14),
20 (A1) + (I-11) + (I-16), (A1) + (I-11) + (I-17), (A1) + (I-11) + (I-18),
(A1) + (I-11) + (I-19), (A1) + (I-11) + (I-20), (A1) + (I-11) + (I-22),

(A1) + (I-12) + (I-13), (A1) + (I-12) + (I-14), (A1) + (I-12) + (I-16),
(A1) + (I-12) + (I-17), (A1) + (I-12) + (I-18), (A1) + (I-12) + (I-19),
25 (A1) + (I-12) + (I-20), (A1) + (I-12) + (I-22),

(A1) + (I-13) + (I-14), (A1) + (I-13) + (I-16), (A1) + (I-13) + (I-17),
(A1) + (I-13) + (I-18), (A1) + (I-13) + (I-20), (A1) + (I-13) + (I-22),

30 (A1) + (I-14) + (I-16), (A1) + (I-14) + (I-17), (A1) + (I-14) + (I-18),
(A1) + (I-14) + (I-19), (A1) + (I-14) + (I-20), (A1) + (I-14) + (I-22),

(A1) + (I-16) + (I-17), (A1) + (I-16) + (I-18), (A1) + (I-16) + (I-19),
(A1) + (I-16) + (I-20), (A1) + (I-16) + (I-22),

(A1) + (I-17) + (I-18), (A1) + (I-17) + (I-19), (A1) + (I-17) + (I-20),
(A1) + (I-17) + (I-22),

5 (A1) + (I-18) + (I-19), (A1) + (I-18) + (I-20), (A1) + (I-18) + (I-22),

(A1) + (I-19) + (I-20), (A1) + (I-19) + (I-22), or

(A1) + (I-20) + (I-22),

10 are not yet known in the art.

Therefore, above defined compositions are also a further object of the present invention.

Also more specifically, the plant growth regulators to be combined with Compound (A)
15 or Compound (A1) according to present invention, preferably to be combined with Compound (A1), are selected from the group consisting of:

Chlormequat-chloride (CCC) [= PGR-1], ethephon [= PGR-2], mepiquat [= PGR-3],
trinexapac-ethyl [= PGR-4], 2,4-D (= PGR-5), MCPA (= PGR-6) and 2,4-D Choline
(=PGR-7)

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A further preferred object of present invention, is the combined use of

(A1) + (PGR-1), (A1) + (PGR-2), (A1) + PGR-3), (A1) + (PGR-4),

(A1) + (PGR-5), (A1) + (PGR-6), (A1) + (PGR-7),

(A1) + (PGR-1) + (PGR-2), (A1) + (PGR-1) + (PGR-3), (A1) + (PGR-1) + (PGR-4), (A1)

25 + (PGR-1) + (PGR-5), (A1) + (PGR-1) + (PGR-6), (A1) + (PGR-1) + (PGR-7),

(A1) + (PGR-2) + (PGR-3), (A1) + (PGR-2) + (PGR-4), (A1) + (PGR-2) + (PGR-4), (A1)

+ (PGR-2) + (PGR-5), (A1) + (PGR-2) + (PGR-6), (A1) + (PGR-2) + (PGR-7), (A1) +

(PGR-3) + (PGR-4), (A1) + (PGR-3) + (PGR-5), (A1) + (PGR-3) + (PGR-6),

(A1) + (PGR-3) + (PGR-7), (A1) + (PGR-4) + (PGR-5), (A1) + (PGR-4) + (PGR-6), (A1)

30 + (PGR-4) + (PGR-7), (A1) + (PGR-5) + (PGR-6), (A1) + (PGR-5) + (PGR-7), or (A1) + (PGR-6) + (PGR-7),

for inducing specific growth regulating responses on plants, on seeds from which they grow or on the locus in which they grow in their normal habitat, preferably in the

absence of extraordinary environmental conditions and, thereby, increasing the yield in such treated plants.

A further preferred object of present invention, is the combined use of

5 (A1) + (PGR-5) + (PGR-6),

for inducing specific growth regulating responses on plants, on seeds from which they grow or on the locus in which they grow in their normal habitat, preferably in the absence of extraordinary environmental conditions and, thereby, increasing the yield in such treated plants.

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Plant yield increasing compositions comprising

(A1) + (PGR-1), (A1) + (PGR-2), (A1) + PGR-3), (A1) + (PGR-4), (A1) + (PGR-5), (A1) + (PGR-6), (A1) + (PGR-7),

15 (A1) + (PGR-1) + (PGR-2), (A1) + (PGR-1) + (PGR-3), (A1) + (PGR-1) + (PGR-4), (A1) + (PGR-1) + (PGR-5), (A1) + (PGR-1) + (PGR-6), (A1) + (PGR-1) + (PGR-7),

(A1) + (PGR-2) + (PGR-3), (A1) + (PGR-2) + (PGR-4), (A1) + (PGR-2) + (PGR-4), (A1) + (PGR-2) + (PGR-5), (A1) + (PGR-2) + (PGR-6), (A1) + (PGR-2) + (PGR-7),

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(A1) + (PGR-3) + (PGR-4), (A1) + (PGR-3) + (PGR-5), (A1) + (PGR-3) + (PGR-6), (A1) + (PGR-3) + (PGR-7),

(A1) + (PGR-4) + (PGR-5), (A1) + (PGR-4) + (PGR-6), (A1) + (PGR-4) + (PGR-7)

25 (A1) + (PGR-5) + (PGR-6), (A1) + (PGR-5) + (PGR-7), or

(A1) + (PGR-6) + (PGR-7)

are not yet known in the art.

30 Therefore, such above defined combinations are also a further object of the present invention.

It is to be said that, even by claiming the preferred use of the above defined combinations of Compounds (A), preferably Compound with one or more compound(s)

selected from the agrochemical compounds in the absence of extraordinary environmental stress conditions, the combined application might also be useful in cases where such extraordinary environmental stress conditions do exist for a certain time period, or, preferably, in an interim phase, i.e. phases in which no extraordinary environmental stress conditions do exist are interrupted by one or more phases in which extraordinary environmental conditions of identical or different kind do occur.

More specifically, the use of Compound (A), preferably Compound (A1) in combination with one or more agrochemical compound(s), preferably with agrochemical compounds selected from the group of fungicides, insecticides, and plant-growth regulators, doesn't show non-expected effects on plants concerning yield increase only in the absence of extraordinary environmental stress, but also on plants that are exposed to longer periods, preferably weeks, more preferably days of extraordinary environmental stress conditions, preferably heat and/or drought stress.

In accordance with the invention, it has additionally been found that the application, to plants or in their environment, of , of Compounds (A), preferably Compound (A1), either alone or in combination with other agrochemical compounds, especially with those that are above defined as the preferred ones from the group consisting of fungicides, insecticides, and plant growth regulators in combination with at least one fertilizer as defined below is/are possible.

Fertilizers which can be used in accordance with the invention together with the Compounds (A), preferably Compound (A1) either alone or in combination with other agrochemical compounds, especially with those that are above defined as the preferred ones from the group consisting of fungicides, insecticides, and plant growth regulators elucidated in detail above are generally organic and inorganic nitrogen-containing compounds, for example ureas, urea/formaldehyde condensation products, amino acids, ammonium salts and ammonium nitrates, potassium salts (preferably chlorides, sulfates, nitrates), salts of phosphoric acid and/or salts of phosphorous acid (preferably potassium salts and ammonium salts). In this context, particular mention should be made of the NPK fertilizers, i.e. fertilizers which contain nitrogen, phosphorus and potassium, calcium ammonium nitrate, i.e. fertilizers which additionally contain calcium, or ammonium nitrate sulfate (formula $(\text{NH}_4)_2\text{SO}_4$

NH₄NO₃), ammonium phosphate and ammonium sulfate. These fertilizers are generally known to the person skilled in the art; see also, for example, Ullmann's Encyclopedia of Industrial Chemistry, 5th edition, vol. A 10, pages 323 to 431, Verlagsgesellschaft, Weinheim, 1987.

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The fertilizers may also contain salts of micronutrients (preferably calcium, sulfur, boron, manganese, magnesium, iron, boron, copper, zinc, molybdenum and cobalt) and phytohormones (for example vitamin B1 and indole-3-acetic acid) or mixtures thereof. Fertilizers used in accordance with the invention may also contain further salts, such as monoammonium phosphate (MAP), diammonium phosphate (DAP), potassium sulfate, potassium chloride, magnesium sulfate. Suitable amounts of the secondary nutrients, or trace elements, are amounts of 0.5 to 5% by weight, based on the overall fertilizer. Further possible ingredients are crop protection compositions, insecticides or fungicides, growth regulators or mixtures thereof. This will be explained in more detail below.

The fertilizers can be used, for example, in the form of powders, granules, prills or compactates. However, the fertilizers can also be used in liquid form, dissolved in an aqueous medium. In this case, it is also possible to use dilute aqueous ammonia as the nitrogen fertilizer. Further possible constituents of fertilizers are described, for example, in Ullmann's Encyclopedia of Industrial Chemistry, 5th edition, 1987, Vol. A 10, pages 363 to 401, DE-A 41 28 828, DE-A 19 05 834 and DE-A 196 31 764. The general composition of the fertilizers which, in the context of the present invention, may take the form of straight and/or compound fertilizers, for example composed of nitrogen, potassium or phosphorus, may vary within a wide range. In general, a content of 1 to 30% by weight of nitrogen (preferably 5 to 20% by weight), 1 to 20% by weight of potassium (preferably 3 to 15% by weight) and a content of 1 to 20% by weight of phosphorus (preferably 3 to 10% by weight) is advantageous. The microelement content is typically in the ppm range, preferably in the range from 1 to 1000 ppm.

In the context of the present invention, the fertilizer and Compounds (A), preferably Compound (A1), either alone or in combination with other agrochemical compounds, especially with those that are above defined as the preferred ones from the group consisting of fungicides, insecticides, and plant growth regulators may be

administered simultaneously, i.e. synchronously. However, it is also possible first to apply the fertilizer and then Compounds (A), preferably Compound (A1), either alone or in combination with other agrochemical compounds, especially with those that are above defined as the preferred ones from the group consisting of fungicides, insecticides, and plant growth regulators, or first to apply a compound of the formula (I) and then the fertilizer. In the case of nonsynchronous application of a compound of the formula (I) and the fertilizer, the application in the context of the present invention is, however, effected in a functional relationship, especially within a period of generally 24 hours, preferably 18 hours, more preferably 12 hours, specifically 6 hours, more specifically 4 hours, even more specifically within 2 hours. In very particular embodiments of the present invention, Compounds (A), preferably Compound (A1), either alone or in combination with other agrochemical compounds, especially with those that are above defined as the preferred ones from the group consisting of fungicides, insecticides, and plant growth regulators and the fertilizer are applied within a time frame of less than 1 hour, preferably less than 30 minutes, more preferably less than 15 minutes.

The active ingredients for use in accordance with the invention can be employed in the following plants, for example, the enumeration which follows being nonlimiting.

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The term "useful plants" as used here refers to crop plants which are employed as plants for obtaining foods, animal feeds, fuels or for industrial purposes, also including ornamentals, turfs, commonly used trees employed as ornamentals in the public and domestic sectors, and forestry trees. Forestry trees include trees for the production of timber, cellulose, paper and products made from parts of the trees.

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The useful plants include, for example, the following types of plants: cereals, for example wheat, barley, rye, triticale, durum (hard wheat), oats, hops, rice, corn, millet/sorghum and maize; beet, for example sugar beet and fodder beet; fruits, for example pome fruit, stone fruit and soft fruit, for example apples, pears, plums, peaches, almonds, cherries and berries, for example strawberries, raspberries, blackberries; legumes, for example beans, lentils, peas and soybeans; oil crops, for example oilseed rape, mustard, poppies, olives, sunflowers, coconuts, castor oil plants, cacao beans and peanuts; cucurbits, for example pumpkin/squash, cucumbers

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and melons; fiber plants, for example cotton, flax, hemp and jute; citrus fruit, for example oranges, lemons, grapefruit and tangerines; vegetables, for example spinach, lettuce, asparagus, cabbage species, carrots, onions, tomatoes, potatoes and bell peppers; Lauraceae, for example avocado, Cinnamomum, camphor, or also plants
 5 such as tobacco, nuts, coffee, eggplant, sugarcane, tea, pepper, vine, grapevines, hops, bananas, latex plants, ornamentals, for example flowers, shrubs, deciduous trees and coniferous trees, and plants for turf and lawn. This enumeration does not constitute a limitation.

10 The following plants are considered to be particularly suitable target crops for the inventive use or method: oats, rye, triticale, durum, cotton, eggplant, turf, pome fruit, stone fruit, soft fruit, corn, wheat, barley, cucumber, tobacco, vines, rice, cereals, pear, pepper, beans, soybeans, oilseed rape, tomato, bell pepper, melons, cabbage, potatoes and apples.

15

Examples of trees which can be improved in accordance with the inventive method include: *Abies* sp., *Eucalyptus* sp., *Picea* sp., *Pinus* sp., *Aesculus* sp., *Platanus* sp., *Tilia* sp., *Acer* sp., *Tsuga* sp., *Fraxinus* sp., *Sorbus* sp., *Betula* sp., *Crataegus* sp., *Ulmus* sp., *Quercus* sp., *Fagus* sp., *Salix* sp., *Populus* sp..

20

Preferred trees which can be improved in accordance with the inventive method include: from the tree species *Aesculus*: *A. hippocastanum*, *A. pariflora*, *A. carnea*; from the tree species *Platanus*: *P. aceriflora*, *P. occidentalis*, *P. racemosa*; from the tree species *Picea*: *P. abies*; from the tree species *Pinus*: *P. radiata*, *P. ponderosa*, *P.*
 25 *contorta*, *P. sylvestre*, *P. elliotii*, *P. montecola*, *P. albicaulis*, *P. resinosa*, *P. palustris*, *P. taeda*, *P. flexilis*, *P. jeffregii*, *P. baksiana*, *P. strobes*; from the tree species *Eucalyptus*: *E. grandis*, *E. globulus*, *E. camadentis*, *E. nitens*, *E. obliqua*, *E. regnans*, *E. pilularis*.

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Particularly preferred trees which can be improved in accordance with the inventive method include: from the tree species *Pinus*: *P. radiata*, *P. ponderosa*, *P. contorta*, *P. sylvestre*, *P. strobes*; from the tree species *Eucalyptus*: *E. grandis*, *E. globulus* and *E. camadentis*.

Particularly preferred trees which can be improved in accordance with the inventive method include: horse chestnut, Platanaceae, linden tree, maple tree.

The present invention can also be applied to any turf grasses, including cool-season
 5 turf grasses and warm-season turf grasses. Examples of cool-season turf grasses are
 bluegrasses (*Poa* spp.), such as Kentucky bluegrass (*Poa pratensis* L.), rough
 bluegrass (*Poa trivialis* L.), Canada bluegrass (*Poa compressa* L.), annual bluegrass
 (*Poa annua* L.), upland bluegrass (*Poa glauantha* Gaudin), wood bluegrass (*Poa*
 10 *nemoralis* L.) and bulbous bluegrass (*Poa bulbosa* L.); bentgrasses (*Agrostis* spp.)
 such as creeping bentgrass (*Agrostis palustris* Huds.), colonial bentgrass (*Agrostis*
tenuis Sibth.), velvet bentgrass (*Agrostis canina* L.), South German Mixed Bentgrass
 (*Agrostis* spp. including *Agrostis tenuis* Sibth., *Agrostis canina* L., and *Agrostis*
palustris Huds.), and redtop (*Agrostis alba* L.);

15 fescues (*Festuca* spp.), such as red fescue (*Festuca rubra* L. spp. *rubra*), creeping
 fescue (*Festuca rubra* L.), chewings fescue (*Festuca rubra commutata* Gaud.), sheep
 fescue (*Festuca ovina* L.), hard fescue (*Festuca longifolia* Thuill.), hair fescue (*Festuca*
capillata Lam.), tall fescue (*Festuca arundinacea* Schreb.) and meadow fescue
 (*Festuca elanor* L.);

20 ryegrasses (*Lolium* spp.), such as annual ryegrass (*Lolium multiflorum* Lam.),
 perennial ryegrass (*Lolium perenne* L.) and italian ryegrass (*Lolium multiflorum* Lam.);

and wheatgrasses (*Agropyron* spp.), such as fairway wheatgrass (*Agropyron cristatum*
 25 (L.) Gaertn.), crested wheatgrass (*Agropyron desertorum* (Fisch.) Schult.) and western
 wheatgrass (*Agropyron smithii* Rydb.).

Examples of further cool-season turfgrasses are beachgrass (*Ammophila breviligulata*
 Fern.), smooth brome grass (*Bromus inermis* Leyss.), cattails such as Timothy (*Phleum*
 30 *pratense* L.), sand cattail (*Phleum subulatum* L.), orchardgrass (*Dactylis glomerata* L.),
 weeping alkaligrass (*Puccinellia distans* (L.) Parl.) and crested dog's-tail (*Cynosurus*
cristatus L.).

Examples of warm-season turfgrasses are Bermudagrass (*Cynodon* spp. L. C. Rich), zoysiagrass (*Zoysia* spp. Willd.), St. Augustine grass (*Stenotaphrum secundatum* Walt Kuntze), centipedegrass (*Eremochloa ophiuroides* Munro Hack.), carpetgrass (*Axonopus affinis* Chase), Bahia grass (*Paspalum notatum* Flugge), Kikuyugrass (5 *Pennisetum clandestinum* Hochst. ex Chiov.), buffalo grass (*Buchloe dactyloids* (Nutt.) Engelm.), Blue gramma (*Bouteloua gracilis* (H.B.K.) Lag. ex Griffiths), seashore paspalum (*Paspalum vaginatum* Swartz) and sideoats grama (*Bouteloua curtipendula* (Michx. Torr.). Cool-season turfgrasses are generally preferred for the use in accordance with the invention. Especially preferred are bluegrass, bentgrass and 10 redtop, fescues and ryegrasses. Bentgrass is especially preferred.

Particular preference is given in accordance with the invention to treating plants of the plant cultivars which are in each case commercially available or in use. Plant cultivars are understood to mean plants which have new properties ("traits") and which have 15 been obtained by conventional breeding, by mutagenesis or with the aid of recombinant DNA techniques. Crop plants may accordingly be plants which can be obtained by conventional breeding and optimization methods or by biotechnological and genetic engineering methods or combinations of these methods, including the transgenic plants and including the plant varieties which can and cannot be protected 20 by plant breeders' rights.

The inventive treatment method can thus also be used for the treatment of genetically modified organisms (GMOs), e.g. plants or seeds. Genetically modified plants (or transgenic plants) are plants in which a heterologous gene has been stably integrated 25 into the genome. The expression "heterologous gene" essentially means a gene which is provided or assembled outside the plant and when introduced in the nuclear, chloroplastic or mitochondrial genome gives the transformed plant new or improved agronomic or other properties by expressing a protein or polypeptide of interest or by downregulating or silencing other gene(s) which are present in the plant (using for 30 example antisense technology, cosuppression technology or RNAi technology [RNA interference]). A heterologous gene that is located in the genome is also called a transgene. A transgene that is defined by its particular location in the plant genome is called a transformation or transgenic event.

The inventive treatment method can further be used for the treatment of genetically modified organisms (GMOs), e.g. plants or seeds in which a heterologous gene has been transiently introduced e.g. using viral vectors.

