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(54) Title: METHOD TO REDUCE THE FREQUENCY AND/OR INTENSITY OF BLOSSOM-END ROT DISORDER IN HORTICULTURAL CROPS

(57) Abstract: Use of Trifloxystrobin to reduce the frequency and/or intensity of blossom-end rot disorder in a horticultural crop.



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Method to reduce the frequency and/or intensity of blossom-end rot disorder in horticultural crops

The present invention relates to the use of Trifloxystrobin for reducing the frequency and/or intensity of blossom-end rot disorder in horticultural crops.

Blossom-end rot is a serious disorder of certain horticultural crops such as tomato, pepper and eggplant. The disorder results in the decay of the respective fruits on their blossom-end, reducing the marketability of the affected fruits.

Its symptoms, occurrence and the searching for the cause of blossom-end rot have been described frequently. For example, the Ohio State University Extension issued an Extension Fact Sheet (HYG-3117-96 by Sally A. Miller, Randall, C. Row and Richard Riedel, which is available on the internet at <http://ohioline.osu.edu/hyg-fact/3000/3117.html>) entitled "Blossom-End Rot of Tomato, Pepper and Eggplant" which describes the symptoms, cause and the management of this disorder.

It is described therein that on tomato and eggplant, blossom-end rot usually begins as a small water-soaked area at the blossom-end of the fruit and which may appear while the fruit is green or during ripening. As the lesion develops, it enlarges, becomes sunken and turns black and leathery. In severe cases, it may completely cover the lower half of the fruit, becoming flat or concave. It is also described that secondary pathogens may invade the lesion, often resulting in complete destruction of the infected fruit.

It is further emphasized therein that blossom-end rot is a physiologic disorder associated with a low concentration of calcium in the fruit. Calcium is required in relatively large concentrations for normal cell growth. When a rapidly growing fruit is deprived of necessary calcium, the tissues break down, leaving the characteristic dry, sunken lesion at the blossom-end. Blossom-end rot is induced when demand for calcium exceeds supply. This may result from low calcium levels or high amounts of competitive cations in the soil, drought stress, or excessive soil moisture fluctuations which reduce uptake and movement of calcium into the plant, or rapid, vegetative growth due to excessive nitrogen fertilization.

Moreover, several studies identified a local calcium deficiency in the distal fruit tissue as the primary cause. In horticultural practice, it is known that the occurrence of blossom-end rot can be minimized by increasing calcium transport toward the fruit by reducing canopy transpiration (Li, Y.L., Stanhelli, C. & Challa, H. 2001: Effect of electrical conductivity and transpiration on production of greenhouse tomato (*Lycopersicon esculentum* L.). *Scientia Horticulturae*, 88, 11-29) or by direct calcium applications (Wada, T., Ikeda, H., Ikeda, M. & Furukawa, H. (1996): Effects of foliar application of calcium solutions on the incidence of blossom-end rot of tomato fruit. *Journal of Japanese Society for Horticultural Science*, 65, 553-558; Ho, L.C. (1998): To quantify environmental and physiological factors controlling calcium uptake, transport and

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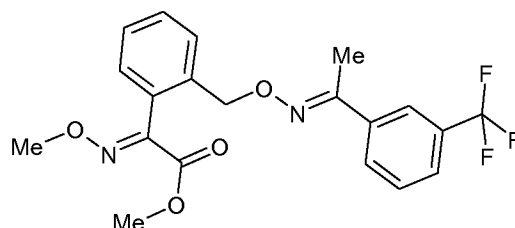
utilization on yield and quality of tomato and sweet peppers in glasshouses. Final report on MAFF project HH1309SPC; Schmitz-Eiberger, M., Haefs, R. & Noga, G. (2002): Calcium deficiency – influence on the antioxidative defense system in tomato plants. *Journal of Plant Physiology*, 159, 733-742).

Sally A. Miller, Randall, C. Row and Richard Riedel in the above mentioned Extension Fact Sheet suggest, for example, to maintain the soil pH around 6.5, as liming will supply calcium and will increase the ratio of calcium ions to other competitive ions in the soil, or to use nitrate nitrogen as the fertilizer nitrogen source, since ammoniacal nitrogen may increase blossom-end rot as excess ammonium ions reduce calcium uptake, or avoid drought stress and wide fluctuations in soil moisture by using mulches and/or irrigation.

However, Ho & White (Ho, L.C. & White, P.J. (2005): A cellular hypothesis for the induction of blossom-end rot in tomato fruit stated. *Annals of Botany*, 95, 571-581) stated that in modern glasshouse/greenhouse fruit production the induction of blossom-end rot (particularly in the tomato production) is rarely caused by inadequate calcium supply. In contrast, blossom-end rot occurs more often in plants with optimum calcium fertilization, particularly when cultivated under conditions that either reduce the transport of calcium to rapidly growing distal fruit tissue or increase the demand of the distal fruit tissue for calcium due to an accelerated fruit expansion (Ho, L.C. (1998): Improving tomato fruit quality by cultivation. In: Cockshull, K.E., Gray, D., Seymour, G.B., Thomas, B. Eds. *Genetic and environmental manipulation of horticultural crops*. Wallingford, UK: CAB International, 17-29).

The inventors now found that when Trifloxystrobin is applied, the intensity of blossom-end rot which appears in horticultural crops can be dramatically decreased.

This was surprising since the strobilurine-type fungicide methyl (*E*)-methoxyimino-{(*E*)- α -[1-(α,α,α -trifluoro-*m*-tolyl)ethylideneaminoxy]-*o*-tolyl} acetate, generally known as Trifloxystrobin and having the following formula



is known to be efficient in controlling broad spectrum of fungal pathogens (cf. EP-B-460575 and US-A-2005-0032903). Although Trifloxystrobin has been known to have positive effects on the health and quality of a plant (such as protein content of cereals – see Clark, D.C. (2003) Agronomic implications of some morphological and biochemical effects of Trifloxystrobin in wheat growing *Pflanzenschutz-Nachrichten Bayer* 56 (2), 281-296; improved abiotic stress tolerance – cf. Freundorfer, I (2008) Less stress – higher

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yield, Bayer CropScience Courier 2, 11-13) nothing is known so far that Trifloxystrobin would also be efficient in reducing the frequency and/or intensity of blossom-end rot disorder.

Thus, the invention is directed to the use of Trifloxystrobin to reduce the frequency and/or intensity of blossom-end rot disorder which may appear in horticultural crops and also for the method to reduce the frequency and/or intensity of blossom-end rot disorder by using Trifloxystrobin.

In an aspect of the invention, Trifloxystrobin is particularly useful to reduce the frequency and/or intensity of blossom-end rot disorder in fruits such as tomato, pepper and eggplant.

Horticultural crops according to the invention comprises the following crops: carrots, pumpkin, squash, zucchini, potato, sweet corn, onions, ornamentals, medicinal herbs, culinary herbs, tomatoes, spinach, pepper, melon, lettuce, cucumber, celery, beets, cabbage, cauliflower, broccoli, Brussels sprouts, kohlrabi, kale, radish, rutabaga, turnip, asparagus, bean, pea, apples, raspberry, strawberry, banana, mango, grapes, peaches, pears, guava, pineapple, pomegranate, garlic, capsicum, chilli, radish, star fruit, tapioca, walnuts, lemon, mandarin, mangold, mushroom, olive, orange, papaya, paprika, passion fruit, peanuts, pecan nuts, prune, pistachio nuts, persimmon, pamplemousse (grapefruit), eggplant, endive, cranberry, gooseberry, hazel nuts, kiwifruit, almonds, amaranth, apricot, artichoke, avocado, blackberry, cashew nut, cherry, clementine, coconut, cantaloupes and includes their harvested goods (such as fruits and vegetables which are commonly referred to herein as fruits).

