Title: FUNGICIDAL MIXTURES COMPRISING PYRACLOSTROBIN

Abstract: The present invention, comprising, as active components mixtures comprising, as active components one fungicial compound I selected from the group consisting of kasugamycin, carpropanid, dicyclomet, tricyclazole mepronil, teclofalam, thifluz-amide, diflumetorim, binapacryl, dinobuten, ferimzone, bitertanol, diniconazole-m, imibenconazole-, simeconazole, pefurazole, piperazine, nuarimol, pyrifluoxfen, triforin, aldimorph, dodemoraphacet, piperalin, ochitinon, oxolsinaure, diethofencarb, pencurion, fluopicolid, pyriofenox, blasticidin-S, miliodycin, streptomycin, oxytracyclin, validamycin a, florosimid, edifenphos, iprobenfos, pyrazophos, isoprothiolane, dicloran, diquotozone, tecnazen, tolclofos-methyl, bifaphenyl, etridiazol, flumorph, ferbam, metam, anilazin, dichlofluanid, dichlorphen, flusulfamid, guazatin, guazatinaclat, validamycin, polyoxin b, pyroquilon, tiadinil, bronopol, chinomethionat, debacar, diclomezin, difenzoquat, difenzoquatmethylsulfat, diphenylamin, flumeover, flusulfamid, methasulfo-carb, nitrapyrin, nitrothio-isopropyl, proquinazid, tebuflouquin, teclofalam and triazoxid; and pyraclostrobin as compound I in synergistic effective amounts.
FUNGICIDAL MIXTURES COMPRISING PYRACLOSTROBIN

Description

The present invention relates to synergistic mixtures comprising, as active components,

1) one fungicidal compound I selected from the group consisting of mepronil, tecloftalam, thifluzamide, diflumetorim, binacprylic, dinobuton, ferimzone, bitertanol, diniconazol-m, imiben-conazol-, simeconazol, pefurazoate, piperazine, nuarimol, pyrifenox, triforin, aldimorph, dodemorphacetat, piperalin, ochthilinon, oxoliniscaure, diethofencarb, pencycuron, fluopicolid, pyriofenon, blasticidin-S, kasugamycin, mildiomycin, streptomycin, oxytetracyclin, validamycin a, fluoroimid, edifenphos, iprobenfos, pyrazophos, isoprothiolane, dicyclon, quintozene, tecnazen, tolclotol-methyl, biphenyl, etridiazol, flumorph, ferbam, metam, anilazin, dichlofluanid, dichlorophen, guazatin, guazatin-acetat, validamycin, polyoxylin b, pyroquilon, tricyclazol, carpropamid, dicyclomet, tiadinil, bronopol, chinomethionat, debacarb, diclomezin, difenzoquat, difenzoquatmethylsulfat, diphenylamin, flumetover, flusulfamid, methasulfocarb, nitrapyrin, nitrothyl-isopropyl, proquinazid, tebufloquin, tecloftalam and triazoxid; and

2) pyraclostrobin as compound II;

in synergistic effective amounts.

These above-referred mixtures are hereinbelow also referred as “inventive mixtures”.

Moreover, the invention relates to a method for controlling phytopathogenic harmful fungi, using the inventive mixtures and to the use of compound I and compound II for preparing such mixtures, and also to compositions comprising such mixtures.

Moreover, the invention relates to a method for controlling phytopathogenic harmful fungi comprising contacting the phytopathogenic harmful fungi, their habitat, breeding grounds, their locus or the plants to be protected against fungal attack, the soil or plant propagation material with an effective amount of a mixture as defined above.

Additionally, the present invention also comprises a method for protection of plant propagation material from phytopathogenic harmful fungi comprising contacting the plant propagation materials with an inventive mixture in fungicidally effective amounts.

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

The present invention further relates to plant-protecting active ingredient mixtures having synergistically enhanced action of improving the health of plants and to a method of applying such inventive mixtures to the plants.

The compounds I and II as well as their fungicidal action and methods for producing them are generally known. For instance, the commercially available compounds may be found in The Pesticide Manual, 14th Edition, British Crop Protection Council (2006) among other publications.