- 5 Plants and plant varieties which are preferably treated according to the invention include all plants which have genetic material which imparts particularly advantageous, useful traits to these plants (whether obtained by breeding and/or biotechnological means).
- 10 Plants and plant varieties which may also be treated according to the invention are those plants characterized by enhanced yield characteristics. Enhanced yield in said plants can be the result of, for example, improved plant physiology, growth and development, such as water use efficiency, water retention efficiency, improved nitrogen use, enhanced carbon assimilation, improved photosynthesis, increased
15 germination efficiency and accelerated maturation. Yield can also be affected by improved plant architecture (under stress and non-stress conditions), including early flowering, flowering control for hybrid seed production, seedling vigor, plant size, internode number and distance, root growth, seed size, fruit size, pod size, pod or ear number, seed number per pod or ear, seed mass, enhanced seed filling, reduced seed
20 dispersal, reduced pod dehiscence and lodging resistance. Further yield traits include seed composition, such as carbohydrate content, protein content, oil content and composition, nutritional value, reduction in anti-nutritional compounds, improved processability and better storage stability.
- 25 Plants that may likewise be treated according to the invention are hybrid plants that already express the characteristics of heterosis, or hybrid vigor, which results in generally higher yield, vigor, health and resistance toward biotic and abiotic stress factors. Such plants are typically made by crossing an inbred male-sterile parent line (the female parent) with another inbred male-fertile parent line (the male parent).
- 30 Hybrid seed is typically harvested from the male-sterile plants and sold to growers. Male-sterile plants can sometimes (e.g. in corn) be produced by detasseling (i.e. the mechanical removal of the male reproductive organs or male flowers) but, more typically, male sterility is the result of genetic determinants in the plant genome. In that case, and especially when seed is the desired product to be harvested from the hybrid

plants, it is typically useful to ensure that male fertility in hybrid plants, which contain the genetic determinants responsible for male sterility, is fully restored. This can be accomplished by ensuring that the male parents have appropriate fertility restorer genes which are capable of restoring the male fertility in hybrid plants that contain the genetic determinants responsible for male sterility. Genetic determinants for male sterility may be located in the cytoplasm. Examples of cytoplasmic male sterility (CMS) were for instance described for Brassica species (WO 1992/005251, WO 1995/009910, WO 1998/27806, WO 2005/002324, WO 2006/021972 and US 6,229,072). However, genetic determinants for male sterility can also be located in the nuclear genome. Male-sterile plants can also be obtained by plant biotechnology methods such as genetic engineering. A particularly useful means of obtaining male-sterile plants is described in WO 89/10396 in which, for example, a ribonuclease such as a barnase is selectively expressed in the tapetum cells in the stamens. Fertility can then be restored by expression in the tapetum cells of a ribonuclease inhibitor such as barstar (e.g. WO 1991/002069).

Plants or plant varieties (obtained by plant biotechnology methods such as genetic engineering) which may also be treated according to the invention are herbicide-tolerant plants, i.e. plants made tolerant to one or more given herbicides. Such plants can be obtained either by genetic transformation, or by selection of plants containing a mutation imparting such herbicide tolerance.

Herbicide-tolerant plants are for example glyphosate-tolerant plants, i.e. plants made tolerant to the herbicide glyphosate or salts thereof. For example, glyphosate-tolerant plants can be obtained by transforming the plant with a gene encoding the enzyme 5-enolpyruvylshikimate-3-phosphate synthase (EPSPS). Examples of such EPSPS genes are the AroA gene (mutant CT7) of the bacterium *Salmonella typhimurium* (Comai et al., Science (1983), 221, 370-371), the CP4 gene of the bacterium *Agrobacterium* sp. (Barry et al., Curr. Topics Plant Physiol. (1992), 7, 139-145), the genes encoding a petunia EPSPS (Shah et al., Science (1986), 233, 478-481), a tomato EPSPS (Gasser et al., J. Biol. Chem. (1988), 263, 4280-4289) or an Eleusine EPSPS (WO 2001/66704). It can also be a mutated EPSPS, as described, for example, in EP-A 0837944, WO 2000/066746, WO 2000/066747 or WO 2002/026995. Glyphosate-tolerant plants can also be obtained by expressing a gene that encodes a

glyphosate oxidoreductase enzyme as described in US 5,776,760 and US 5,463,175. Glyphosate-tolerant plants can also be obtained by expressing a gene that encodes a glyphosate acetyltransferase enzyme as described, for example, in WO 2002/036782, WO 2003/092360, WO 2005/012515 and WO 2007/024782. Glyphosate-tolerant
5 plants can also be obtained by selecting plants containing naturally occurring mutations of the above-mentioned genes as described, for example, in WO 2001/024615 or WO 2003/013226. Plants expressing EPSPS genes that confer glyphosate tolerance are described in e.g. US Patent Application Nos 11/517,991, 10/739,610, 12/139,408, 12/352,532, 11/312,866, 11/315,678, 12/421,292,
10 11/400,598, 11/651,752, 11/681,285, 11/605,824, 12/468,205, 11/760,570, 11/762,526, 11/769,327, 11/769,255, 11/943801 or 12/362,774. Plants comprising other genes that confer glyphosate tolerance, such as decarboxylase genes, are described in e.g. US patent applications 11/588,811, 11/185,342, 12/364,724, 11/185,560 or 12/423,926.

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Other herbicide-resistant plants are for example plants which have been made tolerant to herbicides inhibiting the enzyme glutamine synthase, such as bialaphos, phosphinothricin or glufosinate. Such plants can be obtained by expressing an enzyme detoxifying the herbicide or a mutant glutamine synthase enzyme that is resistant to
20 inhibition e.g. described in US Patent Application No 11/760,602. One such efficient detoxifying enzyme is, for example, an enzyme encoding a phosphinothricin acetyltransferase (such as the bar or pat protein from Streptomyces species for example). Plants expressing an exogenous phosphinothricin acetyltransferase have been described, for example, in US 5,561,236; US 5,648,477; US 5,646,024; US
25 5,273,894; US 5,637,489; US 5,276,268; US 5,739,082; US 5,908,810 and US 7,112,665.

30

Further herbicide-tolerant plants are also plants that have been made tolerant to the herbicides inhibiting the enzyme hydroxyphenylpyruvatedioxygenase (HPPD).
Hydroxyphenylpyruvatedioxygenases are enzymes that catalyze the reaction in which para-hydroxyphenylpyruvate (HPP) is transformed into homogentisate. Plants tolerant to HPPD inhibitors can be transformed with a gene encoding a naturally occurring resistant HPPD enzyme such as an HPPD enzyme from non-plant organisms, such as described in WO 2011/076877, WO 2011/076882, WO2011/076892, WO

2011/076885, WO2011/076889, or HPPD enzyme from a monocot plant, such as Avena sativa or Zea mays, or having at least 98 % sequence identity to an enzyme of Avena sativa or Zea mays, or an HPPD enzyme as described in WO/2011/076885, WO2011/076892, WO/2011/076877, WO/2011/076882, WO/2011/076889, or a gene
5 encoding a mutated or chimeric HPPD enzyme according to WO 1996/038567, WO 1999/024585 and WO 1999/024586 WO 2009/144079, WO 2002/046387, WO/2011/068567, WO/2010/085705, or US 6,768,044. Tolerance to HPPD inhibitors can also be obtained by transforming plants with genes encoding certain enzymes enabling the formation of homogentisate despite the inhibition of the native HPPD
10 enzyme by the HPPD inhibitor. Such plants and genes are described in WO 1999/034008 and WO 2002/36787. Tolerance of plants to HPPD inhibitors can also be improved by transforming plants with a gene encoding a prephenate dehydrogenase enzyme in addition to a gene encoding an HPPD-tolerant enzyme, as described in WO 2004/024928.

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Further herbicide-resistant plants are plants that have been made tolerant to acetolactate synthase (ALS) inhibitors. Known ALS inhibitors include, for example, sulfonylurea, imidazolinone, triazolopyrimidines, pyrimidinyl oxy(thio)benzoates, and/or sulfonylaminocarbonyltriazolinone herbicides. Different mutations in the ALS enzyme
20 (also known as acetohydroxy acid synthase, AHAS) are known to confer tolerance to different herbicides and groups of herbicides, as described, for example, in Tranel and Wright, Weed Science (2002), 50, 700-712, and also in US 5,605,011, US 5,378,824, US 5,141,870 and US 5,013,659. The production of sulfonylurea-tolerant plants and imidazolinone-tolerant plants has been described in US 5,605,011; US 5,013,659; US
25 5,141,870; US 5,767,361; US 5,731,180; US 5,304,732; US 4,761,373; US 5,331,107; US 5,928,937; and US 5,378,824; and also in the international publication WO 1996/033270. Further imidazolinone-tolerant plants have also been described, for example in WO 2004/040012, WO 2004/106529, WO 2005/020673, WO 2005/093093, WO 2006/007373, WO 2006/015376, WO 2006/024351 and WO 2006/060634. Further
30 sulfonylurea- and imidazolinone-tolerant plants have also been described, for example in WO 2007/024782, and US Patent Application No 61/288958.

Other plants tolerant to imidazolinone and/or sulfonylurea can be obtained by induced mutagenesis, by selection in cell cultures in the presence of the herbicide or by

mutation breeding, as described, for example, for soybeans in US 5,084,082, for rice in WO 1997/41218, for sugar beet in US 5,773,702 and WO 1999/057965, for lettuce in US 5,198,599 or for sunflower in WO 2001/065922.

- 5 Plants or plant varieties (obtained by plant biotechnology methods such as genetic engineering) which may also be treated according to the invention are insect-resistant transgenic plants, i.e. plants made resistant to attack by certain target insects. Such plants can be obtained by genetic transformation, or by selection of plants containing a mutation imparting such insect resistance.

10

In the present context, the term "insect-resistant transgenic plant" includes any plant containing at least one transgene comprising a coding sequence encoding:

- 1) an insecticidal crystal protein from *Bacillus thuringiensis* or an insecticidal
15 portion thereof, such as the insecticidal crystal proteins compiled by Crickmore et al., Microbiology and Molecular Biology Reviews (1998), 62, 807-813, updated by Crickmore et al. (2005) in the *Bacillus thuringiensis* toxin nomenclature (online at: http://www.lifesci.sussex.ac.uk/Home/Neil_Crickmore/Bt/), or insecticidal portions thereof, for example proteins of the Cry protein classes Cry1Ab, Cry1Ac, Cry1F,
20 Cry2Ab, Cry3Ae or Cry3Bb or insecticidal portions thereof (e.g. EP 1999141 and WO2007/107302) or such proteins encoded by synthetic genes as described e.g. in US Patent Application No 12/249,016 or
- 2) a crystal protein from *Bacillus thuringiensis* or a portion thereof which is
25 insecticidal in the presence of a second crystal protein other than *Bacillus thuringiensis* or a portion thereof, such as the binary toxin made up of the Cy34 and Cy35 crystal proteins (Moellenbeck et al., Nat. Biotechnol. (2001), 19, 668-72; Schnepf et al., Applied Environm. Microb. (2006), 71, 1765-1774); or
- 30 3) a hybrid insecticidal protein comprising parts of two different insecticidal crystal proteins from *Bacillus thuringiensis*, such as a hybrid of the proteins of 1) above or a hybrid of the proteins of 2) above, for example the Cry1A.105 protein produced by corn event MON98034 (WO 2007/027777); or

- 4) a protein of any one of points 1) to 3) above wherein some, particularly 1 to 10, amino acids have been replaced by another amino acid to obtain a higher insecticidal activity to a target insect species, and/or to expand the range of target insect species affected, and/or because of changes induced in the encoding DNA during cloning or transformation, such as the Cry3Bb1 protein in corn events MON863 or MON88017, or the Cry3A protein in corn event MIR604; or
- 5) an insecticidal secreted protein from *Bacillus thuringiensis* or *Bacillus cereus*, or an insecticidal portion thereof, such as the vegetative insecticidal proteins (VIPs) listed under the following link, for example proteins from the VIP3Aa protein class: http://www.lifesci.sussex.ac.uk/Home/Neil_Crickmore/Bt/vip.html or
- 6) a secreted protein from *Bacillus thuringiensis* or *Bacillus cereus* which is insecticidal in the presence of a second secreted protein from *Bacillus thuringiensis* or *B. cereus*, such as the binary toxin made up of the VIP1A and VIP2A proteins (WO 1994/21795); or
- 7) a hybrid insecticidal protein comprising parts from different secreted proteins from *Bacillus thuringiensis* or *Bacillus cereus*, such as a hybrid of the proteins in 1) above or a hybrid of the proteins in 2) above; or
- 8) a protein of any one of points 1) to 3) above wherein some, particularly 1 to 10, amino acids have been replaced by another amino acid to obtain a higher insecticidal activity to a target insect species, and/or to expand the range of target insect species affected, and/or because of changes induced in the encoding DNA during cloning or transformation (while still encoding an insecticidal protein), such as the VIP3Aa protein in cotton event COT 102.

Of course, insect-resistant transgenic plants, as used herein, also include any plant comprising a combination of genes encoding the proteins of any one of the above classes 1 to 8. In one embodiment, an insect-resistant plant contains more than one transgene encoding a protein of any one of the above classes 1 to 8, to expand the range of target insect species affected or to delay insect resistance development to the plants, by using different proteins insecticidal to the same target insect species but

having a different mode of action, such as binding to different receptor binding sites in the insect.

An "insect-resistant transgenic plant", as used herein, further includes any plant
5 containing at least one transgene comprising a sequence producing upon expression a double-stranded RNA which upon ingestion by a plant insect pest inhibits the growth of this insect pest, as described e.g. in WO 2007/080126, WO 2006/129204, WO 2007/074405, WO 2007/080127 and WO 2007/035650.

10 Examples of nematode resistant plants are described in e.g. US Patent Application Nos 11/765,491, 11/765,494, 10/926,819, 10/782,020, 12/032,479, 10/783,417, 10/782,096, 11/657,964, 12/192,904, 11/396,808, 12/166,253, 12/166,239, 12/166,124, 12/166,209, 11/762,886, 12/364,335, 11/763,947, 12/252,453, 12/209,354, 12/491,396 or 12/497,221.

15

Plants or plant varieties (obtained by plant biotechnology methods such as genetic engineering) which may also be treated according to the invention are tolerant to abiotic stress factors. Such plants can be obtained by genetic transformation, or by selection of plants containing a mutation imparting such stress resistance. Particularly
20 useful stress-tolerant plants include the following:

a. plants which contain a transgene capable of reducing the expression and/or the activity of the poly(ADP-ribose)polymerase (PARP) gene in the plant cells or plants, as described in WO 2000/004173 or EP 04077984.5 or EP 06009836.5;

25

b. plants which contain a stress tolerance-enhancing transgene capable of reducing the expression and/or the activity of the PARP encoding genes of the plants or plant cells, as described, for example, in WO 2004/090140;

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c. plants which contain a stress tolerance-enhancing transgene coding for a plant-functional enzyme of the nicotinamide adenine dinucleotide salvage biosynthesis pathway, including nicotinamidase, nicotinate phosphoribosyltransferase, nicotinic acid mononucleotide adenylyltransferase, nicotinamide adenine dinucleotide synthetase or

nicotinamide phosphoribosyltransferase, as described, for example, in EP 04077624.7 or WO 2006/133827 or PCT/EP07/002433.

Plants or plant varieties (obtained by plant biotechnology methods such as genetic
5 engineering) which may also be treated according to the invention show altered quantity, quality and/or storage stability of the harvested product and/or altered properties of specific ingredients of the harvested product such as, for example:

- 1) Transgenic plants which synthesize a modified starch which is altered with
10 respect to its chemophysical traits, in particular the amylose content or the amylose/amylopectin ratio, the degree of branching, the average chain length, the distribution of the side chains, the viscosity behavior, the gel resistance, the grain size and/or grain morphology of the starch in comparison to the synthesized starch in wild-type plant cells or plants, such that this modified starch is better suited for certain
15 applications. These transgenic plants synthesizing a modified starch are described, for example, in EP 0571427, WO 1995/004826, EP 0719338, WO 1996/15248, WO 1996/19581, WO 1996/27674, WO 1997/11188, WO 1997/26362, WO 1997/32985, WO 1997/42328, WO 1997/44472, WO 1997/45545, WO 1998/27212, WO 1998/40503, WO 99/58688, WO 1999/58690, WO 1999/58654,
20 WO 2000/008184, WO 2000/008185, WO 2000/28052, WO 2000/77229, WO 2001/12782, WO 2001/12826, WO 2002/101059, WO 2003/071860, WO 2004/056999, WO 2005/030942, WO 2005/030941, WO 2005/095632, WO 2005/095617, WO 2005/095619, WO 2005/095618, WO 2005/123927, WO 2006/018319, WO 2006/103107, WO 2006/108702, WO 2007/009823,
25 WO 2000/22140, WO 2006/063862, WO 2006/072603, WO 2002/034923, EP 06090134.5, EP 06090228.5, EP 06090227.7, EP 07090007.1, EP 07090009.7, WO 2001/14569, WO 2002/79410, WO 2003/33540, WO 2004/078983, WO 2001/19975, WO 1995/26407, WO 1996/34968, WO 1998/20145, WO 1999/12950, WO 1999/66050, WO 1999/53072, US 6,734,341, WO 2000/11192,
30 WO 1998/22604, WO 1998/32326, WO 2001/98509, WO 2001/98509, WO 2005/002359, US 5,824,790, US 6,013,861, WO 1994/004693, WO 1994/009144, WO 1994/11520, WO 1995/35026 and WO 1997/20936.

- 2) Transgenic plants which synthesize non-starch carbohydrate polymers or which synthesize non-starch carbohydrate polymers with altered properties in comparison to wild-type plants without genetic modification. Examples are plants which produce polyfructose, especially of the inulin and levan type, as described in EP 0663956, 5 WO 1996/001904, WO 1996/021023, WO 1998/039460 and WO 1999/024593, plants which produce alpha-1,4-glucans, as described in WO 1995/031553, US 2002/031826, US 6,284,479, US 5,712,107, WO 1997/047806, WO 1997/047807, WO 1997/047808 and WO 2000/14249, plants which produce alpha-1,6-branched alpha-1,4-glucans, as described in WO 2000/73422, and plants which produce alternan, as described in 10 WO 2000/047727, EP 06077301.7, US 5,908,975 and EP 0728213.
- 3) Transgenic plants which produce hyaluronan, as described, for example, in WO 2006/032538, WO 2007/039314, WO 2007/039315, WO 2007/039316, JP 2006/304779 and WO 2005/012529.
- 15 4) 4) transgenic plants or hybrid plants, such as onions with characteristics such as 'high soluble solids content', 'low pungency' (LP) and/or 'long storage' (LS), as described in US Patent Appl. No. 12/020,360 and 61/054,026
- 20 Plants or plant varieties (obtained by plant biotechnology methods such as genetic engineering) which may also be treated according to the invention are plants, such as cotton plants, with altered fiber characteristics. Such plants can be obtained by genetic transformation, or by selection of plants containing a mutation imparting such altered fiber characteristics and include:
- 25 a) plants, such as cotton plants, which contain an altered form of cellulose synthase genes, as described in WO 1998/000549;
- b) plants, such as cotton plants, which contain an altered form of rsw2 or rsw3 30 homologous nucleic acids, as described in WO 2004/053219;
- c) plants, such as cotton plants, with an increased expression of sucrose phosphate synthase, as described in WO 2001/017333;

d) plants, such as cotton plants, with an increased expression of sucrose synthase, as described in WO 02/45485;

5 e) plants, such as cotton plants, wherein the timing of the plasmodesmatal gating at the basis of the fiber cell is altered, for example through downregulation of fiber-selective β -1,3-glucanase, as described in WO 2005/017157;

10 f) plants, such as cotton plants, which have fibers with altered reactivity, for example through the expression of the N-acetylglucosaminetransferase gene including nodC and chitin synthase genes, as described in WO 2006/136351.

Plants or plant cultivars (obtained by plant biotechnology methods such as genetic engineering) which may also be treated according to the invention are plants, such as oilseed rape or related Brassica plants, with altered oil profile characteristics. Such
15 plants can be obtained by genetic transformation or by selection of plants containing a mutation imparting such altered oil characteristics and include:

a) plants, such as oilseed rape plants, which produce oil having a high oleic acid content, as described, for example, in US 5,969,169, US 5,840,946 or US 6,323,392 or
20 US 6,063,947;

b) plants, such as oilseed rape plants, which produce oil having a low linolenic acid content, as described in US 6,270,828, US 6,169,190 or US 5,965,755;

25 c) plants, such as oilseed rape plants, which produce oil having a low level of saturated fatty acids, as described, for example, in US 5,434,283 or US Patent Application No 12/668303

Plants or plant cultivars (that can be obtained by plant biotechnology methods such as
30 genetic engineering) which may also be treated according to the invention are plants, such as oilseed rape or related Brassica plants, with altered seed shattering characteristics. Such plants can be obtained by genetic transformation, or by selection of plants contain a mutation imparting such altered seed shattering characteristics and

include plants such as oilseed rape plants with delayed or reduced seed shattering as described in US Patent Appl. No. 61/135,230, WO09/068313 and WO10/006732.