According to the invention Trifloxystrobin is applied at different growth stages, starting before anthesis (i.e. the period during which a flower is fully open and functional. Anthesis may also refer to the onset of that period).

It is preferred to use Trifloxystrobin in greenhouse production of horticultural crops.

In one aspect of the invention, Trifloxystrobin is used in its commercially available formulations and in the use forms, prepared from these formulations, as a mixture with other active compounds, such as insecticides, attractants, sterilizing agents, bactericides, acaricides, nematocides, fungicides, growth-regulating substances, herbicides, safeners, fertilizers or semiochemicals and biological control agents such as the yeast *Metschnikowia fructicola*.

Particularly favourable mixing compounds are, for example, fungicides such as: Inhibitors of the nucleic acid synthesis, for example benalaxyl, benalaxyl-M, bupirimate, clozylacon, dimethirimol, ethirimol, furalaxyl, hymexazol, metalaxyl, metalaxyl-M, ofurace, oxadixyl and oxolinic acid. Inhibitors of the mitosis and cell division, for example benomyl, carbendazim, chlorfenazole, diethofencarb, ethaboxam,

fuberidazole, pencycuron, thiabendazole, thiophanate, thiophanate-methyl and zoxamide. Inhibitors of the respiration, for example diflumetorim as CI-respiration inhibitor; bixafen, boscalid, carboxin, fenfuram, flutolanil, fluopyram, furametpyr, furmecyclox, isopyrazam (mixture of syn-epimeric racemate 1RS,4SR,9RS and anti-epimeric racemate 1RS,4SR,9SR), isopyrazam (syn epimeric racemate 1RS,4SR,9RS), isopyrazam (syn-epimeric enantiomer 1R,4S,9R), isopyrazam (syn-epimeric enantiomer 1S,4R,9S), isopyrazam (anti-epimeric racemate 1RS,4SR,9SR), isopyrazam (anti-epimeric enantiomer 1R,4S,9S), isopyrazam (anti-epimeric enantiomer 1S,4R,9R), mepronil, oxycarboxin, penflufen, penthiopyrad, sedaxane, thifluzamide as CII-respiration inhibitor; amisulbrom, azoxystrobin, cyazofamid, dimoxystrobin, enestroburin, famoxadone, fenamidone, fluoxastrobin, kresoxim-methyl, metominostrobin, oryastrobin, picoxystrobin, pyraclostrobin, pyraoxystrobin, pyrametostrobin, pyribencarb, trifloxystrobin as CIII-respiration inhibitor. Compounds capable to act as an uncoupler, like for example binapacryl, dinocap, fluazinam and meptyldinocap. Inhibitors of the ATP production, for example fentin acetate, fentin chloride, fentin hydroxide, and. Inhibitors of the amino acid and/or protein biosynthesis, for example andoprim, blastidicin silthiofam -S, cyprodinil, kasugamycin, kasugamycin hydrochloride hydrate, mepanipyrim and pyrimethanil. Inhibitors of the signal transduction, for example fenpiclonil, fludioxonil and quinoxifen. Inhibitors of the lipid and membrane synthesis, for example biphenyl, chlozolate, edifenphos, etridiazole, iodocarb, iprobenfos, iprodione, isoprothiolane, procymidone, propamocarb, propamocarb hydrochloride, pyrazophos, tolclufos-methyl and vinclozolin. Inhibitors of the ergosterol biosynthesis, for example aldimorph, azaconazole, bitertanol, bromuconazole, cyproconazole, diclobutrazole, difenoconazole, diniconazole, diniconazole-M, dodemorph, dodemorph acetate, epoxiconazole, etaconazole, fenarimol, fenbuconazole, fenhexamid, fenpropidin, fenpropimorph, fluquinconazole, flurprimidol, flusilazole, flutriafol, furconazole, furconazole-cis, hexaconazole, imazalil, imazalil sulfate, imibenconazole, ipconazole, metconazole, myclobutanil, naftifine, nuarimol, oxpoconazole, paclobutrazol, pefurazoate, penconazole, piperalin, prochloraz, propiconazole, prothioconazole, pyributicarb, pyrifenoxy, quinconazole, simeconazole, spiroxamine, tebuconazole, terbinafine, tetraconazole, triadimefon, triadimenol, tridemorph, triflumizole, triforine, triticonazole, uniconazole, viniconazole and voriconazole. Inhibitors of the cell wall synthesis, for example bentiavalicarb, dimethomorph, flumorph, improvalicarb, mandipropamid, polyoxins, polyoxorim, prothiocarb, validamycin A, and valifenalate. Inhibitors of the melanine biosynthesis, for example carpropamid, diclocymet, fenoxanil, phthalide, pyroquilon and tricyclazole. Compounds capable to induce a host defence, like for example acibenzolar-S-methyl, probenazole, and tiadinil. Compounds capable to have a multisite action, like for example bordeaux mixture, captafol, captan, chlorothalonil, copper naphthenate, copper oxide, copper oxychloride, copper preparations such as copper hydroxide, copper sulphate, dichlofluanid, dithianon, dodine, dodine free base, ferbam, fluorofolpet, folpet, guazatine, guazatine acetate, iminoctadine, iminoctadine albesilate, iminoctadine triacetate, mancozeb, mancozeb, maneb, metiram, metiram zinc, oxine-copper, propamidine,

propineb, sulphur and sulphur preparations including calcium polysulphide, thiram, tolylfluanid, zineb and ziram.

Further compounds like for example 2,3-dibutyl-6-chlorothieno[2,3-d]pyrimidin-4(3H)-one, ethyl (2Z)-3-amino-2-cyano-3-phenylprop-2-enoate, N-[2-(1,3-dimethylbutyl)phenyl]-5-fluoro-1,3-dimethyl-1H-pyrazole-4-carboxamide, 3-(difluoromethyl)-1-methyl-N-(3',4',5'-trifluorobiphenyl-2-yl)-1H-pyrazole-4-carboxamide, 3-(difluoromethyl)-N-[4-fluoro-2-(1,1,2,3,3,3-hexafluoropropoxy)phenyl]-1-methyl-1H-pyrazole-4-carboxamide, (2E)-2-(2-{[6-(3-chloro-2-methylphenoxy)-5-fluoropyrimidin-4-yl]oxy}phenyl)-2-(methoxyimino)-N-methylethanamide, (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-inden-4-yl)pyridine-3-carboxamide, N-(3-ethyl-3,5,5-trimethylcyclohexyl)-3-(Formylamino)-2-hydroxybenzamide, 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, (2E)-2-(methoxyimino)-N-methyl-2-(2-{[(1E)-1-[3-(trifluoromethyl)phenyl]ethylidene}amino]oxy)methyl}phenyl)ethanamide, (2E)-2-(methoxyimino)-N-methyl-2-{2-[(E)-{1-[3-(trifluoromethyl)phenyl]ethoxy}imino)methyl}phenyl)ethanamide, (2E)-2-{2-[[[(1E)-1-(3-{[(E)-1-fluoro-2-phenylethenyl]oxy}phenyl)ethylidene]amino]oxy)methyl]phenyl}-2-(methoxyimino)-N-methylethanamide, 1-(4-chlorophenyl)-2-(1H-1,2,4-triazol-1-yl)cycloheptanol, methyl 1-(2,2-dimethyl-2,3-dihydro-1H-inden-1-yl)-1H-imidazole-5-carboxylate, N-ethyl-N-methyl-N'-{2-methyl-5-(trifluoromethyl)-4-[3-(trimethylsilyl)propoxy]phenyl}imidoforamide, N'-{5-(difluoromethyl)-2-methyl-4-[3-(trimethylsilyl)propoxy]phenyl}-N-ethyl-N-methylimidoforamide, O-{1-[(4-methoxyphenoxy)methyl]-2,2-dimethylpropyl} 1H-imidazole-1-carbothioate, N-[2-(4-{[3-(4-chlorophenyl)prop-2-yn-1-yl]oxy}-3-methoxyphenyl)ethyl]-N²-(methylsulfonyl)valinamide, 5-chloro-7-(4-methylpiperidin-1-yl)-6-(2,4,6-trifluorophenyl)[1,2,4]triazolo[1,5-a]pyrimidine, 5-amino-1,3,4-thiadiazole-2-thiol, propamocarb-fosetyl, 1-[(4-methoxyphenoxy)methyl]-2,2-dimethylpropyl 1H-imidazole-1-carboxylate, 1-methyl-N-[2-(1,1,2,2-tetrafluoroethoxy)phenyl]-3-(trifluoromethyl)-1H-pyrazole-4-carboxamide, 2,3,5,6-tetrachloro-4-(methylsulfonyl)pyridine, 2-butoxy-6-iodo-3-propyl-4H-chromen-4-one, 2-phenylphenol and salts, 3-(difluoromethyl)-1-methyl-N-[2-(1,1,2,2-tetrafluoroethoxy)phenyl]-1H-pyrazole-4-carboxamide, 3,4,5-trichloropyridine-2,6-dicarbonitrile, 3-[5-(4-chlorophenyl)-2,3-dimethylisoxazolidin-3-yl]pyridine, 3-chloro-5-(4-chlorophenyl)-4-(2,6-difluorophenyl)-6-methylpyridazine, 4-(4-chlorophenyl)-5-(2,6-difluorophenyl)-3,6-dimethylpyridazine, quinolin-8-ol, quinolin-8-ol sulfate (2:1) (salt), tebufloquin, 5-methyl-6-octyl-3,7-dihydro[1,2,4]triazolo[1,5-a]pyrimidin-7-amine, 5-ethyl-6-octyl-3,7-dihydro[1,2,4]triazolo[1,5-a]pyrimidin-7-amine, ametocradin, benthiazole, bethoxazin, capsimycin, carvone, chinomethionat, chloroneb, cufraneb, cyflufenamid, cymoxanil, cyprosulfamide, dazomet, debacarb, dichlorophen, diclomezine, dicloran, difenzoquat, difenzoquat methylsulphate, diphenylamine, ecomate, ferimzone, flumetover, fluopicolide, fluoroimide, flusulfamide,

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flutianil, fosetyl-aluminium, fosetyl-calcium, fosetyl-sodium, hexachlorobenzene, irumamycin, isotianil, methasulfocarb, methyl (2E)-2-{2-[(cyclopropyl[(4-methoxyphenyl)imino]methyl)thio]methyl}phenyl}-3-methoxyacrylate, methyl isothiocyanate, metrafenone, (5-chloro-2-methoxy-4-methylpyridin-3-yl)(2,3,4-trimethoxy-6-methylphenyl)methanone, mildiomyacin, tolnifanide, N-(4-chlorobenzyl)-3-[3-methoxy-4-(prop-2-yn-1-yloxy)phenyl]propanamide, N-[(4-chlorophenyl)(cyano)methyl]-3-[3-methoxy-4-(prop-2-yn-1-yloxy)phenyl]propanamide, N-[(5-bromo-3-chloropyridin-2-yl)methyl]-2,4-dichloropyridine-3-carboxamide, N-[1-(5-bromo-3-chloropyridin-2-yl)ethyl]-2,4-dichloropyridine-3-carboxamide, N-[1-(5-bromo-3-chloropyridin-2-yl)ethyl]-2-fluoro-4-iodopyridine-3-carboxamide, N-{(Z)-[(cyclopropylmethoxy)imino][6-(difluoromethoxy)-2,3-difluorophenyl]methyl}-2-phenylacetamide, N-{(E)-[(cyclopropylmethoxy)imino][6-(difluoromethoxy)-2,3-difluorophenyl]methyl}-2-phenylacetamide, natamycin, nickel dimethyldithiocarbamate, nitrothal-isopropyl, octhilinone, oxamocarb, oxyfenthion, pentachlorophenol and salts, phenazine-1-carboxylic acid, phenothrin, phosphorous acid and its salts, propamocarb fosetate, propanosine-sodium, proquinazid, pyrrolnitrin, quintozone, S-prop-2-en-1-yl 5-amino-2-(1-methylethyl)-4-(2-methylphenyl)-3-oxo-2,3-dihydro-1H-pyrazole-1-carbothioate, tecloftalam, tecnazene, triazoxide, trichlormid, 5-chloro-N'-phenyl-N'-prop-2-yn-1-ylthiophene-2-sulfonohydrazide, zarilamid, N-methyl-2-(1-{[5-methyl-3-(trifluoromethyl)-1H-pyrazol-1-yl]acetyl}piperidin-4-yl)-N-[(1R)-1,2,3,4-tetrahydronaphthalen-1-yl]-1,3-thiazole-4-carboxamide, N-methyl-2-(1-{[5-methyl-3-(trifluoromethyl)-1H-pyrazol-1-yl]acetyl}piperidin-4-yl)-N-[(1,2,3,4-tetrahydronaphthalen-1-yl)-1,3-thiazole-4-carboxamide, 3-(difluoromethyl)-N-[4-fluoro-2-(1,1,2,3,3,3-hexafluoropropoxy)phenyl]-1-methyl-1H-pyrazole-4-carboxamide and pentyl {6-[(1-methyl-1H-tetrazol-5-yl)(phenyl)methylidene]amino}oxy)methyl}pyridin-2-yl} carbamate.

Additionally, insecticides, acaricides and nematocides such as Acetylcholinesterase (AChE) inhibitors, for example carbamates, e.g. alanycarb, aldicarb, bendiocarb, benfuracarb, butocarboxim, butoxycarboxim, carbaryl, carbofuran, carbosulfan, ethiofencarb, fenobucarb, formetanate, furathiocarb, isoprocarb, methiocarb, methomyl, metolcarb, oxamyl, pirimicarb, propoxur, thiodicarb, thiofanox, triazamate, trimethacarb, XMC, and xylylcarb; or organophosphates, e.g. acephate, azamethiphos, azinphos (-methyl, -ethyl), cadusafos, chlorethoxyfos, chlorfenvinphos, chlorfenvinphos, chlormephos, chlorpyrifos (-methyl), coumaphos, cyanophos, demeton-S-methyl, diazinon, dichlorvos/DDVP, dicrotophos, dimethoate, dimethylvinphos, disulfoton, EPN, ethion, ethoprophos, famphur, fenamiphos, fenitrothion, fenthion, fosthiazate, heptenophos, isofenphos, isopropyl O-(methoxyaminothio-phosphoryl) salicylate, isoxathion, malathion, mecarbam, methamidophos, methidathion, mevinphos, monocrotophos, naled, omethoate, oxydemeton-methyl, parathion (-methyl), phenthoate, phorate, phosalone, phosmet, phosphamidon, phoxim, pirimiphos (-methyl), profenofos, propetamphos, prothiofos, pyraclofos, pyridaphenthion, quinalphos, sulfotep, tebupirimfos, temephos, terbufos, tetrachlorvinphos, thiometon, triazophos, trichlorfon, and