Particularly useful transgenic plants which may be treated according to the invention are plants which comprise one or more genes which encode one or more toxins and are the transgenic plants available under the following trade names: YIELD GARD® (for example corn, cotton, soybeans), KnockOut® (for example corn), BiteGard® (for example corn), BT-Xtra® (for example corn), Bollgard® (cotton), Nucotn® (cotton), Nucotn 33B® (cotton), NatureGard® (for example corn), Protecta®, Agrisure® (corn), Herculex® (corn), MaizeGard® (corn), MaxGard™ (corn), TwinLink® (cotton), VIPCot® (cotton), Widestrike™ (cotton) and NewLeaf® (potato). Examples of herbicide-tolerant plants which may be mentioned are corn varieties, cotton varieties and soybean varieties which are available under the following trade names: Roundup Ready® (tolerance to glyphosate, for example corn, cotton, soybeans), Glytol® (tolerance to glyphosate, cotton) Liberty Link® (tolerance to phosphinothricin, for example oilseed rape, cotton, soybean), IMI® (tolerance to imidazolinone), Optimum™ Gat™ (tolerance to sulfonylurea and glyphosate) and SCS® (tolerance to sulfonylurea, for example corn) and Enlist™ (tolerance to 2,4-D and glyphosate). Herbicide-resistant plants (plants bred in a conventional manner for herbicide tolerance) which may be mentioned include the varieties sold under the name Clearfield® (for example corn)..Further transgenic plant varieties having improved characteristics are sold under trade names including InVigor® (canola), Amflora® (potatoes) Maveria® (corn). Varieties combining different events may be sold under tradenames including SmartStax® .

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Particularly useful transgenic plants which may be treated according to the invention are plants containing transformation events, or a combination of transformation events, and that are listed for example in the databases for various national or regional regulatory agencies including Event 1143-14A (cotton, insect control, not deposited, described in WO2006/128569); Event 1143-51B (cotton, insect control, not deposited, described in WO2006/128570); Event 1445 (cotton, herbicide tolerance, not deposited, described in US2002120964 or WO2002/034946); Event 17053 (rice, herbicide tolerance, deposited as PTA-9843, described in WO2010/117737); Event 17314 (rice,

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herbicide tolerance, deposited as PTA-9844, described in WO2010/117735); Event 281-24-236 (cotton, insect control - herbicide tolerance, deposited as PTA-6233, described in WO2005/103266 or US2005216969); Event 3006-210-23 (cotton, insect control - herbicide tolerance, deposited as PTA-6233, described in US2007143876 or

5 WO2005/103266); Event 3272 (corn, quality trait, deposited as PTA-9972, described in WO2006098952 or US2006230473); Event 40416 (corn, insect control - herbicide tolerance, deposited as ATCC PTA-11508, described in WO2011/075593); Event 43A47 (corn, insect control - herbicide tolerance, deposited as ATCC PTA-11509, described in WO2011/075595); Event 5307 (corn, insect control, deposited as ATCC

10 PTA-9561, described in WO2010/077816); Event ASR-368 (bent grass, herbicide tolerance, deposited as ATCC PTA-4816, described in US2006162007 or WO2004053062); Event B16 (corn, herbicide tolerance, not deposited, described in US2003126634); Event BPS-CV127-9 (soybean, herbicide tolerance, deposited as NCIMB No. 41603, described in WO2010/080829); Event CE43-67B (cotton, insect

15 control, deposited as DSM ACC2724, described in US2009217423 or WO2006/128573); Event CE44-69D (cotton, insect control, not deposited, described in US20100024077); Event CE44-69D (cotton, insect control, not deposited, described in WO2006/128571); Event CE46-02A (cotton, insect control, not deposited, described in WO2006/128572); Event COT102 (cotton, insect control, not deposited, described in

20 US2006130175 or WO2004039986); Event COT202 (cotton, insect control, not deposited, described in US2007067868 or WO2005054479); Event COT203 (cotton, insect control, not deposited, described in WO2005/054480); Event DAS40278 (corn, herbicide tolerance, deposited as ATCC PTA-10244, described in WO2011/022469); Event DAS-59122-7 (corn, insect control - herbicide tolerance, deposited as ATCC

25 PTA 11384 , described in US2006070139); Event DAS-59132 (corn, insect control - herbicide tolerance, not deposited, described in WO2009/100188); Event DAS68416 (soybean, herbicide tolerance, deposited as ATCC PTA-10442, described in WO2011/066384 or WO2011/066360); Event DP-098140-6 (corn, herbicide tolerance, deposited as ATCC PTA-8296, described in US2009137395 or WO2008/112019);

30 Event DP-305423-1 (soybean, quality trait, not deposited, described in US2008312082 or WO2008/054747); Event DP-32138-1 (corn, hybridization system, deposited as ATCC PTA-9158, described in US20090210970 or WO2009/103049); Event DP-356043-5 (soybean, herbicide tolerance, deposited as ATCC PTA-8287, described in US20100184079 or WO2008/002872); Event EE-1 (brinjal, insect control, not

deposited, described in WO2007/091277); Event FI117 (corn, herbicide tolerance, deposited as ATCC 209031, described in US2006059581 or WO1998/044140); Event GA21 (corn, herbicide tolerance, deposited as ATCC 209033, described in US2005086719 or WO1998/044140); Event GG25 (corn, herbicide tolerance, deposited as ATCC 209032, described in US2005188434 or WO1998/044140); Event GHB119 (cotton, insect control - herbicide tolerance, deposited as ATCC PTA-8398, described in WO2008/151780); Event GHB614 (cotton, herbicide tolerance, deposited as ATCC PTA-6878, described in US2010050282 or WO2007/017186); Event GJ11 (corn, herbicide tolerance, deposited as ATCC 209030, described in US2005188434 or WO1998/044140); Event GM RZ13 (sugar beet, virus resistance , deposited as NCIMB-41601, described in WO2010/076212); Event H7-1 (sugar beet, herbicide tolerance, deposited as NCIMB 41158 or NCIMB 41159, described in US2004172669 or WO2004/074492); Event JOPLIN1 (wheat, disease tolerance, not deposited, described in US2008064032); Event LL27 (soybean, herbicide tolerance, deposited as NCIMB41658, described in WO2006/108674 or US2008320616); Event LL55 (soybean, herbicide tolerance, deposited as NCIMB 41660, described in WO2006/108675 or US2008196127); Event LLcotton25 (cotton, herbicide tolerance, deposited as ATCC PTA-3343, described in WO2003013224 or US2003097687); Event LLRICE06 (rice, herbicide tolerance, deposited as ATCC-23352, described in US6468747 or WO2000/026345); Event LLRICE601 (rice, herbicide tolerance, deposited as ATCC PTA-2600, described in US20082289060 or WO2000/026356); Event LY038 (corn, quality trait, deposited as ATCC PTA-5623, described in US2007028322 or WO2005061720); Event MIR162 (corn, insect control, deposited as PTA-8166, described in US2009300784 or WO2007/142840); Event MIR604 (corn, insect control, not deposited, described in US2008167456 or WO2005103301); Event MON15985 (cotton, insect control, deposited as ATCC PTA-2516, described in US2004-250317 or WO2002/100163); Event MON810 (corn, insect control, not deposited, described in US2002102582); Event MON863 (corn, insect control, deposited as ATCC PTA-2605, described in WO2004/011601 or US2006095986); Event MON87427 (corn, pollination control, deposited as ATCC PTA-7899, described in WO2011/062904); Event MON87460 (corn, stress tolerance, deposited as ATCC PTA-8910, described in WO2009/111263 or US20110138504); Event MON87701 (soybean, insect control, deposited as ATCC PTA-8194, described in US2009130071 or WO2009/064652); Event MON87705 (soybean, quality trait - herbicide tolerance,

deposited as ATCC PTA-9241, described in US20100080887 or WO2010/037016);
Event MON87708 (soybean, herbicide tolerance, deposited as ATCC PTA9670,
described in WO2011/034704); Event MON87754 (soybean, quality trait, deposited as
ATCC PTA-9385, described in WO2010/024976); Event MON87769 (soybean, quality
5 trait, deposited as ATCC PTA-8911, described in US20110067141 or
WO2009/102873); Event MON88017 (corn, insect control - herbicide tolerance,
deposited as ATCC PTA-5582, described in US2008028482 or WO2005/059103);
Event MON88913 (cotton, herbicide tolerance, deposited as ATCC PTA-4854,
described in WO2004/072235 or US2006059590); Event MON89034 (corn, insect
10 control, deposited as ATCC PTA-7455, described in WO2007/140256 or
US2008260932); Event MON89788 (soybean, herbicide tolerance, deposited as ATCC
PTA-6708, described in US2006282915 or WO2006/130436); Event MS11 (oilseed
rape, pollination control - herbicide tolerance, deposited as ATCC PTA-850 or PTA-
2485, described in WO2001/031042); Event MS8 (oilseed rape, pollination control -
15 herbicide tolerance, deposited as ATCC PTA-730, described in WO2001/041558 or
US2003188347); Event NK603 (corn, herbicide tolerance, deposited as ATCC PTA-
2478, described in US2007-292854); Event PE-7 (rice, insect control, not deposited,
described in WO2008/114282); Event RF3 (oilseed rape, pollination control - herbicide
tolerance, deposited as ATCC PTA-730, described in WO2001/041558 or
20 US2003188347); Event RT73 (oilseed rape, herbicide tolerance, not deposited,
described in WO2002/036831 or US2008070260); Event T227-1 (sugar beet, herbicide
tolerance, not deposited, described in WO2002/44407 or US2009265817); Event T25
(corn, herbicide tolerance, not deposited, described in US2001029014 or
WO2001/051654); Event T304-40 (cotton, insect control - herbicide tolerance,
25 deposited as ATCC PTA-8171, described in US2010077501 or WO2008/122406);
Event T342-142 (cotton, insect control, not deposited, described in WO2006/128568);
Event TC1507 (corn, insect control - herbicide tolerance, not deposited, described in
US2005039226 or WO2004/099447); Event VIP1034 (corn, insect control - herbicide
tolerance, deposited as ATCC PTA-3925., described in WO2003/052073), Event
30 32316 (corn,insect control-herbicide tolerance,deposited as PTA-11507, described in
WO2011/084632), Event 4114 (corn,insect control-herbicide tolerance,deposited as
PTA-11506, described in WO2011/084621).

The Compounds (A), preferably Compound (A1) to be used in accordance with the invention, either alone or in combination with other agrochemical compounds, especially with those that are above defined as the preferred ones from the group consisting of fungicides, insecticides, and plant growth regulators, can be converted to
5 customary formulations, such as solutions, emulsions, wettable powders, water- and oil-based suspensions, powders, dusts, pastes, soluble powders, soluble granules, granules for broadcasting, suspoemulsion concentrates, natural compounds impregnated with active ingredient, synthetic substances impregnated with active ingredient, fertilizers, and also microencapsulations in polymeric substances. In the
10 context of the present invention, it is especially preferred when Compounds (A), preferably Compound (A1) are/is used in accordance with the invention, either alone or in combination with other agrochemical compounds, especially with those that are above defined as the preferred ones from the group consisting of fungicides, insecticides, and plant growth regulators are used in the form of a spray formulation.

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The present invention therefore also relates to a spray formulation for increasing the yield of useful plants or crop plants with respect to their harvested plant organs. A spray formulation is described in detail hereinafter:

20 The formulations for spray application are produced in a known manner, for example by mixing Compounds (A), preferably Compound (A1) to be used in accordance with the invention, either alone or in combination with other agrochemical compounds, especially with those that are above defined as the preferred ones from the group consisting of fungicides, insecticides, and plant growth regulatorsinvention with
25 extenders, i.e. liquid solvents and/or solid carriers, optionally with use of surfactants, i.e. emulsifiers and/or dispersants and/or foam formers. Further customary additives, for example customary extenders and solvents or diluents, dyes, wetting agents, dispersants, emulsifiers, antifoams, preservatives, secondary thickeners, stickers, gibberellins and also water, can optionally also be used. The formulations are prepared
30 either in suitable equipment or else before or during application.

The auxiliaries used may be those substances which are suitable for imparting, to the composition itself and/or to preparations derived therefrom (for example spray liquors), particular properties such as particular technical properties and/or else special

biological properties. Useful typical auxiliaries include: extenders, solvents and carriers.

Suitable extenders are, for example, water, polar and nonpolar organic chemical liquids, for example from the classes of the aromatic and nonaromatic hydrocarbons (such as paraffins, alkylbenzenes, alkylnaphthalenes, chlorobenzenes), the alcohols and polyols (which may optionally also be substituted, etherified and/or esterified), the ketones (such as acetone, cyclohexanone), esters (including fats and oils) and (poly)ethers, the unsubstituted and substituted amines, amides, lactams (such as N-alkylpyrrolidones) and lactones, the sulfones and sulfoxides (such as dimethyl sulfoxide).

If the extender used is water, it is also possible to use, for example, organic solvents as auxiliary solvents. Useful liquid solvents are essentially: aromatics such as xylene, toluene or alkylnaphthalenes, chlorinated aromatics and chlorinated aliphatic hydrocarbons such as chlorobenzenes, chloroethylenes or methylene chloride, aliphatic hydrocarbons such as cyclohexane or paraffins, for example petroleum fractions, mineral and vegetable oils, alcohols such as butanol or glycol and also their ethers and esters, ketones such as acetone, methyl ethyl ketone, methyl isobutyl ketone or cyclohexanone, strongly polar solvents such as dimethyl sulfoxide, and also water.

It is possible to use dyes such as inorganic pigments, for example iron oxide, titanium oxide and Prussian Blue, and organic dyes such as alizarin dyes, azo dyes and metal phthalocyanine dyes, and trace nutrients such as salts of iron, manganese, boron, copper, cobalt, molybdenum and zinc.

Useful wetting agents which may be present in the formulations usable in accordance with the invention are all substances which promote wetting and which are conventionally used for the formulation of active agrochemical ingredients. Preference is given to using alkyl naphthalenesulfonates, such as diisopropyl or diisobutyl naphthalenesulfonates.

Useful dispersants and/or emulsifiers which may be present in the formulations usable in accordance with the invention are all nonionic, anionic and cationic dispersants conventionally used for the formulation of active agrochemical ingredients. Usable with preference are nonionic or anionic dispersants or mixtures of nonionic or anionic dispersants. Suitable nonionic dispersants are especially ethylene oxide/propylene oxide block polymers, alkylphenol polyglycol ethers and tristyrylphenol polyglycol ether, and the phosphated or sulfated derivatives thereof. Suitable anionic dispersants are especially lignosulfonates, salts of polyacrylic acid and arylsulfonate/formaldehyde condensates.

10

Antifoams which may be present in the formulations usable in accordance with the invention are all foam-inhibiting substances conventionally used for the formulation of active agrochemical ingredients. Usable with preference are silicone antifoams and magnesium stearate.

15

Preservatives which may be present in the formulations usable in accordance with the invention are all substances usable for such purposes in agrochemical compositions. Examples include dichlorophene and benzyl alcohol hemiformal.

20

Secondary thickeners which may be present in the formulations usable in accordance with the invention are all substances usable for such purposes in agrochemical compositions. Preference is given to cellulose derivatives, acrylic acid derivatives, xanthan, modified clays and finely divided silica.

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Stickers which may be present in the formulations usable in accordance with the invention include all customary binders usable in seed-dressing products. Preferred examples include polyvinylpyrrolidone, polyvinyl acetate, polyvinyl alcohol and tylose. Gibberellins which may be present in the formulations usable in accordance with the invention may preferably be gibberellins A1, A3 (= gibberellic acid), A4 and A7;

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particular preference is given to using gibberellic acid. The gibberellins are known (cf. R. Wegler "Chemie der Pflanzenschutz- und Schädlingsbekämpfungsmittel" [Chemistry of Crop Protection Compositions and Pesticides], vol. 2, Springer Verlag, 1970, p. 401-412).

Further additives may be fragrances, mineral or vegetable, optionally modified oils, waxes and nutrients (including trace nutrients), such as salts of iron, manganese, boron, copper, cobalt, molybdenum and zinc. Additionally present may be stabilizers, such as cold stabilizers, antioxidants, light stabilizers or other agents which improve
5 chemical and/or physical stability.

The formulations contain generally between 0.01 and 98% by weight, preferably between 0.5 and 90%, of the compound of the formula (I).

10 In wettable powders, the active ingredient concentration is, for example, from about 10 to 90% by weight; the remainder to 100% by weight consists of customary formulation constituents. In the case of emulsifiable concentrates, the active ingredient concentration may be from about 1 to 90% by weight, preferably from 5 to 80% by weight. Dust-type formulations contain from 1 to 30% by weight of active ingredient,
15 preferably usually from 5 to 20% by weight of active ingredient; sprayable solutions contain from about 0.05 to 80% by weight, preferably from 2 to 50% by weight of active ingredient. In water-dispersible granules, the active ingredient content depends partly on whether the active compound is present in solid or liquid form and which granulation assistants, fillers, etc. are used. In the granules dispersible in water, the
20 content of active ingredient is, for example, between 1 and 95% by weight, preferably between 10 and 80% by weight.

The active ingredient when used according to present invention may be present in its commercially available formulations and in the use forms, prepared from these
25 formulations, in a mixture with other active ingredients, such as insecticides, attractants, sterilants, bactericides, acaricides, nematocides, fungicides, growth regulators, herbicides, safeners, fertilizers or semiochemicals.

Preferred times for the application of compounds of the formula (I) for regulating plant
30 growth are treatments of the soil, stems and/or leaves with the approved application rates.

Compounds (A), preferably Compound (A1) when used according to present invention, either solely or in combination with one or more above mentioned preferred

agrochemical compounds may generally additionally be present in their/its commercial formulation(s) and in the use form(s) prepared from these formulations in mixtures with other active ingredients, such as insecticides, attractants, sterilants, acaricides, nematocides, fungicides, growth regulators, substances which influence plant maturity, safeners or herbicides that are of different structure compared to those specified above as the preferred ones. Particularly suitable further mixing partners of either Compounds (A), preferably Compound (A1) or compositions thereof as defined above are, for example, the active ingredients of the different classes, specified below in groups, without any preference resulting from the sequence thereof:

Bactericides:

bronopol, dichlorophen, nitrapyrin, nickel dimethyldithiocarbamate, kasugamycin, othilinone, furancarboxylic acid, oxytetracycline, probenazole, streptomycin, tecloftalam, copper sulfate and other copper preparations.