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vamidothion. GABA-gated chloride channel antagonists, for example organochlorines, e.g. chlordane, endosulfan (alpha-); or fiproles (phenylpyrazoles), e.g. ethiprole, fipronil, pyrafluprole, and pyriprole. Sodium channel modulators/voltage-dependent sodium channel blockers, for example pyrethroids, e.g. acrinathrin, allethrin (d-cis-trans, d-trans), bifenthrin, bioallethrin, bioallethrin S-cyclopentenyl, 5 bioresmethrin, cycloprothrin, cyfluthrin (beta-), cyhalothrin (gamma-, lambda-), cypermethrin (alpha-, beta-, theta-, zeta-), cyphenothrin [(1R)-trans-isomers], deltamethrin, dimefluthrin, empenethrin [(EZ)-(1R)-isomers), esfenvalerate, etofenprox, fenpropathrin, fenvalerate, flucythrinate, flumethrin, fluvalinate (tau-), halfenprox, imiprothrin, metofluthrin, permethrin, phenothrin [(1R)-trans-isomer], prallethrin, profluthrin, pyrethrin (pyrethrum), resmethrin, RU 15525, silafluofen, tefluthrin, tetramethrin [(1R)- isomers)], 10 tralomethrin, transfluthrin and ZXI 8901; or DDT; or methoxychlor. Nicotinic acetylcholine receptor agonists, for example chloronicotinyls, e.g. acetamiprid, clothianidin, dinotefuran, imidacloprid, nitenpyram, thiacloprid, thiamethoxam; or nicotine. Allosteric acetylcholine receptor modulators (agonists), for example spinosyns, e.g. spinetoram and spinosad. Chloride channel activators, for example avermectins/milbemycins, e.g. abamectin, emamectin benzoate, lepimectin, and milbemectin. Juvenile 15 hormone mimics, e.g. hydroprene, kinoprene, methoprene; or fenoxycarb; pyriproxyfen. Miscellaneous non-specific (multi-site) inhibitors, for example gassing agents, e.g. methyl bromide and other alkyl halides; or chloropicrin; sulfuryl fluoride; borax; tartar emetic. Selective homopteran feeding blockers, e.g. pymetrozine or flonicamid. Mite growth inhibitors, e.g. clofentezine, diflovidazin, hexythiazox, etoxazole. Microbial disruptors of insect midgut membranes, e.g. *Bacillus thuringiensis* subspecies *israelensis*, *Bacillus* 20 *sphaericus*, *Bacillus thuringiensis* subspecies *aizawai*, *Bacillus thuringiensis* subspecies *kurstaki*, *Bacillus thuringiensis* subspecies *tenebrionis*, and BT crop proteins: Cry1Ab, Cry1Ac, Cry1Fa, Cry2Ab, mCry3A, Cry3Ab, Cry3Bb, Cry34/35Ab1. Inhibitors of mitochondrial ATP synthase, for example diafenthiuron; or organotin miticides, e.g. azocyclotin, cyhexatin, and fenbutatin oxide; or propargite; tetradifon. Uncouplers of oxidative phosphorylation via disruption of the proton gradient, for example chlorfenapyr, and DNOC. 25 Nicotinic acetylcholine receptor channel blockers, for example bensultap, cartap hydrochloride, thiocyclam, and thiosultap-sodium. Inhibitors of chitin biosynthesis, type 0, for example benzoylureas, e.g. bistrifluron, chlorfluazuron, diflubenzuron, flucycloxuron, flufenoxuron, hexaflumuron, lufenuron, novaluron, noviflumuron, penfluron, teflubenzuron, and triflumuron. Inhibitors of chitin biosynthesis, type 1, for example buprofezin. Moulting disruptors, for example cyromazine. Ecdysone receptor agonists/disruptors, for 30 example diacylhydrazines, e.g. chromafenozide, halofenozide, methoxyfenozide, and tebufenozide. Octopamine receptor agonists, for example amitraz. Mitochondrial complex III electron transport inhibitors, for example hydramethylnon; acequinocyl or fluacrypyrim. Mitochondrial complex I electron transport inhibitors, for example METI acaricides, e.g. fenazaquin, fenpyroximate, pyrimidifen, pyridaben, tebufenpyrad, tolfenpyrad or rotenone (Derris). Voltage-dependent sodium channel blockers, e.g. 35 indoxacarb; metaflumizone. Inhibitors of acetyl CoA carboxylase, for example tetrionic acid derivatives, e.g.

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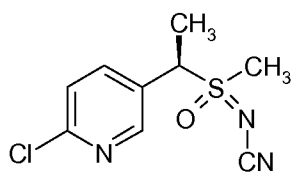
spirodiclofen and spiromesifen; or tetramic acid derivatives, e.g. spirotetramat. Mitochondrial complex IV electron inhibitors, for example phosphines, e.g. aluminium phosphide, calcium phosphide, phosphine, and zinc phosphide or cyanide. Mitochondrial complex II electron transport inhibitors, for example cyenopyrafen. Ryanodine receptor modulators, for example diamides, e.g. chlorantraniliprole (Rynaxypyr),

5 Cyantraniliprole (Cyazypyr), and flubendiamide. Further active ingredients with unknown or uncertain mode of action, for example azadirachtin, amidoflumet, benzoximate, bifenazate, chinomethionat, cryolite, cyflumetofen, dicofol, flufenimer, pyridalyl, and pyrifluquinazon; or one of the following known active compounds:

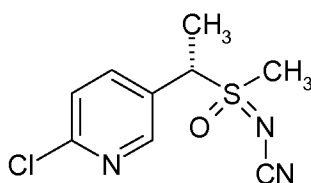
10 4-{[(6-bromopyrid-3-yl)methyl](2-fluorethyl)amino}furan-2(5H)-on (known from WO 2007/115644), 4-{[(6-fluoropyrid-3-yl)methyl](2,2-difluorethyl)amino}furan-2(5H)-on (known from WO 2007/115644), 4-{[(2-chlor-1,3-thiazol-5-yl)methyl](2-fluorethyl)amino}furan-2(5H)-on (known from WO 2007/115644), 4-{[(6-chloropyrid-3-yl)methyl](2-fluorethyl)amino}furan-2(5H)-on (known from WO 2007/115644), 4-{[(6-chloropyrid-3-yl)methyl](2,2-difluorethyl)amino}furan-2(5H)-on known from WO 2007/115644), 4-{[(6-chlor-5-fluoropyrid-3-yl)methyl](methyl)amino}furan-2(5H)-on (known from WO 2007/115643), 4-{[(5,6-dichloropyrid-3-yl)methyl](2-fluorethyl)amino}furan-2(5H)-on (known from WO 2007/115646), 4-{[(6-chlor-5-fluoropyrid-3-yl)methyl](cyclopropyl)amino}furan-2(5H)-on (known from WO 2007/115643), 4-{[(6-chloropyrid-3-yl)methyl](cyclopropyl)amino}furan-2(5H)-on (known from EP-A-0 539 588), 4-{[(6-chloropyrid-3-yl)methyl](methyl)amino}furan-2(5H)-on (known from EP-A-0 539 588), [(6-chloropyridin-3-yl)methyl](methyl)oxido- λ 4-sulfanylidencyanamid (known from WO 2007/149134), [1-(6-chloropyridin-3-yl)ethyl](methyl)oxido- λ 4-sulfanylidencyanamid (known from WO 2007/149134) and its

15 diastereomeres (A) and (B)

20



(A)



(B)

(also known from WO 2007/149134), [(6-trifluormethylpyridin-3-yl)methyl](methyl)oxido- λ 4-sulfanylidencyanamid (known from WO 2007/095229), or sulfoxaflor (also known from WO 2007/149134), 11-(4-chloro-2,6-dimethylphenyl)-12-hydroxy-1,4-dioxo-9-azadispiro[4.2.4.2]tetradec-11-en-10-one (known from WO 2006/089633), 3-(4'-fluoro-2,4-dimethylbiphenyl-3-yl)-4-hydroxy-8-oxa-1-

25 azaspiro[4.5]dec-3-en-2-one (known from WO 2008/067911), and 1-{2,4-dimethyl-5-[(2,2,2-trifluoroethyl)sulfinyl]phenyl}-3-(trifluoromethyl)-1H-1,2,4-triazole (known from WO 1999/55668).

Additionally, favourable mixing compounds the following which are described, for example, in Weed Research 26, 441-445 (1986), or "The Pesticide Manual", 13th edition, The British Crop Protection Council

and the Royal Soc. of Chemistry, 2003, and the literature cited therein, and which for example act as inhibitor of acetolactate synthase, acetyl-CoA-carboxylase, cellulose-synthase, enolpyruvylshikimat-3-phosphat-synthase, glutamin-synthetase, p-hydroxyphenylpyruvat-dioxygenase, phytoendesaturase, photosystem I, photosystem II and/or protoporphyrinogen-oxidase.

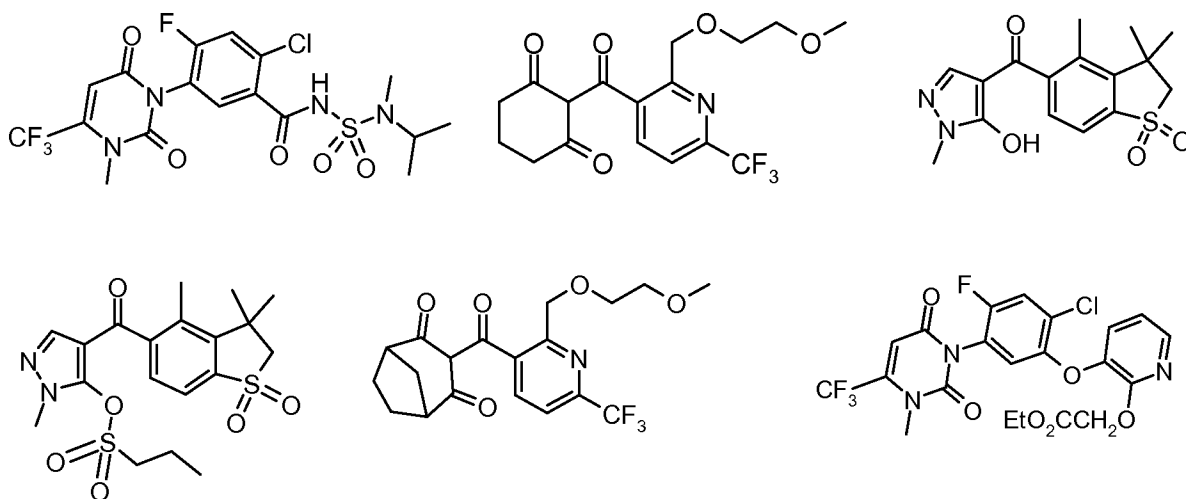
- 5 Examples of active compounds which may be mentioned as herbicides or plant growth regulators which are known from the literature and which can be combined with the compounds according to the invention are the following:

Acetochlor, acibenzolar, acibenzolar-s-methyl, acifluorfen, acifluorfen-sodium, aclonifen, alachlor, allidochlor, alloxymid, alloxymid-sodium, ametryn, amicarbazone, amidochlor, amidosulfuron,
 10 aminopyralid, amitrole, ammoniumsulfamat, ancymidol, anilofos, asulam, atrazine, azafenidin, azimsulfuron, aziprotryn, BAH-043, BAS-140H, BAS-693H, BAS-714H, BAS-762H, BAS-776H, BAS-800H, beflubutamid, benazolin, benazolin-ethyl, bencarbazone, benfluralin, benfuresate, bensulide, bensulfuron-methyl, bentazone, benzfendizone, benzobicyclon, benzofenap, benzofluor, benzoylprop, bifenox, bilanafos, bilanafos-sodium, bispyribac, bispyribac-sodium, bromacil, bromobutide,
 15 bromofenoxim, bromoxynil, bromuron, buminafos, busoxinone, butachlor, butafenacil, butamifos, butenachlor, butralin, butroxydim, butylate, cafenstrole, carbetamide, carfentrazone, carfentrazone-ethyl, chlomethoxyfen, chloramben, chlorazifop, chlorazifop-butyl, chlorbromuron, chlorbufam, chlorfenac, chlorfenac-sodium, chlorfenprop, chlorflurenol, chlorflurenol-methyl, chloridazon, chlorimuron, chlorimuron-ethyl, chlormequat-chlorid, chlornitrofen, chlorophthalim, chlorthal-dimethyl, chlorotoluron,
 20 chlorsulfuron, cinidon, cinidon-ethyl, cinmethylin, cinosulfuron, clethodim, clodinafop clodinafop-propargyl, clofencet, clomazone, clomeprop, cloprop, clopyralid, cloransulam, cloransulam-methyl, cumyluron, cyanamide, cyanazine, cyclanilide, cycloate, cyclosulfamuron, cycloxydim, cycluron, cyhalofop, cyhalofop-butyl, cyperquat, cyprazine, cyprazole, 2,4-D, 2,4-DB, daimuron/dymron, dalapon, daminozide, dazomet, n-decanol, desmedipham, desmetryn, detosyl-pyrazolate (DTP), diallate, dicamba,
 25 dichlobenil, dichlorprop, dichlorprop-p, diclofop, diclofop-methyl, diclofop-p-methyl, diclosulam, diethatyl, diethatyl-ethyl, difenoxuron, difenzoquat, diflufenican, diflufenzopyr, diflufenzopyr-sodium, dimefuron, dikegulac-sodium, dimefuron, dimepiperate, dimethachlor, dimethametryn, dimethenamid, dimethenamid-p, dimethipin, dimetrasulfuron, dinitramine, dinoseb, dinoterb, diphenamid, dipropetryn, diquat, diquat-dibromide, dithiopyr, diuron, DNOC, eglinazone-ethyl, endothal, eptc, esprocarb, ethalfuralin,
 30 ethametsulfuron-methyl, ethephon, ethidimuron, ethiozin, ethofumesate, ethoxyfen, ethoxyfen-ethyl, ethoxysulfuron, etobenzanid, F-5331, i.e. N-[2-chlor-4-fluor-5-[4-(3-fluorpropyl)-4,5-dihydro-5-oxo-1H-tetrazol-1-yl]-phenyl]-ethansulfonamid, fenoprop, fenoxaprop, fenoxaprop-p, fenoxaprop-ethyl, fenoxaprop-p-ethyl, fentrazamide, fenuron, flamprop, flamprop-m-isopropyl, flamprop-m-methyl, flazasulfuron,