Insecticides/acaricides/nematicides:

1) acetylcholine esterase (AChE) inhibitors, a) from the substance group of the carbamates, for example alanycarb, aldicarb, aldoxycarb, allyxycarb, aminocarb, bendiocarb, benfuracarb, bufencarb, butacarb, butocarboxim, butoxycarboxim, carbaryl, carbofuran, carbosulfan, cloethocarb, dimetilan, ethiofencarb, fenobucarb, fenothiocarb, fenoxycarb, formetanate, furathiocarb, isoprocarb, metam-sodium, methiocarb, methomyl, metolcarb, oxamyl, pirimicarb, promecarb, propoxur, thiofanox, trimethacarb, XMC, xylylcarb, triazamate, b) from the group of the organophosphates, for example acephate, azamethiphos, azinphos (-methyl, -ethyl), bromophos-ethyl, bromfenvinfos (-methyl), butathiofos, cadusafos, carbophenothion, chlorethoxyfos, chlofenvinphos, chlormephos, coumaphos, cyanofenphos, cyanophos, chlofenvinphos, demeton-S-methyl, demeton-S-methylsulfone, dialifos, diazinon, dichlofenthion, dichlorvos/DDVP, dicrotophos, dimethoate, dimethylvinphos, dioxabenzofos, disulfoton, EPN, ethion, ethoprophos, etrimfos, famphur, fenamiphos, fenitrothion, fensulfothion, fenthion, flupyrazofos, fonofos, formothion, fosmethilan, fosthiazate, heptenophos, iodofenphos, iprobenfos, isazofos, isofenphos, isopropyl O-salicylate, isoxathion, malathion, mecarbam, methacrifos, methamidophos,

methidathion, mevinphos, monocrotophos, naled, omethoate, oxydemeton-methyl, parathion (-methyl/-ethyl), phenthoate, phorate, phosalone, phosmet, phosphamidon, phosphocarb, phoxim, pirimiphos (-methyl/-ethyl), profenofos, propaphos, propetamphos, prothiofos, prothoate, pyraclofos, pyridaphenthion, pyridathion,
 5 quinalphos, sebufos, sulfotep, sulprofos, tebupirimfos, temephos, terbufos, tetrachlorvinphos, thiometon, triazophos, triclofon, vamidothion

I2) sodium channel modulators / voltage-dependent sodium channel blockers, a) from the group of the pyrethroids, for example acrinathrin, allethrin (d-cis-trans, d-trans),
 10 beta-cyfluthrin, bifenthrin, bioallethrin, bioallethrin-S-cyclopentyl isomer, bioethanomethrin, biopermethrin, bioresmethrin, chlovaporthrin, cis-cypermethrin, cis-resmethrin, cis-permethrin, cloocythrin, cycloprothrin, cyfluthrin, cyhalothrin, cypermethrin (alpha-, beta-, theta-, zeta-), cyphenothrin, eflusilanate, empenthrin (1R isomer), esfenvalerate, etofenprox, fenfluthrin, fenpropathrin, fenpyrithrin, fenvalerate,
 15 flubrocycythrinate, flucythrinate, flufenprox, flumethrin, fluvalinate, fubfenprox, gamma-cyhalothrin, imiprothrin, kadethrin, lambda-cyhalothrin, metofluthrin, permethrin (cis-, trans-), phenothrin (1R-trans isomer), prallethrin, profluthrin, protrifenbute, pyresmethrin, pyrethrin, resmethrin, RU 15525, silafluofen, tau-fluvalinate, tefluthrin, terallethrin, tetramethrin (1R isomer), tralomethrin, transfluthrin, ZXI 8901, pyrethrins
 20 (pyrethrum), b) DDT, c) oxadiazines, for example indoxacarb, d) semicarbazones, for example metaflumizone (BAS3201)

I3) acetylcholine receptor agonists/antagonists, a) from the group of the chloronicotinyis,
 25 for example acetamiprid, AKD 1022, dinotefuran, imidaclothiz, nitenpyram, nithiazine, thiacloprid, b) nicotine, bensultap, cartap;

I4) acetylcholine receptor modulators from the group of the spinosyns,

30 I5) GABA-controlled chloride channel antagonists, a) from the group of the organochlorines, for example camphechlor, chlorodane, endosulfan, gamma-HCH, HCH, heptachlor, lindane, methoxychlor, b) fiproles, for example acetoprole, pyrafluprole, pyriprole, vaniliprole;

l6) chloride channel activators, for example emamectin, ivermectin, lepimectin, milbemycin;

l7) juvenile hormone mimetics, for example diofenolan, epofenonane, fenoxycarb,
5 hydroprene, kinoprene, methoprene, pyriproxifen, triprene;

l8) ecdysone agonists/disruptors, for example chromafenozide, halofenozide, methoxyfenozide, tebufenozide;

10 l9) chitin biosynthesis inhibitors, for example bistrifluron, chlofluazuron, diflubenzuron, fluazuron, flucycloxuron, flufenoxuron, hexaflumuron, novaluron, noviflumuron, penfluron, teflubenzuron, buprofezin, cyromazine;

l10) inhibitors of oxidative phosphorylation, a) ATP disruptors, for example
15 diafenthiuron, b) organotin compounds, for example azocyclotin, cyhexatin, fenbutatin oxide;

l11) decouplers of oxidative phosphorylation by interruption of the H-proton gradient, a)
from the group of the pyrroles, for example chlorofenapyr, b) from the class of the
20 dinitrophenols, for example binapacyrl, dinobuton, dinocap, DNOC, meptyldinocap;

l12) site I electron transport inhibitors, for example METIs, especially, as examples, fenazaquin, fenpyroximate, pyrimidifen, pyridaben, tebufenpyrad, tolfenpyrad or else hydramethylnon, dicofol
25

l13) site II electron transport inhibitors, for example rotenone

l14) site III electron transport inhibitors, for example acequinocyl, fluacrypyrim

30 l15) microbial disruptors of the insect gut membrane, for example *Bacillus thuringiensis* subspecies *israelensis*, *Bacillus sphaericus*, *Bacillus thuringiensis* subspecies *aizawai*, *Bacillus thuringiensis* subspecies *kurstaki*, *Bacillus thuringiensis* subspecies *tenebrionis*, and BT plant proteins, for example Cry1Ab, Cry1Ac, Cry1Fa, Cry2Ab, mCry3A, Cry3Ab, Cry3Bb, Cry34/35Ab1

I16) lipid synthesis inhibitors, a) from the group of the tetrionic acids, for example spirodiclofen, spiromesifen, b) from the class of the tetramic acids, for example spirotetramat, cis-3-(2,5-dimethylphenyl)-4-hydroxy-8-methoxy-1-azaspiro[4.5]dec-3-
 5 en-2-one

I17) octopaminergic agonists, for example amitraz

I18) inhibitors of magnesium-stimulated ATPase, for example propargite
 10

I19) nereistoxin analogs, for example thiocyclam hydrogen oxalate, thiosultap-sodium

I20) ryanodine receptor agonists, a) from the group of the benzenedicarboxamides, b) from the group of the anthranilamides, 3-bromo-N-{2-bromo-4-chloro-6-[(1-cyclopropylethyl)carbamoyl]phenyl}-1-(3-chloropyridin-2-yl)-1H-pyrazole-5-
 15 carboxamide (known from WO2005/077934) or methyl 2-[3,5-dibromo-2-({[3-bromo-1-(3-chloropyridin-2-yl)-1H-pyrazol-5-yl]carbonyl}amino)benzoyl]-1,2-dimethylhydrazinecarboxylate (known from WO2007/043677)

20 I21) biologics, hormones or pheromones, for example azadirachtin, *Bacillus spec.*, *Beauveria spec.*, codlemone, *Metarrhizium spec.*, *Paecilomyces spec.*, thuringiensin, *Verticillium spec.*

I22) active ingredients with unknown or nonspecific mechanisms of action, a) fumigants, for example aluminum phosphide, methyl bromide, sulfuryl fluoride, b) antifeedants, for example cryolite, flonicamide, pymetrozine, c) mite growth inhibitors, for example clofentezine, etoxazole, hexythiazox, d) amidoflumet, benclothiaz, benzoximate, bifenazate, bromopropylate, buprofezin, chinomethionat, chlorodimeform, chlorobenzilate, chloropicrin, clothiazoben, cycloprene, cyflumetofen, dicyclanil, fenoxacrim, fentrifanil, flubenzimine, flufenerim, flutenzin, gossyplure, hydramethylnone, japonilure, metoxadiazone, petroleum, piperonyl butoxide, potassium oleate, pyridalyl, sulfluramid, tetradifon, tetrasul, triarathene, verbutin and
 30 the following known active compounds: 4-[(6-bromopyrid-3-yl)methyl](2-fluoroethyl)amino}furan-2(5H)-one (known from WO 2007/115644), 4-[(6-fluoropyrid-

3-yl)methyl](2,2-difluoroethyl)amino}furan-2(5H)-one (known from WO 2007/115644),
 4-[[[(2-chloro-1,3-thiazol-5-yl)methyl](2-fluoroethyl)amino}furan-2(5H)-one (known from
 WO 2007/115644), 4-[[[(6-chloropyrid-3-yl)methyl](2-fluoroethyl)amino}furan-2(5H)-one
 (known from WO 2007/115644), 4-[[[(6-chloropyrid-3-yl)methyl](2,2-
 5 difluoroethyl)amino}furan-2(5H)-one (known from WO 2007/115644), 4-[[[(6-chloro-5-
 fluoropyrid-3-yl)methyl](methyl)amino}furan-2(5H)-one (known from WO 2007/115643),
 4-[[[(5,6-dichloropyrid-3-yl)methyl](2-fluoroethyl)amino}furan-2(5H)-one (known from
 WO 2007/115646), 4-[[[(6-chloro-5-fluoropyrid-3-yl)methyl](cyclopropyl)amino}furan-
 2(5H)-one (known from WO 2007/115643), 4-[[[(6-chloropyrid-3-
 10 yl)methyl](cyclopropyl)amino}furan-2(5H)-one (known from EP0539588), 4-[[[(6-
 chloropyrid-3-yl)methyl](methyl)amino}furan-2(5H)-one (known from EP0539588), [1-
 (6-chloropyridin-3-yl)ethyl](methyl)oxido- λ^4 -sulfanylidene cyanamide (known from
 WO 2007/149134) and the diastereomers thereof {[[(1*R*)-1-(6-chloropyridin-3-
 yl)ethyl](methyl)oxido-lambda⁶-sulfanylidene}cyanamide and {[[(1*S*)-1-(6-chloropyridin-
 15 3-yl)ethyl](methyl)oxido-lambda⁶-sulfanylidene}cyanamide (likewise known from
 WO 2007/149134) and 1-[2-fluoro-4-methyl-5-[(2,2,2-trifluoroethyl)sulfinyl]phenyl]-3-
 (trifluoromethyl)-1*H*-1,2,4-triazol-5-amine (known from WO 2006/043635),
 [(3*S*,4*aR*,12*R*,12*aS*,12*bS*)-3-[(cyclopropylcarbonyl)oxy]-6,12-dihydroxy-4,12*b*-
 dimethyl-11-oxo-9-(pyridin-3-yl)-1,3,4,4*a*,5,6,6*a*,12,12*a*,12*b*-decahydro-2*H*,11*H*-
 20 benzo[*f*]pyrano[4,3-*b*]chromen-4-yl)methyl cyclopropane-carboxylate (known from
 WO 2006/129714), 2-cyano-3-(difluoromethoxy)-*N,N*-dimethylbenzenesulfonamide
 (known from WO2006/056433), 2-cyano-3-(difluoromethoxy)-*N*-
 methylbenzenesulfonamide (known from WO2006/100288), 2-cyano-3-
 (difluoromethoxy)-*N*-ethylbenzenesulfonamide (known from WO2005/035486), 4-
 25 (difluoromethoxy)-*N*-ethyl-*N*-methyl-1,2-benzothiazole-3-amine 1,1-dioxide (known
 from WO2007/057407), *N*-[1-(2,3-dimethylphenyl)-2-(3,5-dimethylphenyl)ethyl]-4,5-
 dihydro-1,3-thiazole-2-amine (known from WO2008/104503), {1'-[(2*E*)-3-(4-
 chlorophenyl)prop-2-en-1-yl]-5-fluorospiro[indole-3,4'-piperidin]-1(2*H*)-yl}(2-
 chloropyridin-4-yl)methanone (known from WO2003106457), 3-(2,5-dimethylphenyl)-4-
 30 hydroxy-8-methoxy-1,8-diazaspiro[4.5]dec-3-en-2-one (known from WO2009049851),
 3-(2,5-dimethylphenyl)-8-methoxy-2-oxo-1,8-diazaspiro[4.5]dec-3-en-4-yl ethyl
 carbonate (known from WO2009049851), 4-(but-2-yn-1-yloxy)-6-(3,5-
 dimethylpiperidin-1-yl)-5-fluoropyrimidine (known from WO2004099160),
 (2,2,3,3,4,4,5,5-octafluoropentyl)(3,3,3-trifluoropropyl)malononitrile (known from

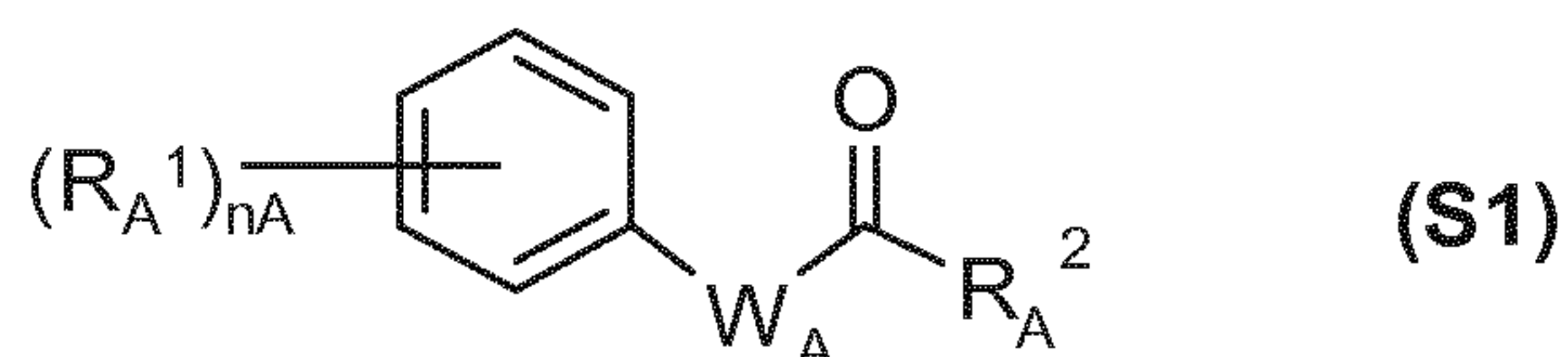
WO2005063094), (2,2,3,3,4,4,5,5-octafluoropentyl)(3,3,4,4,4-pentafluorobutyl)malononitrile (known from WO2005063094), 8-[2-(cyclopropylmethoxy)-4-(trifluoromethyl)phenoxy]-3-[6-(trifluoromethyl)pyridazin-3-yl]-3-azabicyclo[3.2.1]octane (known from WO2007040280 / 282), 2-ethyl-7-methoxy-3-methyl-6-[(2,2,3,3-tetrafluoro-2,3-dihydro-1,4-benzodioxin-6-yl)oxy]quinolin-4-yl methyl carbonate (known from JP2008110953), 2-ethyl-7-methoxy-3-methyl-6-[(2,2,3,3-tetrafluoro-2,3-dihydro-1,4-benzodioxin-6-yl)oxy]quinolin-4-yl acetate (known from JP2008110953), PF1364 (Chemical Abstracts No. 1204776-60-2, known from JP2010018586), 5-[5-(3,5-dichlorophenyl)-5-(trifluoromethyl)-4,5-dihydro-1,2-oxazol-3-yl]-2-(1H-1,2,4-triazol-1-yl)benzonitrile (known from WO2007075459), 5-[5-(2-chloropyridin-4-yl)-5-(trifluoromethyl)-4,5-dihydro-1,2-oxazol-3-yl]-2-(1H-1,2,4-triazol-1-yl)benzonitrile (known from WO2007075459), 4-[5-(3,5-dichlorophenyl)-5-(trifluoromethyl)-4,5-dihydro-1,2-oxazol-3-yl]-2-methyl-N-{2-oxo-2-[(2,2,2-trifluoroethyl)amino]ethyl}benzamide (known from WO2005085216).

15

Safeners are preferably selected from the group consisting of:

S1) compounds of the formula (S1), provided that they are different from the Compound (A) applied according to the invention use or method of using,

20

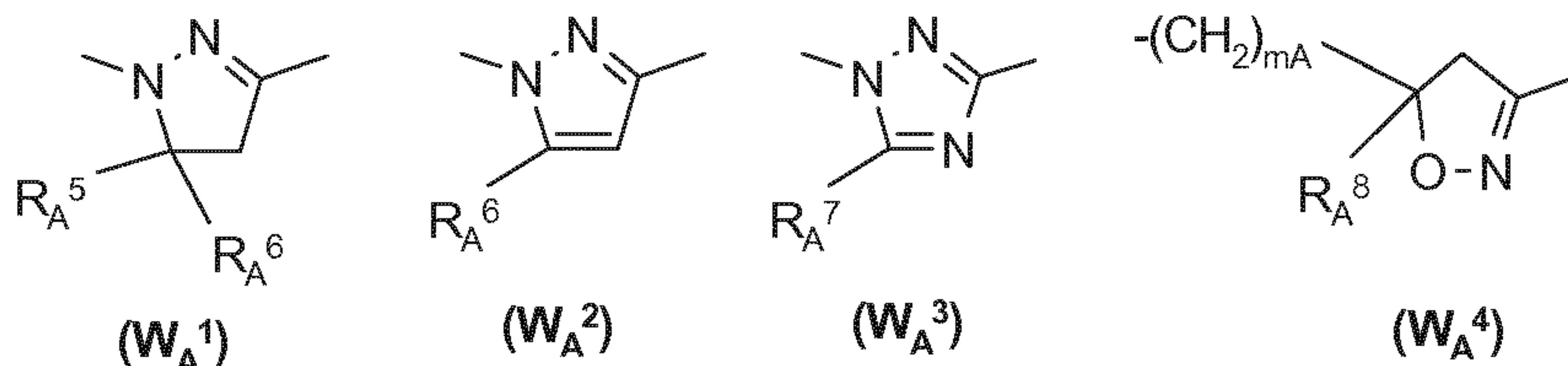


where the symbols and indices are each defined as follows:

n_A is a natural number from 0 to 5, preferably 0 to 3;

R_A^1 is halogen, (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy, nitro or (C₁-C₄)-haloalkyl;

25



- W_A is an unsubstituted or substituted divalent heterocyclic radical from the group consisting of partially unsaturated or aromatic five-membered heterocycles having 1 to 3 hetero ring atoms from the group of N and O, where at least one nitrogen atom and at most one oxygen atom is present in the ring, preferably a radical from the group consisting of (W_A^1) to (W_A^4),
 5 m_A is 0 or 1;
 R_A^2 is OR_A^3 , SR_A^3 or $NR_A^3R_A^4$ or a saturated or unsaturated 3- to 7-membered heterocycle having at least one nitrogen atom and up to 3 heteroatoms, preferably from the group consisting of O and S, which is attached via the nitrogen atom to the carbonyl group in (S1) and which is unsubstituted or substituted by radicals from the group consisting of (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy and optionally substituted phenyl, preferably a radical of the formula OR_A^3 , NHR_A^4 or $N(CH_3)_2$, in particular of the formula OR_A^3 ;
 10 R_A^3 is hydrogen or an unsubstituted or substituted aliphatic hydrocarbyl radical, preferably having a total of 1 to 18 carbon atoms;
 R_A^4 is hydrogen, (C₁-C₆)-alkyl, (C₁-C₆)-alkoxy or substituted or unsubstituted phenyl;
 R_A^5 is H, (C₁-C₈)-alkyl, (C₁-C₈)-haloalkyl, (C₁-C₄)-alkoxy-(C₁-C₈)-alkyl, cyano or $COOR_A^9$ where R_A^9 is hydrogen, (C₁-C₈)-alkyl, (C₁-C₈)-haloalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₁-C₆)-hydroxyalkyl, (C₃-C₁₂)-cycloalkyl or tri-(C₁-C₄)-alkylsilyl;
 20 R_A^6 , R_A^7 , R_A^8 are the same or different and are each hydrogen, (C₁-C₈)-alkyl, (C₁-C₈)-haloalkyl, (C₃-C₁₂)-cycloalkyl or substituted or unsubstituted phenyl;
 preferably:
 a) compounds of the type of the dichlorophenylpyrazoline-3-carboxylic acid (S1^a),
 25 preferably compounds such as 1-(2,4-dichlorophenyl)-5-(ethoxycarbonyl)-5-methyl-2-pyrazoline-3-carboxylic acid, ethyl 1-(2,4-dichlorophenyl)-5-(ethoxycarbonyl)-5-methyl-2-pyrazoline-3-carboxylate (S1-1) ("mefenpyr-diethyl"), and related compounds, as described in WO-A-91/07874;
 30 b) derivatives of dichlorophenylpyrazolecarboxylic acid (S1^b), preferably compounds such as ethyl 1-(2,4-dichlorophenyl)-5-methylpyrazole-3-carboxylate (S1-2), ethyl 1-(2,4-dichlorophenyl)-5-isopropylpyrazole-3-carboxylate (S1-3), ethyl

1-(2,4-dichlorophenyl)-5-(1,1-dimethylethyl)pyrazole-3-carboxylate (S1-4) and related compounds, as described in EP-A-333 131 and EP-A-269 806;

- c) derivatives of 1,5-diphenylpyrazole-3-carboxylic acid (S1^c), preferably compounds such as ethyl

5 1-(2,4-dichlorophenyl)-5-phenylpyrazole-3-carboxylate (S1-5), methyl 1-(2-chlorophenyl)-5-phenylpyrazole-3-carboxylate (S1-6) and related compounds, as described, for example, in EP-A-268554;

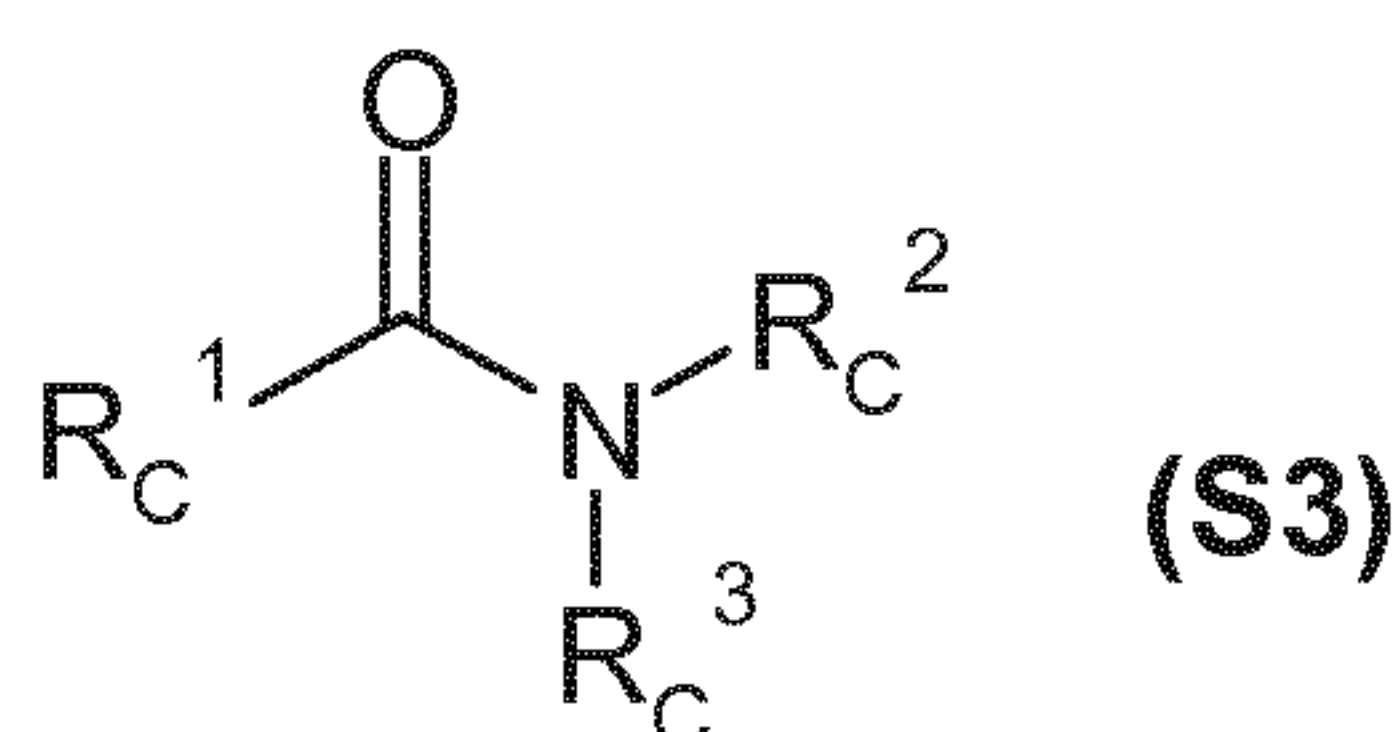
- d) compounds of the triazolecarboxylic acid type (S1^d), preferably compounds such as fenchlorazole(-ethyl), i.e. ethyl

10 1-(2,4-dichlorophenyl)-5-trichloromethyl-(1H)-1,2,4-triazole-3-carboxylate (S1-7), and related compounds as described in EP-A-174 562 and EP-A-346 620;

- e) compounds of the 5-benzyl- or 5-phenyl-2-isoxazoline-3-carboxylic acid or of the 5,5-diphenyl-2-isoxazoline-3-carboxylic acid type (S1^e), preferably compounds such as ethyl 5-(2,4-dichlorobenzyl)-2-isoxazoline-3-carboxylate (S1-8) or ethyl
15 5-phenyl-2-isoxazoline-3-carboxylate (S1-9) and related compounds as described in WO-A-91/08202, or 5,5-diphenyl-2-isoxazolinecarboxylic acid (S1-10) or ethyl 5,5-diphenyl-2-isoxazoline-3-carboxylate (S1-11) ("isoxadifen-ethyl") or n-propyl 5,5-diphenyl-2-isoxazoline-3-carboxylate (S1-12) or ethyl
20 5-(4-fluorophenyl)-5-phenyl-2-isoxazoline-3-carboxylate (S1-13), as described in patent application WO-A-95/07897.

- S2) Quinoline derivatives such as
diethyl (5-chloro-8-quinolinoxy)malonate,
25 diallyl (5-chloro-8-quinolinoxy)malonate,
methyl ethyl (5-chloro-8-quinolinoxy)malonate
and related compounds as described in EP-A-0 582 198.

- 30 S3) Compounds of the formula (S3)

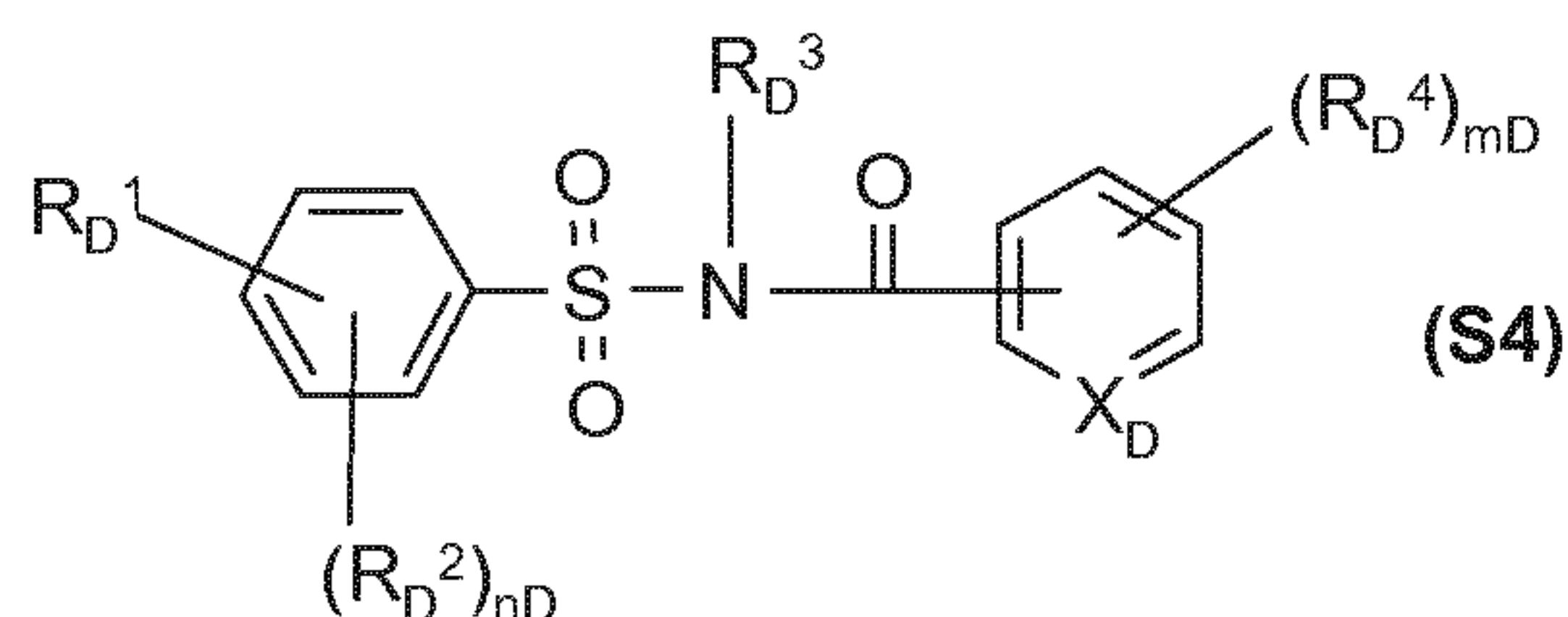


where the symbols and indices are each defined as follows:

R_C^1 is (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-haloalkenyl, (C₃-C₇)-cycloalkyl, preferably dichloromethyl;

- 5 R_C^2 , R_C^3 are the same or different and are each hydrogen, (C₁-C₄)-alkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-alkynyl, (C₁-C₄)-haloalkyl, (C₂-C₄)-haloalkenyl, (C₁-C₄)-alkylcarbamoyl-(C₁-C₄)-alkyl, (C₂-C₄)-alkenylcarbamoyl-(C₁-C₄)-alkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, dioxolanyl-(C₁-C₄)-alkyl, thiazolyl, furyl, furylalkyl, thienyl, piperidyl, substituted or unsubstituted phenyl, or R_C^2 and R_C^3 together form a
- 10 substituted or unsubstituted heterocyclic ring, preferably an oxazolidine, thiazolidine, piperidine, morpholine, hexahydropyrimidine or benzoxazine ring; preferably: active ingredients of the dichloroacetamide type, which are frequently used as pre-emergence safeners (soil-acting safeners), for example
- 15 "dichlormid" (N,N-diallyl-2,2-dichloroacetamide) (S3-1), "R-29148" (3-dichloroacetyl-2,2,5-trimethyl-1,3-oxazolidine) from Stauffer (S3-2), "R-28725" (3-dichloroacetyl-2,2-dimethyl-1,3-oxazolidine) from Stauffer (S3-3), "benoxacor" (4-dichloroacetyl-3,4-dihydro-3-methyl-2H-1,4-benzoxazine) (S3-4), "PPG-1292" (N-allyl-N-[(1,3-dioxolan-2-yl)methyl]dichloroacetamide) from PPG Industries (S3-5), "DKA-24" (N-allyl-N-[(allylaminocarbonyl)methyl]dichloroacetamide) from
- 20 Sagro-Chem (S3-6), "AD-67" or "MON 4660" (3-dichloroacetyl-1-oxa-3-azaspiro[4,5]decane) from Nitrokemia or Monsanto (S3-7), "TI-35" (1-dichloroacetylazepane) from TRI-Chemical RT (S3-8), "diclonon" (dicyclonone) or "BAS145138" or "LAB145138" (S3-9) ((RS)-1-dichloroacetyl-3,3,8a-trimethylperhydropyrrolo[1,2-a]pyrimidin-6-one) from BASF, "furilazole" or "MON
- 25 13900" ((RS)-3-dichloroacetyl-5-(2-furyl)-2,2-dimethyloxazolidine) (S3-10); and the (R) isomer thereof (S3-11).

S4) N-Acylsulfonamides of the formula (S4) and salts thereof

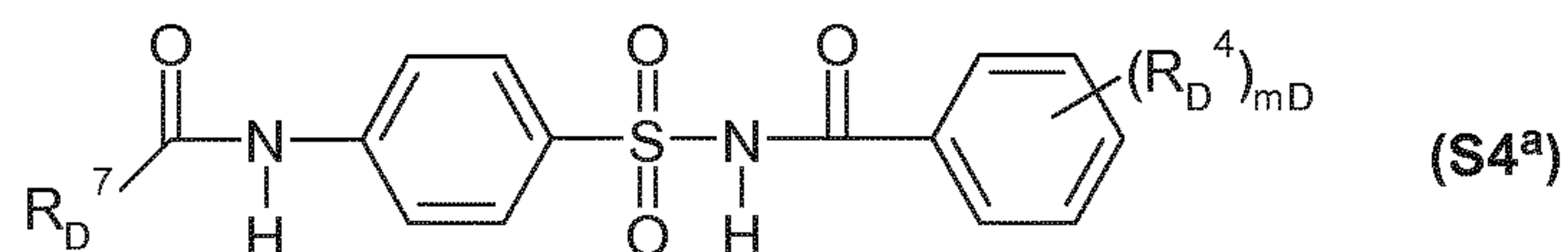


where the symbols and indices are each defined as follows:

- X_D is CH or N;
- 5 R_D^1 is $CO-NR_D^5R_D^6$ or $NHCO-R_D^7$;
- R_D^2 is halogen, (C_1-C_4) -haloalkyl, (C_1-C_4) -haloalkoxy, nitro, (C_1-C_4) -alkyl, (C_1-C_4) -alkoxy, (C_1-C_4) -alkylsulfonyl, (C_1-C_4) -alkoxycarbonyl or (C_1-C_4) -alkylcarbonyl;
- R_D^3 is hydrogen, (C_1-C_4) -alkyl, (C_2-C_4) -alkenyl or (C_2-C_4) -alkynyl;
- R_D^4 is halogen, nitro, (C_1-C_4) -alkyl, (C_1-C_4) -haloalkyl, (C_1-C_4) -haloalkoxy, (C_3-C_6) -cycloalkyl, phenyl, (C_1-C_4) -alkoxy, cyano, (C_1-C_4) -alkylthio, (C_1-C_4) -alkylsulfinyl, (C_1-C_4) -alkylsulfonyl, (C_1-C_4) -alkoxycarbonyl or (C_1-C_4) -alkylcarbonyl;
- 10 R_D^5 is hydrogen, (C_1-C_6) -alkyl, (C_3-C_6) -cycloalkyl, (C_2-C_6) -alkenyl, (C_2-C_6) -alkynyl, (C_5-C_6) -cycloalkenyl, phenyl or 3- to 6-membered heterocyclyl containing v_D heteroatoms from the group of nitrogen, oxygen and sulfur, where the seven
- 15 latter radicals are substituted by v_D substituents from the group of halogen, (C_1-C_6) -alkoxy, (C_1-C_6) -haloalkoxy, (C_1-C_2) -alkylsulfinyl, (C_1-C_2) -alkylsulfonyl, (C_3-C_6) -cycloalkyl, (C_1-C_4) -alkoxycarbonyl, (C_1-C_4) -alkylcarbonyl and phenyl, and in the case of cyclic radicals also (C_1-C_4) -alkyl and (C_1-C_4) -haloalkyl;
- R_D^6 is hydrogen, (C_1-C_6) -alkyl, (C_2-C_6) -alkenyl or (C_2-C_6) -alkynyl, where the three
- 20 latter radicals are substituted by v_D radicals from the group consisting of halogen, hydroxy, (C_1-C_4) -alkyl, (C_1-C_4) -alkoxy and (C_1-C_4) -alkylthio, or
- R_D^5 and R_D^6 together with the nitrogen atom bearing them form a pyrrolidinyl or piperidinyl radical;
- R_D^7 is hydrogen, (C_1-C_4) -alkylamino, di- (C_1-C_4) -alkylamino, (C_1-C_6) -alkyl, (C_3-C_6) -cycloalkyl, where the 2 latter radicals are substituted by v_D substituents from the
- 25 group of halogen, (C_1-C_4) -alkoxy, (C_1-C_6) -haloalkoxy and (C_1-C_4) -alkylthio, and in the case of cyclic radicals also (C_1-C_4) -alkyl and (C_1-C_4) -haloalkyl;
- n_D is 0, 1 or 2;
- m_D is 1 or 2;
- 30 v_D is 0, 1, 2 or 3;

among these, preference is given to compounds of the N-acylsulfonamide type, for example of the formula (S4^a) below, which are known, for example, from WO-A-97/45016

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in which

- 5 R_D^7 is (C₁-C₆)-alkyl, (C₃-C₆)-cycloalkyl, where the 2 latter radicals are substituted by v_D substituents from the group consisting of halogen, (C₁-C₄)-alkoxy, (C₁-C₆)-haloalkoxy and (C₁-C₄)-alkylthio and, in the case of cyclic radicals, also (C₁-C₄)-alkyl and (C₁-C₄)-haloalkyl;

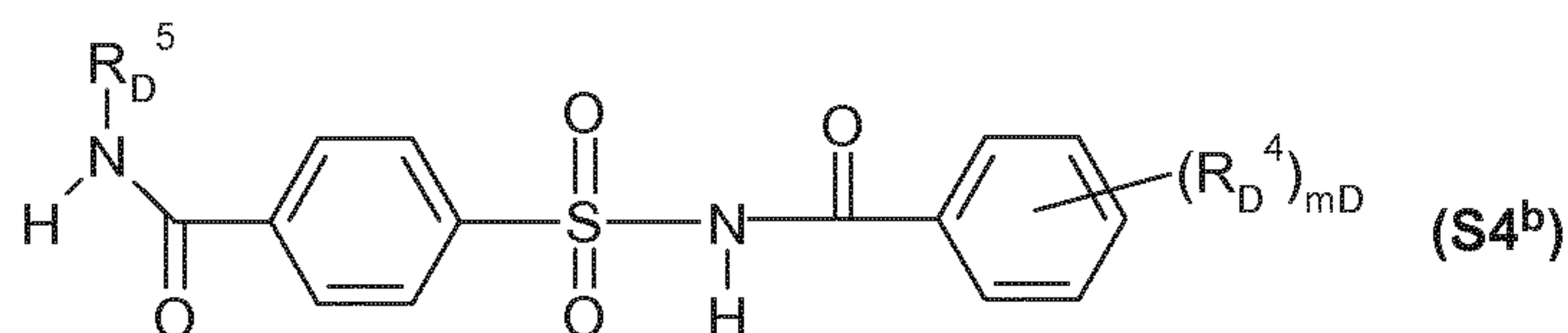
R_D^4 is halogen, (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy, CF₃;

- 10 m_D is 1 or 2;

v_D is 0, 1, 2 or 3;

and also to acylsulfamoylbenzamides, for example of the formula (S4^b) below, which are known, for example, from WO-A-99/16744,

15



for example those in which

R_D^5 = cyclopropyl and (R_D^4) = 2-OMe ("cyprosulfamide", S4-1),

- 20 R_D^5 = cyclopropyl and (R_D^4) = 5-Cl-2-OMe (S4-2),

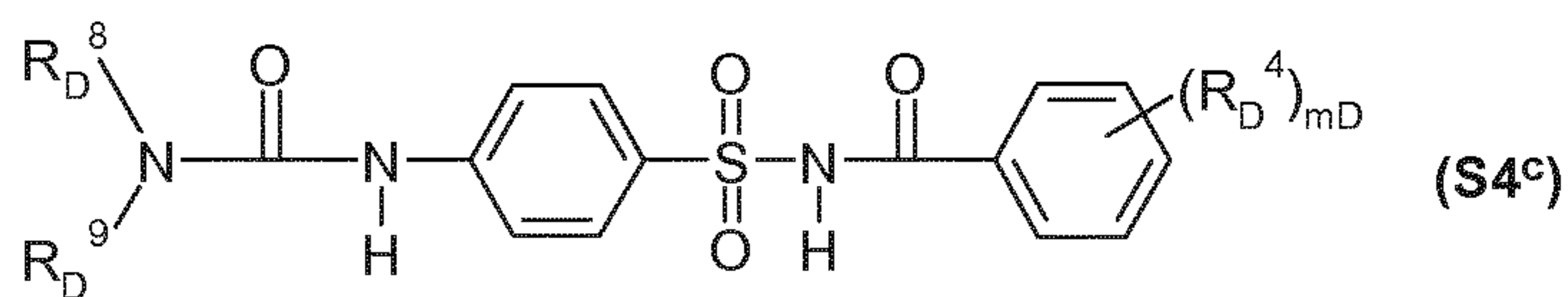
R_D^5 = ethyl and (R_D^4) = 2-OMe (S4-3),

R_D^5 = isopropyl and (R_D^4) = 5-Cl-2-OMe (S4-4) and

R_D^5 = isopropyl and (R_D^4) = 2-OMe (S4-5);

- 25 and to compounds of the N-acylsulfamoylphenylurea type, of the formula (S4^c), which are known, for example, from EP-A-365484,

69



in which

R_D^8 and R_D^9 are each independently hydrogen, (C₁-C₈)-alkyl, (C₃-C₈)-cycloalkyl, (C₃-C₆)-alkenyl, (C₃-C₆)-alkynyl,

R_D^4 is halogen, (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy, CF₃,

m_D is 1 or 2;

for example

- 10 1-[4-(N-2-methoxybenzoylsulfamoyl)phenyl]-3-methylurea,
 1-[4-(N-2-methoxybenzoylsulfamoyl)phenyl]-3,3-dimethylurea,
 1-[4-(N-4,5-dimethylbenzoylsulfamoyl)phenyl]-3-methylurea.