florasulam, fluazifop, fluazifop-p, fluazifop-butyl, fluazifop-p-butyl, fluazolate, flucarbazone, flucarbazone-sodium, flucetosulfuron, fluchloralin, flufenacet (thiafluamide), flufenpyr, flufenpyr-ethyl, flumetralin, flumetsulam, flumiclorac, flumiclorac-pentyl, flumioxazin, flumipropyn, fluometuron, fluorodifen, fluoroglycofen, fluoroglycofen-ethyl, flupoxam, flupropacil, flupropanate, flupyrsulfuron, flupyrsulfuron-
 5 methyl-sodium, flurenol, flurenol-butyl, fluridone, flurochloridone, fluroxypyr, fluroxypyr-meptyl, flurprimidol, flurtamone, fluthiacet, fluthiacet-methyl, fluthiamide, fomesafen, foramsulfuron, forchlorfenuron, fosamine, furyloxyfen, gibberellinic acid, glufosinate, l-glufosinate, l-glufosinate-ammonium, glufosinate-ammonium, glyphosate, glyphosate-isopropylammonium, H-9201, halosafen, halosulfuron, halosulfuron-methyl, haloxyfop, haloxyfop-p, haloxyfop-ethoxyethyl, haloxyfop-p-
 10 ethoxyethyl, haloxyfop-methyl, haloxyfop-p-methyl, hexazinone, hnpc-9908, HOK-201, H W-02, imazamethabenz, imazamethabenz-methyl, imazamox, imazapic, imazapyr, imazaquin, imazethapyr, imazosulfuron, inabenfide, indanofan, indolacetic acid (IAA), 4-indol-3-yl- butanoic acid (IBA), iodosulfuron, iodosulfuron-methyl-sodium, ioxynil, isocarbamid, isopropalin, isoproturon, isouron, isoxaben, isoxachlortole, isoxaflutole, isoxapyrifop, IDH-100, KUH-043, KUH-071, karbutilate,
 15 ketospiradox, lactofen, lenacil, linuron, maleinic acid hydrazid, MCPA, MCPB, MCPB-methyl, -ethyl und -sodium, mecoprop, mecoprop-sodium, mecoprop-butotyl, mecoprop-p-butotyl, mecoprop-p-dimethylammonium, mecoprop-p-2-ethylhexyl, mecoprop-p-kalium, mefenacet, mefluidide, mepiquat-chlorid, mesosulfuron, mesosulfuron-methyl, mesotrione, methabenzthiazuron, metam, metamifop, metamitron, metazachlor, methazole, methoxyphenone, methyldymron, 1-methylcyclopropen,
 20 methylisothiocyanat, metobenzuron, metobenzuron, metobromuron, metolachlor, s-metolachlor, metosulam, metoxuron, metribuzin, metsulfuron, metsulfuron-methyl, molinate, monalide, monocarbamide, monocarbamide-dihydrogensulfat, monolinuron, monosulfuron, monuron, MT 128, MT-5950, i.e. N-[3-chlor-4-(1-methylethyl)-phenyl]-2-methylpentanamide, NGGC-011, naproanilide, napropamide, naptalam, NC-310, i.e. 4-(2,4-dichlorobenzoyl)-1-methyl-5-benzyloxyppyrazole, neburon, nicosulfuron, nipyraclufen,
 25 nitralin, nitrofen, nitrophenolat-sodium (mixture of isomers), nitrofluorfen, nonanoic acid, norflurazon, orbencarb, orthosulfamuron, oryzalin, oxadiargyl, oxadiazon, oxasulfuron, oxaziclomefone, oxyfluorfen, paclobutrazol, paraquat, paraquat-dichlorid, pelargonic acid (nonanoic acid), pendimethalin, pendralin, penoxsulam, pentanochlor, pentoxazone, perfluidone, pethoxamid, phenisopham, phenmedipham, phenmedipham-ethyl, picloram, picolinafen, pinoxaden, piperophos, pirifenop, pirifenop-butyl, pretilachlor,
 30 primisulfuron, primisulfuron-methyl, probenazole, profluaol, procyazine, prodiamine, prifluraline, profoxydim, prohexadione, prohexadione-calcium, prohydrojasmon, prometon, prometryn, propachlor, propanil, propaquizafop, propazine, propham, propisochlor, propoxycarbazon, propoxycarbazon-sodium, propyzamide, prosulfalin, prosulfocarb, prosulfuron, prynachlor, pyraclonil, pyraflufen, pyraflufen-ethyl, pyrasulfotole, pyrazolynate (pyrazolate), pyrazosulfuron-ethyl, pyrazoxyfen, pyribambenz, pyribambenz-
 35 isopropyl, pyribenzoxim, pyributicarb, pyridafol, pyridate, pyriftalid, pyriminobac, pyriminobac-methyl,

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pyrimisulfan, pyriithiobac, pyriithiobac-sodium, pyroxasulfone, pyroxsulam, quinclorac, quinmerac, quinclamine, quizalofop, quizalofop-ethyl, quizalofop-p, quizalofop-p-ethyl, quizalofop-p-tefuryl, rimsulfuron, secbumeton, sethoxydim, siduron, simazine, simetryn, SN-106279, sulcotrione, sulfallate (cdec), sulfentrazone, sulfometuron, sulfometuron-methyl, sulfosate (glyphosate-trimesium), sulfosulfuron, SYN-523, SYP-249, SYP-298, SYP-300, tebutam, tebuthiuron, tecnazene, tefuryltrione, tembotrione, tepraloxymid, terbacil, terbucarb, terbutylchlor, terbutylmeton, terbutylazine, terbutryn, th-547, thenylchlor, thiafluamide, thiazafluron, thiazopyr, thidiazimin, thidiazuron, thiencarbazone, thiencarbazone-methyl, thifensulfuron, thifensulfuron-methyl, thiobencarb, tiocarbamil, topramezone, tralkoxydim, triallate, triasulfuron, triaziflam, triazofenamide, tribenuron, tribenuron-methyl, trichlor acetic acid (tca), triclopyr, tridiphane, trietazine, trifloxysulfuron, trifloxysulfuron-sodium, trifluralin, triflusulfuron, triflusulfuron-methyl, trimeturon, trinexapac, trinexapac-ethyl, tritosulfuron, tsitodef, uniconazole, uniconazole-p, vernolate, ZJ-0166, ZJ-0270, ZJ-0543, ZJ-0862, as well as the following compounds



Common names are used in accordance with the International Organization for Standardization (ISO) or the chemical names, if appropriate together with a customary code number, of the compounds and always comprise all applicable forms such as acids, salts, esters, or modifications such as isomers, like stereoisomers and optical isomers. As an example at least one applicable form and/or modifications can be mentioned.

When used in the method according to the invention, the application rates of Trifloxystrobin can be varied within a substantial range, depending on the route of application. The application rate of the compounds according to the invention in the treatment of plant parts, for example leaves, is from 0.1 to 10 000 g/ha, preferably from 1 to 1000 g/ha, especially preferably from 10 to 1000 g/ha (when applied by watering or trickling, the application rate may even be reduced, especially when inert substrates such as rock wool or

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perlite are used). For the purposes of the invention, these application rates are only mentioned by way of example and are not limiting.

Trifloxystrobin can be employed in the customary formulations, such as solutions, emulsions, wettable powders, water- and oil-based suspensions, powders, dusts, pastes, soluble powders, soluble granules, granules for scattering, suspension/emulsion concentrates, natural substances impregnated with active substance, synthetic substances impregnated with active substance, fertilizers and microencapsulations in polymeric substances.

These formulations are prepared in a known manner, for example by mixing the active substances with extenders, that is to say liquid solvents and/or solid carriers, if appropriate using surface-active agents, that is emulsifiers and/or dispersants and/or foam formers. The formulations are prepared either in suitable apparatuses or else before or during the application.

Adjuvants which may be used are those substances which are suitable for imparting special properties to the composition itself and/or to preparations derived there from (for example spray mixtures, seed treatments), such as certain technical properties and/or else special biological properties. Typical adjuvants which are suitable are: 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), of the alcohols and polyols (which may optionally also be substituted, etherified and/or esterified), of the ketones (such as acetone, cyclohexanone), esters (also fats and oils) and (poly)ethers, of the basic and substituted amines, amides, lactams (such as N-alkylpyrrolidones) and lactones, of the sulphones and sulfoxides (such as dimethyl sulphoxide).

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

According to the invention, a carrier means a natural or synthetic, organic or inorganic substance which may be solid or liquid and with which the active substances are mixed or associated for the purpose of better

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applicability, in particular for application to plants or plant parts or seeds. The solid or liquid carrier is generally inert and should be agriculturally useful.

Suitable solid or liquid carriers are: for example ammonium salts and ground natural rocks, such as kaolins, clays, talc, chalk, quartz, attapulgite, Montmorillonite or diatomaceous earth and ground synthetic rocks
5 such as highly-dispersed silica, alumina and silicates, solid carriers for granules which are suitable are: for example crushed and fractionated natural rocks such as calcite, marble, pumice, sepiolite, dolomite, and synthetic granules of inorganic and organic meals and granules of organic material such as paper, sawdust, coconut shells, maize cobs and tobacco stalks; suitable emulsifiers and/or foam formers are: for example nonionic and anionic emulsifiers such as polyoxyethylene fatty acid esters, polyoxyethylene fatty alcohol
10 ethers, for example alkylaryl polyglycol ethers, alkylsulphonates, alkyl sulphates, arylsulphonate and protein hydrolysates; suitable dispersants are nonionic and/or ionic substances, for example from the classes of the alcohol-POE and/or -POP ethers, acid and/or POP-POE esters, alkyl aryl- and/or POP-POE ethers, fatty and/or POP-POE adducts, POE and/or POP polyol derivatives, POE and/or POP sorbitan or sugar adducts, alkyl or aryl sulphates, alkyl- or aryl-sulphonates and alkyl or aryl phosphates or the corresponding PO ether
15 adducts. Oligomers or polymers which are also suitable are, for example, those derived from vinylic monomers, from acrylic acid, from EO and/or PO alone or in combination with, for example, (poly)alcohols or (poly)amines. Lignin and its sulphonic acid derivatives, unmodified and modified celluloses, aromatic and/or aliphatic sulphonic acids and their adducts with formaldehyde may also be employed.

Stickers such as carboxymethylcellulose, natural and synthetic polymers in the form of powders, granules or
20 latices such as gum arabic, polyvinyl alcohol, polyvinyl acetate, and natural phospholipids such as cephalins and lecitins and synthetic phospholipids may be used in the formulations.

Colorants such as inorganic pigments, for example iron oxide, titanium oxide, Prussian blue, and organic dyes, such as alizarin, azo and metal phthalocyanine dyes, and trace nutrients such as salts of iron, manganese, boron, copper, cobalt, molybdenum and zinc may be used.

25 Further additives may be fragrances, mineral or vegetable oils which can optionally be modified, waxes and nutrients (also trace nutrients), such as salts of iron, manganese, boron, copper, cobalt, molybdenum and zinc.

Other substances which may be present are stabilizers such as low-temperature stabilizers, preservatives, antioxidants, UV stabilizers or other agents which improve the chemical and/or physical stability.

30 The content of Trifloxystrobin the use forms prepared from the commercially available formulations can vary within wide limits. The total active substance concentration, or the active substance concentration of

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the individual active substances, of the use forms is in the range of from 0.00000001 to 97% by weight of active substance, preferably in the range of from 0.0000001 to 97% by weight, especially preferably in the range of from 0.000001 to 83% by weight or 0.000001 to 5% by weight and very especially preferably in the range of from 0.0001 to 1% by weight.

- 5 Application is made in a customary manner adapted to suit the use forms.

All plants and plant parts may be treated in accordance with the invention. In this context, plants are understood as meaning all plants and plant populations, such as desired and undesired wild plants or crop plants (including naturally occurring crop plants). Crop plants may be plants which can be obtained by traditional breeding and optimization methods or by biotechnological and recombinant methods or combinations of these methods, including the transgenic plants and including the plant varieties capable or not of being protected by plant breeders' rights. Plant parts are understood as meaning all aerial and subterranean parts and organs of the plants, such as shoot, leaf, flower and root, examples which may be mentioned being leaves, needles, stalks, stems, flowers, fruiting bodies, fruits and seed, and also roots, tubers and rhizomes. The plant parts also include harvested material and vegetative and generative propagation material, for example fruits, seeds, cuttings, tubers, rhizomes, slips, seed, bulbils, layers and runners. Equally, plant species and plant varieties which occur in the wild or which are obtained by traditional biological breeding methods such as hybridization or protoplast fusion, and their parts may be treated. In one variant of the invention, transgenic plants and plant varieties which have been obtained by recombinant methods, such as, for example, antisense or cosuppression technology, RNA interference -
15
20 RNAi - technology, if appropriate in combination with traditional methods (genetically modified organisms) and their parts are treated.

The invention is illustrated by the following examples without restricting the present application to them.

Greenhouse experiments were carried out to evaluate the effect of fungicide applications on the fruit quality, in particular the effect of Trifloxystrobin on the intensity of blossom-end rot in tomato. Tomato plants of the cultivar "Harzfeuer" were therefore cultivated on Rockwool at different calcium regimes, 100 % and 33 % calcium level, with and without Trifloxystrobin application.
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Example A: Test Tomato (*Lycopersicon esculentum* MILL.), cv. Harzfeuer

The fertilization was carried in combination with the irrigation, using a drip application system.

Tomato (*Lycopersicon esculentum* MILL.), cultivar Harzfeuer on Rockwool has been sowed and approximately after 3 weeks, the plants have been transferred to Rockwool bags. After the specified
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intervals the plants have been treated 4 times with Trifloxystrobin and/or a modified Hogland solution which contained 100 % or 33% calcium (Ca-Hogland solution) and having the composition as given below.

Trifloxystrobin has been applied through spray application of commercially available Flint® 50WG solution (conc. 0.025 % [v/v] Trifloxystrobin), and the Hoagland solution via dripping system.

- 5 Treatment with Trifloxystrobin and/ or Ca-Hoagland solution was carried out 59 days (treatment No. 1), 75 days (treatment No. 2), 89 days (treatment No. 3) and 106 days (treatment No. 4) after sowing according to the following regime:

Treatment No.	Ca-content [%] of the Hoagland solution	Application of Trifloxystrobin
1	100	-
2	100	+
3	33	-
4	33	+

Ca-Hoagland solution:

Salt	100 % Ca-Hoagland solution [mg/l]	33 % Ca-Hoagland solution [mg/l]
MnCl ₂ x H ₂ O	0,502 Mn	0,502 Mn
KH ₂ PO ₄	39,1 K	39,1 K
ZnSO ₄ x 7 H ₂ O	0,1 Zn	0,1 Zn
Na ₂ B ₄ O ₇	0,49 B	0,49 B
CuSO ₄ x 7 H ₂ O	0,02 Cu	0,02 Cu
Na ₂ MoO ₄ x 2 H ₂ O	0,024 Mo	0,024 Mo
MgSO ₄ x 7 H ₂ O	48,6 Mg	48,6 Mg
Ca(NO ₃) ₂ x 4 H ₂ O	200,5 Ca / 140 N	66,8 Ca / 46,7 N
NH ₄ NO ₃		58,3 N
KNO ₃	195,5 K / 70 N	293,3 K / 105 N
Fetrilon™ 13 %, a watersoluble iron containing fertilizer	5,2 Fe	5,2 Fe

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The frequency and intensity of blossom-end rot symptoms were assessed on green and red fruits. The assessment was carried out at three different growth stages, whereas the last and final assessment depended on panicle maturity.

(a) Effect of Trifloxystrobin on the frequency of blossom-end rot of green fruits

- 15 It has been found that green fruits of tomato plants cultivated at full calcium supply level (100 %) showed 99 days (1. assessment) and 112 days (2. assessment) after sowing no blossom-end rot-related symptoms.

Even at the third (final) assessment, the combination of full calcium fertilization and Trifloxystrobin applications prevented the occurrence of blossom-end rot, whereas in non-treated tomatoes symptoms

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became visible. On fruits grown under deficiency, non-treated tomatoes exhibited more frequently symptoms of blossom-end rot than Trifloxystrobin-treated tomatoes. However, the difference in the frequency of blossom-end rot between non- and Trifloxystrobin-treated tomatoes decreased with increasing time. Tomatoes cultivated under Ca deficiency exhibited more frequently Blossom-end rot symptoms than

5 fruits grown in 100 % Ca.

Treatment	Green tomato fruits without blossom-end rot					
	1 st assessment		2 nd assessment		3 rd assessment	
	[n]	[%]	[n]	[%]	[n]	[%]
UTC* (100 % Ca)	366	100	434	100	127	94
UTC* (33 % Ca)	229	78	317	80	105	72
Trifloxystrobin (100 % Ca)	377	100	447	100	158	100
Trifloxystrobin (33 % Ca)	290	88	360	83	128	74

* UTC = Untreated Control (no trifloxystrobin application)

(b) Effect of Trifloxystrobin on the frequency of blossom-end rot on red fruits

At full calcium supply level, no blossom-end rot symptoms were recorded on red tomato fruits 112 days after sowing, neither in the fungicide-free nor in the Trifloxystrobin plots. Grown under calcium deficiency

10 many red tomato fruits in the fungicide-free plots suffered from blossom-end rot. Applying Trifloxystrobin under those conditions markedly reduced frequency of the blossom-end rot-related symptoms.