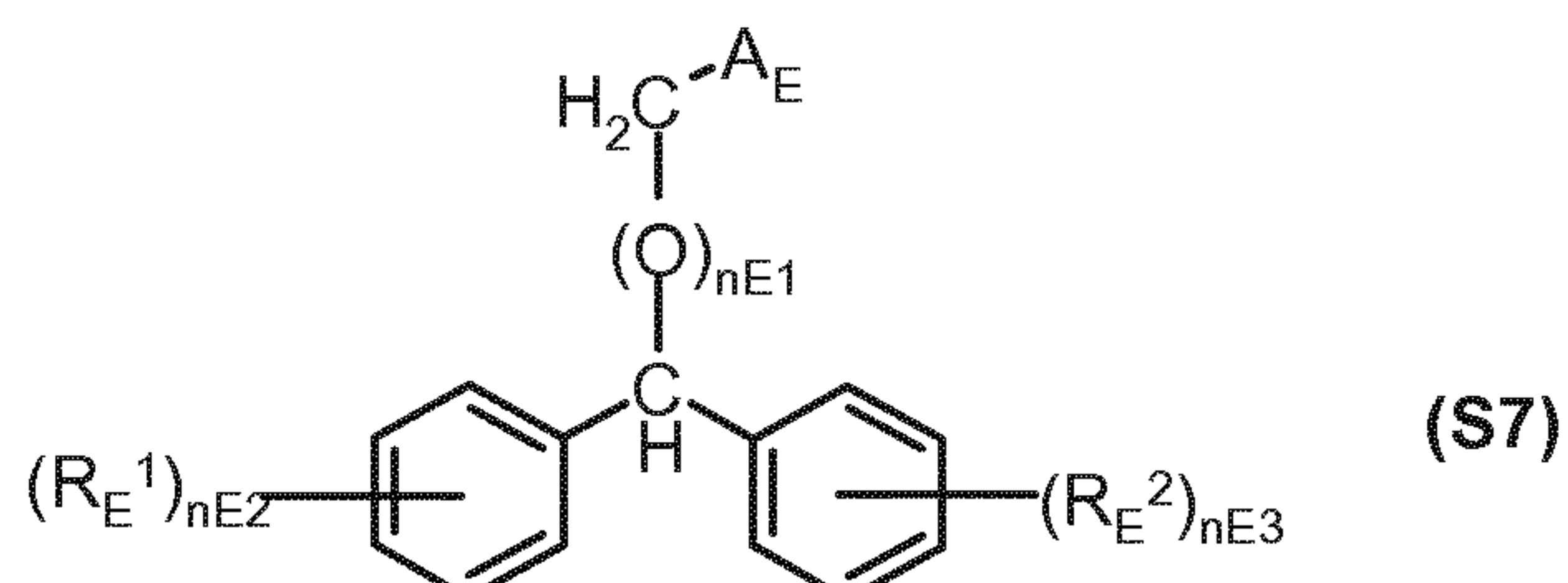
- 15 S5) Active ingredients from the class of the hydroxyaromatics and the aromatic-aliphatic carboxylic acid derivatives (S5), for example ethyl 3,4,5-triacetoxybenzoate, 3,5-dimethoxy-4-hydroxybenzoic acid, 3,5-dihydroxybenzoic acid, 4-hydroxysalicylic acid, 4-fluorosalicylic acid, 2-hydroxycinnamic acid, 2,4-dichlorocinnamic acid, as described in WO-A-2004/084631, WO-A-2005/015994, WO-A-2005/016001.

20

- S6) Active ingredients from the class of the 1,2-dihydroquinoxalin-2-ones (S6), for example 1-methyl-3-(2-thienyl)-1,2-dihydroquinoxalin-2-one, 1-methyl-3-(2-thienyl)-1,2-dihydroquinoxaline-2-thione, 1-(2-aminoethyl)-3-(2-thienyl)-1,2-dihydroquinoxalin-2-one hydrochloride, 1-(2-methylsulfonylaminoethyl)-3-(2-thienyl)-1,2-dihydroquinoxalin-2-one, as described in WO-A-2005/112630.

25

- S7) Compounds of the formula (S7), as described in WO-A-1998/38856,



where the symbols and indices are each defined as follows:

R_E^1 , R_E^2 are each independently halogen, (C₁-C₄)alkyl, (C₁-C₄)alkoxy, (C₁-C₄)haloalkyl, (C₁-C₄)alkylamino, di-(C₁-C₄)alkylamino, nitro;

5 A_E is COOR_E^3 or COSR_E^4

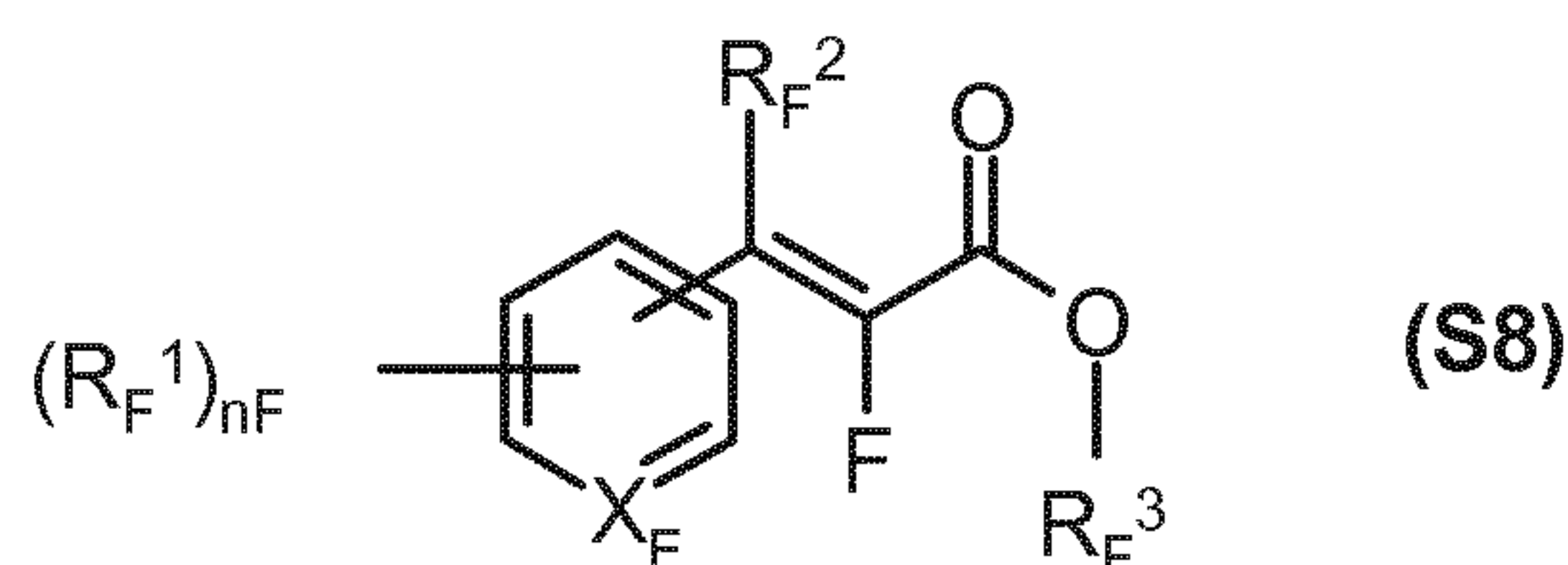
R_E^3 , R_E^4 are each independently hydrogen, (C₁-C₄)alkyl, (C₂-C₆)alkenyl, (C₂-C₄)alkynyl, cyanoalkyl, (C₁-C₄)haloalkyl, phenyl, nitrophenyl, benzyl, halobenzyl, pyridinylalkyl and alkylammonium,

n_E^1 is 0 or 1;

10 n_E^2 , n_E^3 are each independently 0, 1 or 2,

preferably diphenylmethoxyacetic acid, ethyl diphenylmethoxyacetate, methyl diphenylmethoxyacetate (CAS reg. no. 41858-19-9) (S7-1).

15 S8) Compounds of the formula (S8), as described in WO-A-98/27049,



in which

20 X_F is CH or N,

n_F if $X_F = \text{N}$ is an integer from 0 to 4 and

if $X_F = \text{CH}$ is an integer from 0 to 5,

R_F^1 is halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, nitro, (C₁-C₄)-alkylthio, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-alkoxycarbonyl, optionally substituted phenyl, optionally substituted phenoxy,

25 R_F^2 is hydrogen or (C₁-C₄)-alkyl,

R_F^3 is hydrogen, (C₁-C₈)-alkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-alkynyl or aryl, where each of the carbon-containing radicals mentioned above is unsubstituted or substituted by one or more, preferably by up to three, identical or different radicals from the group consisting of halogen and alkoxy; or salts thereof,

30

preferably compounds in which

X_F is CH,

5 n_F is an integer from 0 to 2,

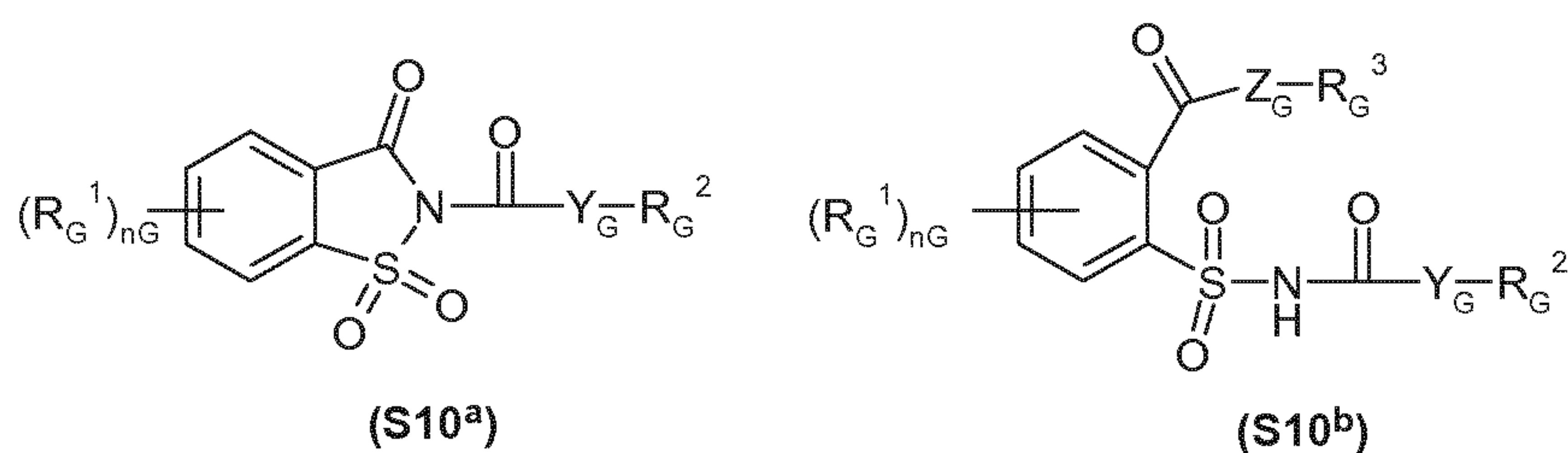
R_F^1 is halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy,

R_F^2 is hydrogen or (C₁-C₄)-alkyl,

10 R_F^3 is hydrogen, (C₁-C₈)-alkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-alkynyl or aryl, where each of the aforementioned carbon-containing radicals is unsubstituted or substituted by one or more, preferably by up to three, identical or different radicals from the group consisting of halogen and alkoxy; or salts thereof.

S9) Active ingredients from the class of the 3-(5-tetrazolylcarbonyl)-2-quinolones (S9), for example 1,2-dihydro-4-hydroxy-1-ethyl-3-(5-tetrazolylcarbonyl)-2-quinolone (CAS reg. no.: 219479-18-2), 1,2-dihydro-4-hydroxy-1-methyl-3-(5-tetrazolylcarbonyl)-2-quinolone (CAS reg. no.: 95855-00-8), as described in WO-A-1999/000020.

20 S10) Compounds of the formula (S10^a) or (S10^b) as described in WO-A-2007/023719 and WO-A-2007/023764



in which

25 R_G^1 is halogen, (C₁-C₄)-alkyl, methoxy, nitro, cyano, CF₃, OCF₃

Y_G , Z_G are each independently O or S,

n_G is an integer from 0 to 4,

R_G^2 is (C₁-C₁₆)-alkyl, (C₂-C₆)-alkenyl, (C₃-C₆)-cycloalkyl, aryl; benzyl, halobenzyl,

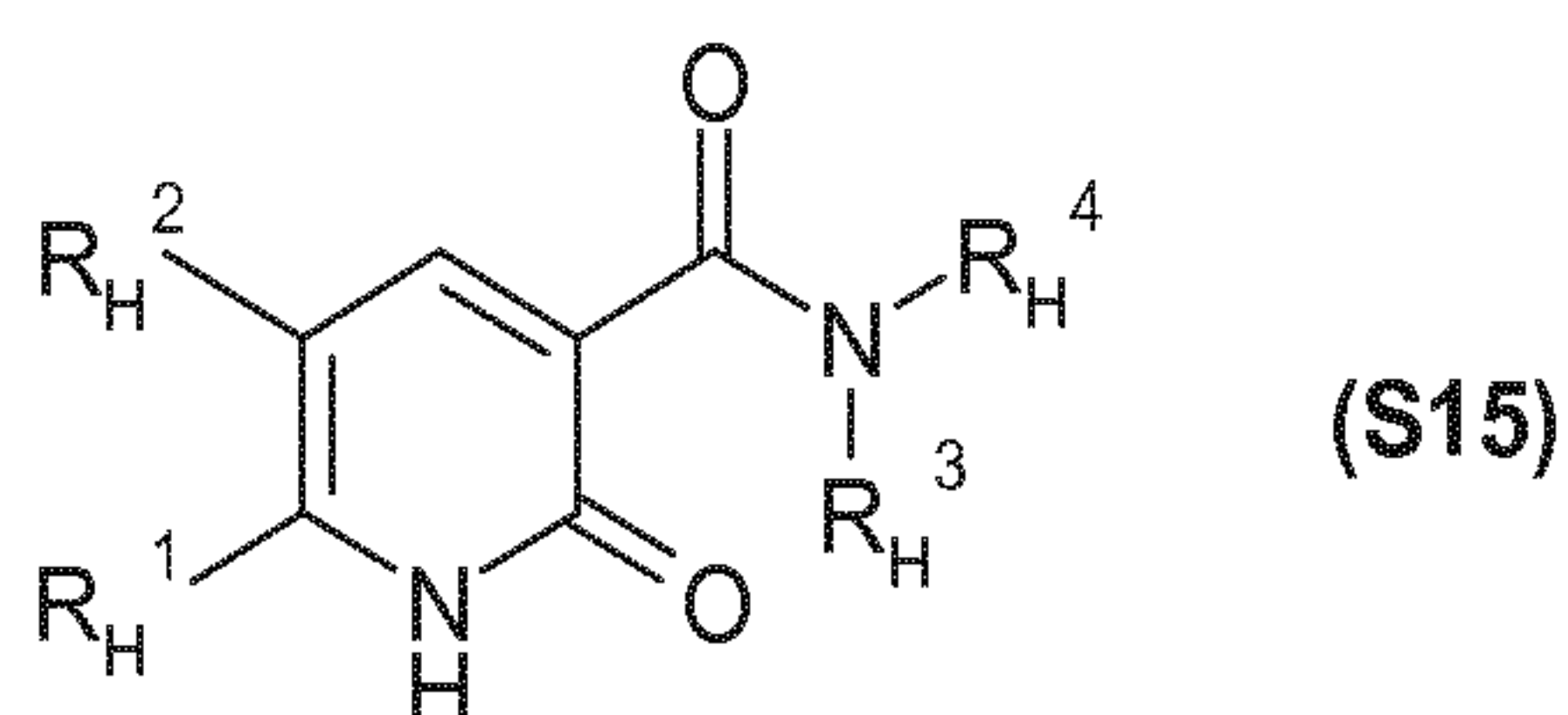
R_G^3 is hydrogen or (C₁-C₆)-alkyl.

- 5 S11) Active ingredients of the oxyimino compound type (S11), which are known as seed-dressing compositions, for example "oxabetrinil" ((Z)-1,3-dioxolan-2-yl-methoxyimino(phenyl)acetonitrile) (S11-1), which is known as a seed-dressing safener for millet against damage by metolachlor, "fluxofenim" (1-(4-chlorophenyl)-2,2,2-trifluoro-1-ethanone O-(1,3-dioxolan-2-ylmethyl) oxime) (S11-2), which is known as a seed-dressing safener for millet against damage by metolachlor, and "cyometrinil" or "CGA-43089" ((Z)-cyanomethoxyimino(phenyl)acetonitrile) (S11-3), which is known as a seed-dressing safener for millet against damage by metolachlor.
- 10 S12) Active ingredients from the class of the isothiochromanones (S12), for example methyl [(3-oxo-1H-2-benzothiopyran-4(3H)-ylidene)methoxy]acetate (CAS reg. no.: 205121-04-6) (S12-1) and related compounds from WO-A-1998/13361.
- 15 S13) One or more compounds from group (S13): "naphthalic anhydride" (1,8-naphthalenedicarboxylic anhydride) (S13-1), which is known as a seed-dressing safener for corn against damage by thiocarbamate herbicides, "fencloirim" (4,6-dichloro-2-phenylpyrimidine) (S13-2), which is known as a safener for pretilachlor in sown rice, "flurazole" (benzyl 2-chloro-4-trifluoromethyl-1,3-thiazole-5-carboxylate) (S13-3), which is known as a seed-dressing safener for millet against damage by alachlor and metolachlor, "CL 304415" (CAS reg. no. 31541-57-8) (4-carboxy-3,4-dihydro-2H-1-benzopyran-4-acetic acid) (S13-4) from American Cyanamid, which is known as a safener for corn against damage by imidazolinones, "MG 191" (CAS reg. no. 96420-72-3) (2-dichloromethyl-2-methyl-1,3-dioxolane) (S13-5) from Nitrokemia, which is known as a safener for corn, "MG-838" (CAS reg. no. 133993-74-5) (2-propenyl 1-oxa-4-azaspiro[4.5]decane-4-carbodithioate) (S13-6) from Nitrokemia, "disulfoton" (O,O-diethyl S-2-ethylthioethyl phosphorodithioate) (S13-7), "dietholate" (O,O-diethyl O-phenylphosphorothioate) (S13-8), "mephenate" (4-chlorophenyl methyl carbamate) (S13-9).
- 20
- 25
- 30
- S14) Active ingredients which, in addition to herbicidal action against harmful plants, also have safener action on crop plants such as rice, for example "dimepiperate" or "MY-93" (S-1-methyl-1-phenylethylpiperidine-1-carbothioate), which is known

as a safener for rice against damage by the herbicide molinate, "daimuron" or "SK 23" (1-(1-methyl-1-phenylethyl)-3-p-tolylurea), which is known as a safener for rice against damage by the herbicide imazosulfuron, "cumyluron" = "JC-940" (3-(2-chlorophenylmethyl)-1-(1-methyl-1-phenylethyl)urea, see JP-A-60087254),
 5 which is known as a safener for rice against damage by some herbicides, "methoxyphenon" or "NK 049" (3,3'-dimethyl-4-methoxybenzophenone), which is known as a safener for rice against damage by some herbicides, "CSB" (1-bromo-4-(chloromethylsulfonyl)benzene) from Kumiai, (CAS reg. no. 54091-06-4), which is known as a safener against damage by some herbicides in rice.