Treatment	Red tomato fruits without blossom-end rot					
	1 st assessment		2 nd assessment		3 rd assessment	
	[n]	[%]	[n]	[%]	[n]	[%]
UTC*(100 % Ca)	--	--	65	100	417	98
UTC* (33 % Ca)	5	19	25	24	198	40
Trifloxystrobin (100 % Ca)	--	--	50	100	448	99
Trifloxystrobin (33 % Ca)	11	52	34	39	224	46

*UTC = Untreated control (no Trifloxystrobin application)

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(c) Effect of Trifloxystrobin on the intensity of blossom-end rot on red fruits grown under Ca deficiency

Compared to the untreated control (UTC), Trifloxystrobin applications reduced the intensity of blossom-end rot symptoms on tomato fruits cultivated under Ca deficiency. Within the first and second assessment, blossom-end rot symptoms of non-treated plants were predominantly characterized as medium to strong.

- 5 Tomato fruits of Trifloxystrobin-treated plants showed predominantly no or light symptoms, especially in the second and the third (final) assessment.

1st assessment:

Treatment	No or light symptoms		Medium to strong symptoms	
	[n]	[%]	[n]	[%]
UTC (33 % Ca)	10	38	16	62
Trifloxystrobin (33 % Ca)	12	57	9	43

2nd assessment:

Treatment	No or light symptoms		Medium to strong symptoms	
	[n]	[%]	[n]	[%]
UTC (33 % Ca)	44	42	61	58
Trifloxystrobin (33 % Ca)	60	69	27	31

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3rd assessment:

Treatment	No or light symptoms		Medium to strong symptoms	
	[n]	[%]	[n]	[%]
UTC (33 % Ca)	319	65	172	35
Trifloxystrobin (33 % Ca)	365	74	126	26

Claims

1. Use of Trifloxystrobin for reducing the frequency and/or intensity of blossom-end rot disorder in a horticultural crop.

2. Use according to claim 1, wherein Trifloxystrobin is applied by spray application.

5 3. Use according to claim 1 or 2, wherein the concentration of Trifloxystrobin is in the range of from 0.0001 to 1% by weight.

4. Use according to any one of claims 1 to 3, wherein the horticultural crop is selected among carrots, pumpkin, squash, zucchini, potato, sweet corn, onions, ornamentals, medicinal herbs, culinary herbs, tomatoes, spinach, pepper, melon, lettuce, cucumber, celery, beets, cabbage, cauliflower, broccoli, 10 Brussels sprouts, kohlrabi, kale, radish, rutabaga, turnip, asparagus, bean, pea, apples, raspberry, strawberry, banana, mango, grapes, peaches, pears, guava, pineapple, pomegranate, garlic, capsicum, chilli, radish, star fruit, tapioca, walnuts, lemon, mandarin, mangold, mushroom, olive, orange, papaya, paprika, passionfruit, peanuts, pecan nuts, prune, pistachio nuts, persimmon, pamplemousse (grapefruit), eggplant, endive, cranberry, gooseberry, hazel nuts, kiwifruit, almonds, amaranth, apricot, artichoke, avocado, blackberry, 15 cashew nut, cherry, clementine, coconut and cantaloupes.

5. Use according to any one of claims 1 to 4, wherein the horticultural crop is conventional crop or genetically modified crop.

6. Use according to any one of claims 1 to 5, wherein Trifloxystrobin is employed jointly with at least one other active compound from the group of insecticides, attractants, sterilizing agents, bactericides, 20 acaricides, nematocides, fungicides, growth-regulating substances, herbicides, safeners, fertilizers, semiochemicals and biological control agents.

7. A method to reduce the frequency and/or intensity of blossom-end rot disorder in a horticultural crop comprising the step of applying Trifloxystrobin.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2011/050930

A. CLASSIFICATION OF SUBJECT MATTER
INV. A01N37/50
ADD.

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

B. FIELDS SEARCHED

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

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, BIOSIS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	MILLER S ET AL: "Blossom-End Rot of Tomato, Pepper, and Eggplant", EXTENSION FACTSHEET, THE OHIO STATE UNIVERSITY EXTENSION, no. HYG-3117-96, 1 June 1996 (1996-06-01), pages 1-2, XP007912430, cited in the application the whole document ----- -/--	1



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"&" document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2011/050930

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DATABASE BIOSIS [Online] BIOSCIENCES INFORMATION SERVICE, PHILADELPHIA, PA, US; March 2005 (2005-03), HO LIM C ET AL: "A cellular hypothesis for the induction of blossom-end rot in tomato fruit", XP002575584, Database accession no. PREV200500209223 cited in the application * abstract -& ANNALS OF BOTANY (LONDON), vol. 95, no. 4, March 2005 (2005-03), pages 571-581, XP002575588, ISSN: 0305-7364 -----	1
A	DATABASE WPI Week 200879 Thomson Scientific, London, GB; AN 2008-N53945 XP002575587, & CN 101 268 780 A (UNIV HUAZHONG NORMAL) 24 September 2008 (2008-09-24) * abstract & CN 101 268 780 A (UNIV HUAZHONG NORMAL [CN]) 24 September 2008 (2008-09-24) -----	1
A	DATABASE BIOSIS [Online] BIOSCIENCES INFORMATION SERVICE, PHILADELPHIA, PA, US; 1992, DE KOCK S L ET AL: "BLOSSOM-END ROT OF PEARS SYSTEMIC INFECTION OF FLOWERS AND IMMATURE FRUIT BY BOTRYTIS-CINEREA", XP002575580, Database accession no. PREV199294100677 * abstract & JOURNAL OF PHYTOPATHOLOGY (BERLIN), vol. 135, no. 4, 1992, pages 317-327, ISSN: 0931-1785 -----	1
A	DATABASE BIOSIS [Online] BIOSCIENCES INFORMATION SERVICE, PHILADELPHIA, PA, US; 1990, LAMBERT D H: "POSTHARVEST FUNGI OF LOWBUSH BLUEBERRY FRUIT", XP002575581, Database accession no. PREV199090027438 * abstract & PLANT DISEASE, vol. 74, no. 4, 1990, pages 285-287, ISSN: 0191-2917 ----- -/--	1

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2011/050930

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DATABASE BIOSIS [Online] BIOSCIENCES INFORMATION SERVICE, PHILADELPHIA, PA, US; 1987, NASU H ET AL: "PEAR FRUIT ROT CAUSED BY AGENTS OF JAPANESE PEAR CANCER PHOMOPSIS-FUKUSHII AND BLOSSOM END ROT OF EUROPEAN PEAR PHOMOPSIS-SP", XP002575582, Database accession no. PREV198886008512 * abstract & ANNALS OF THE PHYTOPATHOLOGICAL SOCIETY OF JAPAN, vol. 53, no. 5, 1987, pages 630-637, ISSN: 0031-9473 -----	1
A	DATABASE BIOSIS [Online] BIOSCIENCES INFORMATION SERVICE, PHILADELPHIA, PA, US; December 2008 (2008-12), DE COSTA D M ET AL: "Effectiveness and molecular characterization of Burkholderia spinoso, a prospective biocontrol agent for controlling postharvest diseases of banana", XP002575583, Database accession no. PREV200900037571 * abstract & BIOLOGICAL CONTROL, vol. 47, no. 3, December 2008 (2008-12), pages 257-267, ISSN: 1049-9644 -----	1
A	DHAL, N.K.; SWAIN, N.C.; VARSHNEY, J.L.; BISWAL, G.: "Etiology of mycoflora causing blossom-end rot of tomato", INDIAN PHYTOPATHOLOGY, vol. 50, no. 4, 1997, pages 587-592, XP009131557, the whole document -----	1