10

S15) Compounds of the formula (S15) or tautomers thereof
 as described in WO-A-2008/131861 and WO-A-2008/131860



15

in which

R_H^1 is a (C₁-C₆)haloalkyl radical and

R_H^2 is hydrogen or halogen and

R_H^3 , R_H^4 are each independently hydrogen, (C₁-C₁₆)alkyl, (C₂-C₁₆)alkenyl or

20

(C₂-C₁₆)alkynyl, where each of the 3 latter radicals is unsubstituted or substituted by one or more radicals from the group of halogen, hydroxyl, cyano, (C₁-C₄)alkoxy, (C₁-C₄)haloalkoxy, (C₁-C₄)alkylthio, (C₁-C₄)alkylamino, di[(C₁-C₄)alkyl]amino, [(C₁-C₄)alkoxy]carbonyl, [(C₁-C₄)haloalkoxy]carbonyl, (C₃-C₆)cycloalkyl which is unsubstituted or substituted, phenyl which is
 25 unsubstituted or substituted, and heterocyclyl which is unsubstituted or substituted, or (C₃-C₆)cycloalkyl, (C₄-C₆)cycloalkenyl, (C₃-C₆)cycloalkyl which is fused on one side of the ring to a 4- to 6-membered saturated or unsaturated carbocyclic ring, or (C₄-C₆)cycloalkenyl which is fused on one side of the ring to a 4- to 6-membered saturated or unsaturated carbocyclic ring, where each of
 30 the 4 latter radicals is unsubstituted or substituted by one or more radicals from

the group of halogen, hydroxyl, cyano, (C₁-C₄)alkyl, (C₁-C₄)haloalkyl, (C₁-C₄)alkoxy, (C₁-C₄)haloalkoxy, (C₁-C₄)alkylthio, (C₁-C₄)alkylamino, di[(C₁-C₄)alkyl]amino, [(C₁-C₄)alkoxy]carbonyl, [(C₁-C₄)haloalkoxy]carbonyl, (C₃-C₆)cycloalkyl which is unsubstituted or substituted, phenyl which is unsubstituted or substituted, and heterocyclyl which is unsubstituted or substituted,

or

10 R_H³ is (C₁-C₄)-alkoxy, (C₂-C₄)alkenyloxy, (C₂-C₆)alkynyloxy or (C₂-C₄)haloalkoxy and R_H⁴ is hydrogen or (C₁-C₄)-alkyl or

R_H³ and R_H⁴ together with the directly bonded nitrogen atom are a four- to eight-membered heterocyclic ring which, in addition to the nitrogen atom, may also contain further ring heteroatoms, preferably up to two further ring heteroatoms from the group of N, O and S, and which is unsubstituted or substituted by one or more radicals from the group of halogen, cyano, nitro, (C₁-C₄)alkyl, (C₁-C₄)haloalkyl, (C₁-C₄)alkoxy, (C₁-C₄)haloalkoxy and (C₁-C₄)alkylthio.

20 S16) Active ingredients which are used primarily as herbicides but also have safener action on crop plants, for example (2,4-dichlorophenoxy)acetic acid (2,4-D), (4-chlorophenoxy)acetic acid, (R,S)-2-(4-chloro-o-tolyloxy)propionic acid (mecoprop), 4-(2,4-dichlorophenoxy)butyric acid (2,4-DB), (4-chloro-o-tolyloxy)acetic acid (MCPA), 4-(4-chloro-o-tolyloxy)butyric acid, 4-(4-chlorophenoxy)butyric acid, 3,6-dichloro-2-methoxybenzoic acid (dicamba), 1-(ethoxycarbonyl)ethyl 3,6-dichloro-2-methoxybenzoate (lactidichlor-ethyl).

Substances which influence plant maturity:

30 Usable combination partners for the compounds according to formula (I) when used according to present invention in mixture formulations or in a tankmix are, for example, known active ingredients based on inhibition of, for example, 1-aminocyclopropane-1-carboxylate synthase, 1-aminocyclopropane-1-carboxylate oxidase and the ethylene receptors, e.g. ETR1, ETR2, ERS1, ERS2 or EIN4, as described, for example, in

Biotechn. Adv. 2006, 24, 357-367; Bot. Bull. Acad. Sin. 199, 40, 1-7 or Plant Growth Reg. 1993, 13, 41-46 and literature cited therein.

Examples of known substances which influence plant maturity and can be combined
 5 with the inventive compounds include the active ingredients which follow (the
 compounds are designated by the "common name" according to the International
 Organization for Standardization (ISO) or by the chemical name or by the code
 number) and always encompass all use forms, such as acids, salts, esters and
 isomers, such as stereoisomers and optical isomers. By way of example, one use form
 10 and in some cases a plurality of use forms are mentioned:

rhizobitoxine, 2-aminoethoxyvinylglycine (AVG), methoxyvinylglycine (MVG),
 vinylglycine, aminooxyacetic acid, sinefungin, S-adenosylhomocysteine, 2-keto-4-
 methyl thiobutyrate, 2-(methoxy)-2-oxoethyl (isopropylidene)aminooxyacetate, 2-
 15 (hexyloxy)-2-oxoethyl (isopropylidene)aminooxyacetate, 2-(isopropoxy)-2-oxoethyl
 (cyclohexylidene)aminooxyacetate, putrescine, spermidine, spermine, 1,8-diamino-4-
 aminoethyloctane, L-canaline, daminozide, methyl 1-aminocyclopropyl-1-carboxylate,
 N-methyl-1-aminocyclopropyl-1-carboxylic acid, 1-aminocyclopropyl-1-carboxamide,
 substituted 1-aminocyclopropyl-1-carboxylic acid derivatives as described in
 20 DE3335514, EP30287, DE2906507 or US5123951, 1-aminocyclopropyl-1-hydroxamic
 acid, 1-methylcyclopropene, 3-methylcyclopropene, 1-ethylcyclopropene, 1-n-
 propylcyclopropene, 1-cyclopropenylmethanol, carvone, eugenol, sodium cycloprop-1-
 en-1-ylacetate, sodium cycloprop-2-en-1-ylacetate, sodium 3-(cycloprop-2-en-1-
 yl)propanoate, sodium 3-(cycloprop-1-en-1-yl)propanoate, jasmonic acid, methyl
 25 jasmonate, ethyl jasmonate.

Substances which influence plant health and germination:

Usable combination partners for the inventive compounds in mixture formulations or in
 30 a tankmix are, for example, known active ingredients that influence plant health or
 germination. Examples of known substances influencing plant health and germination
 and can be combined with the inventive compounds include the active ingredients
 which follow (the compounds are designated by the "common name" according to the
 International Organization for Standardization (ISO) or by the chemical name or by the

code number) and always encompass all use forms, such as acids, salts, esters and isomers, such as stereoisomers and optical isomers. By way of example, one use form and in some cases a plurality of use forms are mentioned): sarcosine, phenyl alanine, tryptophan, N'-methyl-1-phenyl-1-N,N-diethylaminomethanesulfonamide, Apio-
 5 galacturonane as described in WO2010017956, 4-oxo-4-[(2-phenylethyl)amino]butanoic acid, 4-[[2-(1H-indole-3-yl)ethyl]amino]-4-oxobutanoic acid, 4-[(3-methylpyridin-2-yl)amino]-4-oxobutanoic acid, allantoin, 5-amino levulinic acid, (2S,3R)-2-(3,4-dihydroxyphenyl)-3,4-dihydro-2H-chromene-3,5,7-triol and structurally related catechines as described in WO2010122956, 2-Hydroxy-4-
 10 (methylsulfanyl)butanoic acid, (3E,3 α R,8 β S)-3-([(2R)-4-methyl-5-oxo-2,5-dihydrofuran-2-yl]oxy)methylene)-3,3 α ,4,8 β -tetrahydro-2H-indeno[1,2-b]furan-2-one and related lactons as described in EP2248421, abscisic acid, (2Z,4E)-5-[6-Ethynyl-1-hydroxy-2,6-dimethyl-4-oxocyclohex-2-en-1-yl]-3-methylpenta-2,4-dienoic acid, Methyl-
 15 (2Z,4E)-5-[6-ethynyl-1-hydroxy-2,6-dimethyl-4-oxocyclohex-2-en-1-yl]-3-methylpenta-2,4-dienoate

Herbicides or plant growth regulators:

Usable combination partners for the inventive use of compounds of formula (I) in
 20 mixture formulations or in a tankmix are, for example, known active ingredients based on inhibition of, for example, acetolactate synthase, acetyl-CoA carboxylase, cellulose synthase, enolpyruvylshikimate-3-phosphate synthase, glutamine synthetase, p-hydroxyphenylpyruvate dioxygenase, phytoendodesaturase, photosystem I, photosystem II, protoporphyrinogen oxidase, gibberellin biosynthesis, as described, for example, in
 25 Weed Research 26 (1986) 441-445 or "The Pesticide Manual", 15th edition, The British Crop Protection Council and the Royal Soc. of Chemistry, 2009 and literature cited therein.

Examples of known herbicides or plant growth regulators which can be combined with
 30 the inventive compounds include the active ingredients which follow (the compounds are designated by the "common name" according to the International Organization for Standardization (ISO) or by the chemical name or by the code number) and always encompass all use forms, such as acids, salts, esters and isomers, such as

stereoisomers and optical isomers. By way of example, one use form and in some cases a plurality of use forms are mentioned:

Possible mixing partners from the group of herbicides are:

- 5 acetochlor, acifluorfen, acifluorfen-sodium, aclonifen, alachlor, allidochlor, alloxydim, alloxydim-sodium, ametryn, amicarbazone, amidochlor, amidosulfuron, aminocyclopyrachlor, aminocyclopyrachlor-potassium, aminocyclopyrachlor-methyl, aminopyralid, amitrole, ammoniumsulfamate, anilofos, asulam, atrazine, azafenidin, azimsulfuron, beflubutamid, benazolin, benazolin-ethyl, benfluralin, benfuresate,
- 10 bensulfuron, bensulfuron-methyl, bensulide, bentazone, benzobicyclon, benzofenap, bicyclopyrone, bifenox, bilanafos, bilanafos-sodium, bispyribac, bispyribac-sodium, bromacil, bromobutide, bromofenoxim, bromoxynil, bromoxynil-potassium, bromoxynil-heptanoate, bromoxynil-octanoate, bromoxynil-butyrate, busoxinone, butachlor, butafenacil, butamifos, butenachlor, butralin, butroxydim, butylate, cafenstrole,
- 15 carbetamide, carfentrazone, carfentrazone-ethyl, chloramben, chlorbromuron, chlorfenac, chlorfenac-sodium, chlorfenprop, chlorflurenol, chlorflurenol-methyl, chloridazon, chlorimuron, chlorimuron-ethyl, chlorophthalim, chlorotoluron, chlorthal-dimethyl, chlorsulfuron, cinidon, cinidon-ethyl, cinmethylin, cinosulfuron, clethodim, clodinafop, clodinafop-propargyl, clomazone, clomeprop, clopyralid, cloransulam,
- 20 cloransulam-methyl, cumyluron, cyanamide, cyanazine, cycloate, cyclosulfamuron, cycloxydim, cyhalofop, cyhalofop-butyl, cyprazine, 2,4-D, 2,4-D-butotyl, -butyl, -dimethylammonium, -diolamin, -ethyl, -2-ethylhexyl, -isobutyl, -isooctyl, -isopropylammonium, -potassium, -triisopropanolammonium and -trolamine, 2,4-DB, 2,4-DB-butyl, -dimethylammonium, -isooctyl, -potassium
- 25 and -sodium, daimuron (dymron), dalapon, dazomet, n-decanol, desmedipham, detosyl-pyrazolate (DTP), dicamba, dichlobenil, dichlorprop, dichlorprop-P, diclofop, diclofop-methyl, diclofop-P-methyl, diclosulam, difenzoquat, diflufenican, diflufenzopyr, diflufenzopyr-sodium, dimefuron, dimepiperate, dimethachlor, dimethametryn, dimethenamid, dimethenamid-P, dimetrasulfuron, dinitramine, dinoterb, diphenamid,
- 30 diquat, diquat-dibromid, dithiopyr, diuron, DNOC, endothal, EPTC, esprocarb, ethalfluralin, ethametsulfuron, ethametsulfuron-methyl, ethiozin, ethofumesate, ethoxyfen, ethoxyfen-ethyl, ethoxysulfuron, etobenzanid, F-5331, i.e. N-[2-chloro-4-fluoro-5-[4-(3-fluoropropyl)-4,5-dihydro-5-oxo-1H-tetrazol-1-yl]-phenyl]-ethansulfonamide, F-7967, i.e. 3-[7-chloro-5-fluor-2-(trifluoromethyl)-1H-benzimidazol-

4-yl]-1-methyl-6-(trifluormethyl)pyrimidin-2,4(1H,3H)-dion, fenoxaprop, fenoxaprop-P, fenoxaprop-ethyl, fenoxaprop-P-ethyl, fenoxasulfone, fentrazamide, flamprop, flamprop-M-isopropyl, flamprop-M-methyl, flazasulfuron, florasulam, fluazifop, fluazifop-P, fluazifop-butyl, fluazifop-P-butyl, flucarbazone, flucarbazone-sodium, 5 flucetosulfuron, fluchloralin, flufenacet (thiafluamide, fluthiamide), flufenpyr, flufenpyr-ethyl, flumetsulam, flumiclorac, flumiclorac-pentyl, flumioxazin, fluometuron, fluoroglycofen, fluoroglycofen-ethyl, flupropanate, flupyrsulfuron, flupyrsulfuron-methyl-sodium, flurenol, flurenol-butyl, fluridone, flurochloridone, fluroxypyr, fluroxypyr-meptyl, flurtamone, fluthiacet, fluthiacet-methyl, fluthiamide, fomesafen, fomesafen-sodium, 10 foramsulfuron, fosamine, glufosinate, glufosinate-ammonium, glufosinate-P, glufosinate-P-ammonium, glufosinate-P-sodium, glyphosate, glyphosate-isopropylammonium, -ammonium, -diammonium, -dimethylammonium, -potassium, -sodium and -trimesium, H-9201, i.e. O-(2,4-Dimethyl-6-nitrophenyl)-O-ethyl-isopropylphosphoramidothioat, halosulfuron, halosulfuron-methyl, haloxyfop, 15 haloxyfop-P, haloxyfop-ethoxyethyl, haloxyfop-P-ethoxyethyl, haloxyfop-methyl, haloxyfop-P-methyl, hexazinone, HW-02, i.e. 1-(dimethoxyphosphoryl)-ethyl-(2,4-dichlorophenoxy)acetate, imazamethabenz, Imazamethabenz-methyl, imazamox, imazamox-ammonium, imazapic, imazapic-ammonium, imazapyr, imazapyr-isopropylammonium, imazaquin, imazaquin-ammonium, imazethapyr, imazethapyr-ammonium, imazosulfuron, indanofan, indaziflam, iodosulfuron, iodosulfuron-methyl-sodium, ioxynil, ioxynil-sodium, ioxynil-potassium, ioxynil-octanoate, ipfencarbazone, isoproturon, isouron, isoxaben, isoxaflutole, karbutilate, KUH-043, i.e. 3-({[5-(difluoromethyl)-1-methyl-3-(trifluormethyl)-1H-pyrazol-4-yl]methyl}sulfonyl)-5,5-dimethyl-4,5-dihydro-1,2-oxazole, ketospiradox, lactofen, lenacil, linuron, MCPA (salts 20 and esters), MCPB (salts and esters), MCPB-methyl, -ethyl and -sodium, mecoprop, mecoprop-sodium, and -butotyl, mecoprop-P, mecoprop-P-butotyl, -dimethylammonium, -2-ethylhexyl and -potassium, mefenacet, mefluidide, mesosulfuron, mesosulfuron-methyl, mesotrione, metam, metamifop, metamidron, metazachlor, metazosulfuron, methabenzthiazuron, methiopyrisulfuron, methiozolin, 30 methyl isothiocyanate, metobromuron, metolachlor, S-metolachlor, metosulam, metoxuron, metribuzin, metsulfuron, metsulfuron-methyl, molinate, monolinuron, monosulfuron, monosulfuron-ester, MT-128, i.e. 6-chloro-N-[(2E)-3-chloroprop-2-en-1-yl]-5-methyl-N-phenylpyridazin-3-amine, MT-5950, i.e. N-[3-chloro-4-(1-methylethyl)-phenyl]-2-methylpentanamide, NGGC-011, napropamide, NC-310, i.e. 4-(2,4-

Dichlorbenzoyl)-1-methyl-5-benzyloxypyrazol, neburon, nicosulfuron, nonanoic acid, norflurazon, oleic acid (fatty acids), orbencarb, orthosulfamuron, oryzalin, oxadiargyl, oxadiazon, oxasulfuron, oxaziclomefon, oxyfluorfen, paraquat, paraquat dichloride, pebulate, pelargonic acid (Nonansäure), pendimethalin, penoxsulam,

5 pentachlorophenol, pentoxazone, pethoxamid, petroleum oils, phenmedipham, phenmedipham-ethyl, picloram, picolinafen, pinoxaden, piperophos, pretilachlor, primisulfuron, primisulfuron-methyl, prodiamine, prifluraline, profoxydim, prometon, prometryn, propachlor, propanil, propaquizafop, propazine, propham, propisochlor, propoxycarbazone, propoxycarbazone-sodium, propyrisulfuron, propyzamide,

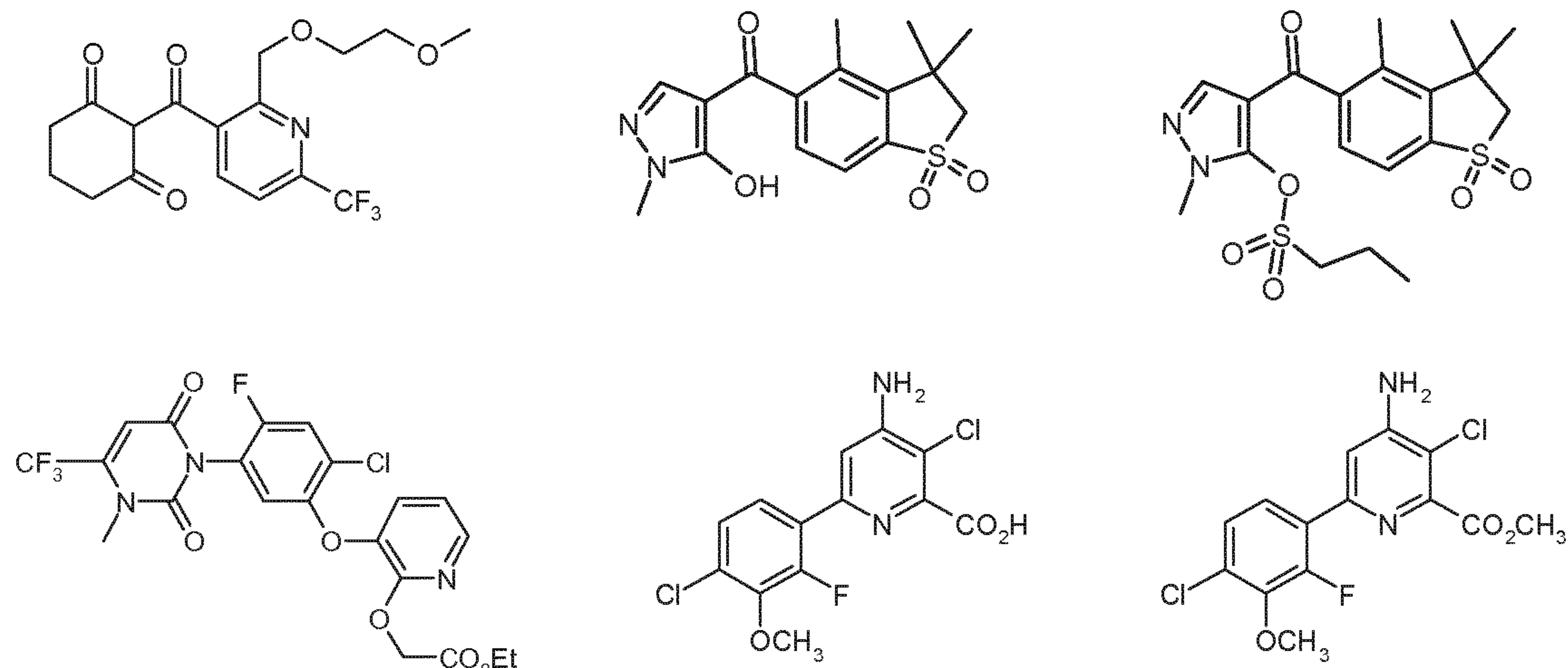
10 prosulfocarb, prosulfuron, pyraclonil, pyraflufen, pyraflufen-ethyl, pyrasulfotole, pyrazolynate (pyrazolate), pyrazosulfuron, pyrazosulfuron-ethyl, pyrazoxyfen, pyribambenz, pyribambenz-isopropyl, pyribambenz-propyl, pyribenzoxim, pyributicarb, pyridafol, pyridate, pyriftalid, pyriminobac, pyriminobac-methyl, pyrimisulfan, pyriothiobac, pyriothiobac-sodium, pyroxasulfone, pyroxsulam, quinclorac, quinmerac,

15 quincloramine, quizalofop, quizalofop-ethyl, quizalofop-P, quizalofop-P-ethyl, quizalofop-P-tefuryl, rimsulfuron, saflufenacil, sethoxydim, siduron, simazine, simetryn, sulcotrione, sulfentrazone, sulfometuron, sulfometuron-methyl, sulfosate, sulfosulfuron, SW-065, SYN-523, SYP-249, i.e. 1-ethoxy-3-methyl-1-oxobut-3-en-2-yl-5-[2-chlor-4-(trifluormethyl)phenoxy]-2-nitrobenzoate, SYP-300, i.e. 1-[7-fluoro-3-oxo-4-(prop-2-in-

20 1-yl)-3,4-dihydro-2H-1,4-benzoxazin-6-yl]-3-propyl-2-thioxoimidazolidin-4,5-dione, TCA (trichloroacetic acid), TCA-sodium, tebuthiuron, tefuryltrione, tembotrione, tepraloxymid, terbacil, terbucarb, terbumeton, terbuthylazin, terbutryn, thenylchlor, thiazopyr, thienicarbazone, thienicarbazone-methyl, thifensulfuron, thifensulfuron-methyl, thiobencarb, topramezone, tralkoxydim, triafamone, triallate, triasulfuron,

25 triaziflam, tribenuron, tribenuron-methyl, triclopyr, trietazine, trifloxysulfuron, trifloxysulfuron-sodium, trifluralin, triflusulfuron, triflusulfuron-methyl, tritosulfuron, urea sulfate, vernolate, ZJ-0862, i.e. 3,4-dichloro-N-{2-[(4,6-dimethoxypyrimidin-2-yl)oxy]benzyl}aniline, as well as the following compounds:

80



Possible mixing partners from the group of plant-growth regulators are, for example:

- 5 abscisic acid, acibenzolar, acibenzolar-S-methyl, 5-aminolaevulinic acid, ancymidol, 6-benzylaminopurine, brassinolide, catechin, cloprop, cyclanilide, 3-(cycloprop-1-enyl)propionic acid, 3-(cycloprop-1-enyl)propionic acid, sodium salt, daminozide, dazomet, n-decanol, dikegulac, dikegulac-sodium, endothal, flumetralin, flurenol, flurenol-butyl, flurprimidol, forchlorfenuron, gibberellic acid, inabenfide, indol-3-acetic
- 10 acid (IAA), 4-indol-3-ylbutyric acid, isoprothiolane, jasmonic acid, methyl jasmonate, kinetin, maleic hydrazide, mepiquat chloride, 1-methylcyclopropene, 2-(1-naphthyl)acetamide, 1-naphthylacetic acid, 2-naphthyloxyacetic acid, nitrophenolate-mixture, 4-oxo-4[(2-phenylethyl)amino]butanoic acid, paclobutrazol, N-phenylphthalamic acid, probenazol, prohexadione, prohexadione-calcium,
- 15 prohydrojasmon, propham, salicylic acid, Strigolacton, tecnazene, thidiazuron, triacontanol, trinexapac, tsitodef, uniconazole, uniconazole-P.

- 20 The invention is to be illustrated by the biological examples which follow, but without restricting it thereto.

Biological examples

A) Testing conditions

5 A1) Testing conditions in glasshouse trials

The trials can be carried out in a glasshouse under normal good growth conditions for the plants using pot trials with 8 cm diameter pots. Each pot should contain 6-8 plants. The results were the average of two replicates.

10 The applications can be done with seed treatment, pre-emergence or post-emergence treatments. The pre- or post-emergence applications shall be made with spray applications using 100-300 l/water per hectare.

The assessments can be done via visual ratings (0-100 % scale, several days after the application, comparing treated vs. untreated checks pots).

15

A2) Testing conditions in a growth chamber

Into each 16 cm diameter pot containing 3 liters loamy soil, one *Triticum aestivum* (TRZAS), variety "AC harvest" kernel was sown. Obtained results were the average of five replicates.

20 The plants were grown in a growth chamber under slightly reduced water conditions but otherwise normal and good growing conditions.

Spray application - with spray applications using 100-300 l/water per hectare - was done at a plant growth stage of 56-61, according to the BBCH scheme.

25 The trials have been harvested after crops reached the full maturity. After the harvest, the total weights of grains (kernels/seeds) per pot were taken.

The results are disclosed under C1, below.

A3) Testing conditions in field trials

30 The trials have been carried out under natural field conditions (plot trials, 10sqm , 4 replications) with spray applications using 100-300 l/water per hectare.

The applications have been done as post emergence treatments straight (alone , 1 application). The growth stage of the crops species at the time of application are reported in the single tables as well as the dose rates of the active ingredients applied.

The trials have been harvested after crops reached the full maturity. After the harvest, the total weights of grains (kernels/seeds) per plot were taken . Afterwards the seed samples were dried to 14 % moisture. The freshweight were calculated to a uniform dry weight of 86 % for all harvested plots. The results are reported as means over 4
 5 replications per treatment based on 14 % moisture resp. 86% dry weight. The time interval (in days) between applications and harvest time are also described in the single tables.

The results are disclosed under C2.

10 A4) Seed treatment conditions

The active ingredients can be applied to the untreated, dry seeds together with a carrier. After a short period of time to let the seeds dry, they'll be ready to be sown in the pot or field using standard equipments.

The results are disclosed under C3, below.

15

B) Abbreviations in the result tables

	Dose rate g/ai	=	dose rates in gram active ingredient per hectare
	ai	=	active ingredient (based on 100% content)
20	CQM	=	cloquintocet-mexyl (common name) (A1 of present invention)
	UTC	=	untreated control plots
	post-emergence	=	applied(sprayed) after emergence of the crop plants (the growth stage of the plants at the time of application is reported in the tables accordingly)
25	GS	=	growth stages in a Decimal scale (acc. Zaddoks)
	yield	=	harvested weight of mature grains(seeds / kernels) pro hectare (ha); adjusted to 86 % dry weight resp. 14 % moisture
30	dt	=	decitone (=100 kg or 0.1 metric tone)

C1) Results obtained from growth chamber trials

Table C1-1: Grain yield of *Triticum aestivum* variety "AC Harvest" after treatment with cloquintocet-mexyl (CQM), several fungicides and insecticides and mixtures of CQM and the respective fungicides and insecticides

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Active ingredient (s)	Dose rate g/ha ¹⁾	Grain Yield, g/plant	Relative, %	Difference (%) vs. UTC
UTC	-	1,06	100,0	-
cloquintocet-mexyl (CQM; "A1")	10	1,10	103,7	+ 3,7
metalaxyl (F-10)	10	1,14	107,5	+ 7,5
CQM + metalaxyl	10 +10	1,20	113,2	+13,2
Clothianidin (I-3)	10	1,19	112,3	+12,3
CQM + clothianidin	10 +10	1,26	118,9	+18,9
Fipronil (I-8)	10	1,19	112,3	+12,3
CQM + fipronil	10 +10	1,25	117,9	+17,9
Imidacloprid (I-11)	10	1,14	107,5	+ 7,5
CQM + imidacloprid	10 +10	1,23	116,0	+16,0
Pyraclostrobin (F-57)	10	1,24	117,0	+17,0
CQM + pyraclostrobin	10 +10	1,33	125,5	+25,5
Azoxystrobin (F-47)	10	1,22	115,1	+15,1
CQM + azoxystrobin	10 +10	1,25	117,9	+17,9
Trifloxystrobin (F-60)	10	1,12	105,7	+ 5,7
CQM + trifloxystrobin	10 +10	1,25	117,9	+17,9
Prothioconazole (F-124)	10	1,02	96,2	- 3,8
CQM + prothioconazole	10 +10	1,23	116,0	+16,0
Difenoconazole (F-105)	10	1,02	96,2	- 3,8
CQM + difenoconazole	10 +10	1,18	111,3	+11,3

C2) Results obtained from field trials

Table C2-1: Corn – Grain yield effects after post emergence applications of CQM

Active ingredient (s)	Dose rate gai/ha ¹⁾	Yield, dt/ha ²⁾	Relative, %	Difference (%) vs. UTC
(A) UTC	-	48,8	100,0	-
(B) CQM	100	52,7	108,0	+ 9,0 %

5 ¹⁾ Application: post emergence, stem elongation stage (GS 33)

²⁾ Harvest: 84 days after application

Table C2-2: Corn – Grain yield effects after post emergence applications of CQM

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Active ingredient (s)	Dose rate gai/ha ¹⁾	Yield,dt/ha ²⁾	Relative, %	Difference (%) vs. UTC
(A) UTC	-	92	100,0	-
(B) CQM	20	94	102,4	+ 2,4 %

¹⁾ Application: mid-post,

²⁾ Harvest: 76 days after application

15 Table C2-3: Corn – Grain yield effects after post emergence applications
of CQM + Pyraclostrobin (=F57)

Active ingredient (s)	Dose rate gai/ha ¹⁾	Yield, dt/ha ²⁾	Relative, %	Difference (%) vs. UTC
(A) UTC	-	92	100,0	-
(B) CQM	20	94	102,4	+ 2,4 %
(C) Pyraclostrobin	250	78	84,8	- 15,2 %
(B) + (C)	20 + 250	95	104,0	+ 4,0 %

¹⁾ Application: mid-post,

²⁾ Harvest: 76 days after application

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Table C2-4: Spring wheat - Grain yield effects after post emergence applications
of CQM

Active ingredient	Dose rate gai/kg seed / gai/ha ¹⁾	Yield dt/ha ²⁾	Relative %	Difference (%) vs. UTC
(A) UTC	-	38,3	100,0	-
(B) CQM	100 gai/ ha	41,7	109,0	+ 9,0 %

25 ¹⁾ Application: post emergence , flag leaf stage (GS 39)

²⁾ Harvest: 80 days after application

85

Table C2-5: Spring wheat-Grain yield effects after late post emergence applications of CQM

Active ingredient	Dose rate gai/kg seed / gai/ha ¹⁾	Yield dt/ha ²⁾	Relative %	Difference (%) vs. UTC
(A) UTC	-	37,6	100,0	-
(B) CQM	100 gai/ ha	40,2	107,0	+ 7,0 %

¹⁾ Application: late post emergence, ear heading (GS 55)²⁾ Harvest: 72 days after application

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Table C2-6: Oil seed rape (spring; Canola)
- Grain yield effects post emergence applications of CQM

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Active ingredient	Dose rate gai/kg seed / gai/ha ¹⁾	Yield dt/ha ²⁾	Relative %	Difference (%) vs. UTC
(A) UTC	-	17,7	100,0	-
(B) CQM	100 gai/ ha	18,4	104,0	+4,0 %

¹⁾ Application: late post emergence, begin of flowering (GS 60)²⁾ Harvest: 49 days after application

15 C3) Results obtained from Seed Treatment

Table C1-1: Triticum aestivum seeds (TRZAS) treated according to conditions disclosed under A4, above

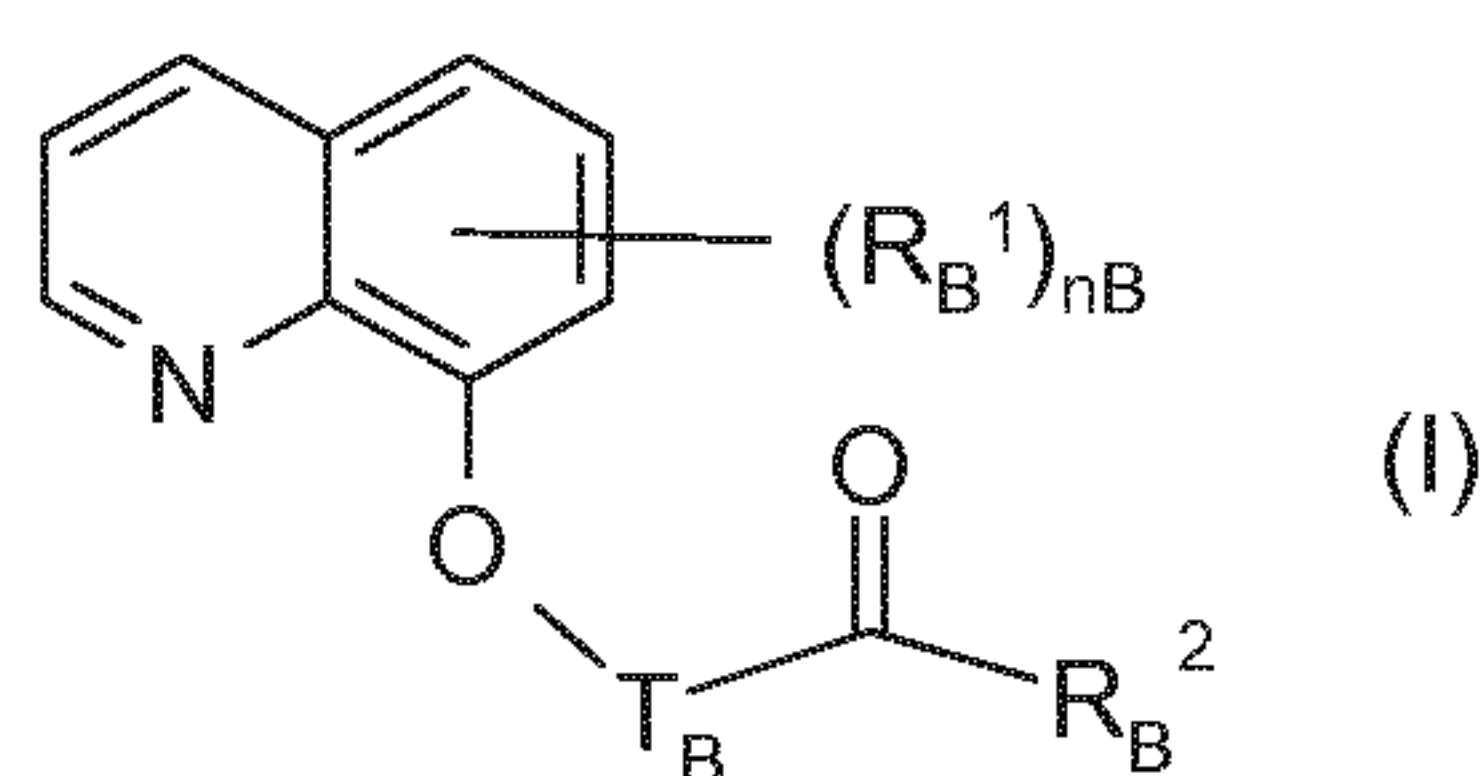
Active ingredient (s)	Dose rate gai/kg seed	Grain Yield, g/plant	Relative, %	Difference (%) vs. UTC
UTC	-	1,80	100,0	-
cloquintocet-mexyl (CQM)	0,5	2,06	114,4	+14,4
cloquintocet-mexyl (CQM)	1	1,97	109,4	+9,4
metalaxyl (F-10)	1	1,52	84,4	-15,6
CQM + metalaxyl	1 + 1	2,17	120,6	+20,6
Fludioxonil (F-83)	1	2,06	114,4	+14,4
CQM + Fludioxonil	0,5 +1	2,59	143,9	+43,9
Difenoconazole (F-105)	1	1,62	90	-10
CQM + difenoconazole	0,5 +1	2,20	122,2	+22,2

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Claims

BCS 13-1005

1. Use of a Compound (A) for increasing the yield of useful plants or crop plants
 5 with respect to their harvested plant organs, which plants are growing in their normal habitat, and wherein the Compound (A) is selected from compounds of the formula (I), or hydrates and salts thereof,



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in which

- R_B^1 is halogen, (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy, nitro or (C₁-C₄)-haloalkyl;
 n_B is a natural number from 0 to 5, preferably 0 to 3;
 R_B^2 is OR_B^3 , SR_B^3 or $NR_B^3R_B^4$ or a saturated
 15 or unsaturated 3- to 7-membered heterocycle having at least one nitrogen atom and up to 3 heteroatoms, preferably from the group consisting of O and S, which is attached via the nitrogen atom to the carbonyl group in (S2) and which is unsubstituted or substituted by radicals from the group consisting of (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy and optionally substituted phenyl, preferably a radical of the
 20 formula OR_B^3 , NHR_B^4 or $N(CH_3)_2$, in particular of the formula OR_B^3 ;
 R_B^3 is hydrogen or an unsubstituted or substituted aliphatic hydrocarbonyl radical, preferably having a total of 1 to 18 carbon atoms;
 R_B^4 is hydrogen, (C₁-C₆)-alkyl, (C₁-C₆)-alkoxy or substituted or unsubstituted phenyl;
 T_B is a (C₁- or C₂)-alkanediyl chain which is unsubstituted or substituted by one or
 25 two (C₁-C₄)-alkyl radicals or by [(C₁-C₃)-alkoxy]carbonyl;
2. The use as claimed in claim 1, characterized in that Compound (A) is 1-methylhexyl (5-chloro-8-quinolinoxy)acetate ("cloquintocet-mexyl").

3. The use as claimed in any one of claims 1 to 2, characterized by increasing the grain yield of crop plants selected from group consisting of cereals, canola, soybean and cotton crops.
- 5 4. The use as claimed in any one of claims 1 to 2, characterized by increasing the grain yield of crop plants selected from group consisting of wheat, barley, rye or triticale plants.
- 10 5. The use as claimed in any one of claims 1 to 2, characterized by increasing increasing the gluten content of seed kernels of crop plants selected from group consisting of cereals, canola and soybean crops.
- 15 6. The use as claimed in any one of claims 1 to 2, characterized by increasing the gluten content of seed kernels of crop plants selected from group consisting of cereal crops.
- 20 7. The use as claimed in any one of claims 1 to 2, characterized by increasing the protein content of seed kernels of crop plants selected from group consisting of cereals, canola and soybean crops.
8. The use as claimed in any one of claims 1 to 2, characterized by increasing the yield of the amount by weight of beets of beet plants.
- 25 9. The use as claimed in any one of claims 1 to 2, characterized by increasing the sugar content of sugar plants.
10. The use as claimed in any one of claims 1 to 2, characterized by increasing the germination and emergence of cereal crops.
- 30 11. The use as claimed in any one of claims 1 to 2, characterized by increasing the biomass yield of maize plants growing in the absence of extraordinary environmental conditions.

12. The use as claimed in any one of claims 1 to 2, characterized by increasing the biomass yield of sugar plants.

13. A method for increasing the yield of useful plants or crop plants with respect to their harvested plant organs which plants are growing in their normal habitat, and wherein a Compound (A) as defined in any of claims 1 to 2 is applied in an effective, preferably non-phytotoxic amount to the crop plants, the seeds from which they grow, or to the locus in which they grow in their normal habitat.

14. The method according to claim 13, and wherein Compound (A) is applied in combination with one or more compounds selected from the group of fungicides, insecticides and plant growth regulators.

15. The method according to claim 14, wherein a Compound (A) is applied in combination with with (i) fluoxastrobin and prothioconazole, (ii) pyraclostrobin and metconazole, (iii) trifloxystrobin and propiconazole, (iv) trifloxystrobin and prothioconazole, (v) prothioconazole and tebuconazole, (vi) bixafen and prothioconazole, (vii) bixafen and tebuconazole, or (viii) bixafen and trifloxystrobin.

16. The method according to anyone of claims 14 or 15 and in which Compound (A) is as defined in claim 2.

17. A plant yield increasing composition comprising a Compound (A) and further comprising the combination of two fungicides which combination is selected from the group consisting of

(i) pyraclostrobin and metconazole, (ii) trifloxystrobin and propiconazole, (iii) prothioconazole and tebuconazole, (iv) fluoxastrobin and prothioconazole, (v) trifloxystrobin and prothioconazole, (vi) bixafen and prothioconazole, (vii) bixafen and tebuconazole, and (viii) bixafen and trifloxystrobin.

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18. The plant yield increasing composition according to claim 17 and wherein Compound (A) is as defined in claim 2.