Herein, it has to be noted that kasugamycin can be also present in form of an agricultural acceptable salt, for example, kasugamycin hydrochlorid, kasugamycinhydrochlorid-hydrate.

One typical problem arising in the field of fungal control lies in the need to reduce the dosage rates of the active ingredient in order to reduce or avoid unfavorable environmental or toxicological effects whilst still allowing effective fungal control.

In regard to the instant invention the term phytopathogenic harmful fungi is hereinbelow abbreviated as “harmful fungi”.

Another problem encountered concerns the need to have available fungal control agents which are effective against a broad spectrum of harmful fungi.

There also exists the need for fungal control agents that combine knock-down activity with prolonged control, that is, fast action with long lasting action.

Another difficulty in relation to the use of fungicides is that the repeated and exclusive application of an individual fungicidal compound leads in many cases to a rapid selection of harmful fungi, which have developed natural or adapted resistance against the active compound in question. Therefore there is a need for fungal control agents that help prevent or overcome resistance.

Another problem underlying the present invention is the desire for compositions that improve plants, a process which is commonly and hereinafter referred to as “plant health”.

The term plant health comprises various sorts of improvements of plants that are not connected to the control of fungi. For example, advantageous properties that may be mentioned are improved crop characteristics including: emergence, crop yields, protein content, oil content, starch content, more developed root system (improved root growth), improved stress tolerance (e.g. against drought, heat, salt, UV, water, cold), reduced ethylene (reduced production and/or inhibition of reception), tillering increase, increase in plant height, bigger leaf blade, less dead basal leaves, stronger tillers, greener leaf color, pigment content, photosynthetic activity, less input needed (such as fertilizers or water), less seeds needed, more productive tillers, earlier flowering, early grain maturity, less plant verse (lodging), increased shoot growth, enhanced plant vigor, increased plant stand and early and better germination; or any other advantages familiar to a person skilled in the art.

It was therefore an object of the present invention to provide fungicidal mixtures which solve the problems of reducing the dosage rate and/or enhancing the spectrum of activity and/or combining knock-down activity with prolonged control and/or to resistance management and/or promoting the health of plants.

We have found that this object is in part or in whole achieved by the complex mixtures comprising the active compounds defined in the outset.

Especially, it has been found that the mixtures as defined in the outset show markedly enhanced action against fungi compared to the control rates that are possible with the individual compounds and/or is suitable for improving the health of plants when applied to plants, parts of plants, plant propagation materials (preferably seeds), or at their locus of growth.

It has been found that the action of the inventive mixtures goes far beyond the fungicidal and/or plant health improving action of the active compounds present in the mixture alone.

Moreover, we have found that simultaneous, that is joint or separate, application of the compound I and compound II or successive application of the compound I and compound II allows enhanced control of harmful fungi, compared to the control rates that are possible with the individual compounds (synergistic fungicidal mixtures).

Moreover, we have found that simultaneous, that is joint or separate, application of the compound I and compound II or successive application of the compound I and compound II provides enhanced plant health effects compared to the plant health effects that are possible with the individual compounds (synergistic mixtures wherein the synergism is plant health synergism).
In a particular preferred embodiment of the invention, it has been found that the inventive mixtures are especially suitable for combating phytopathogenic fungi on rice. Moreover, it has been found that the inventive mixtures are useful for combating phytopathogenic fungi in paddy rice fields.

The ratios by weight for the respective mixtures comprising fungicidal compound I and the fungicidal compound II are from 1:500 to 500:1, preferably from 1:100 to 100:1, more preferably from 1:25 to 25:1 and most preferably from 1:10 to 10:1.

In a more preferred embodiment, the mixture comprise a fungicidal compound I selected from the group consisting of kasugamycin, carpropamid, dicyclomet and tricyclazol and compound II, wherein, preferably, the ratios by weight for the respective mixtures comprising fungicidal compound I and the fungicidal compound II are from 1:500 to 500:1, preferably from 1:100 to 100:1, more preferably from 1:25 to 25:1 and most preferably from 25:1 to 1:2 (I:II).

Most preferably, the mixtures according to the present invention comprise pyraclostrobin as compound II and kasugamycin as compound II in synergistically effective amounts, wherein, preferably, the ratios by weight for the respective mixtures comprising fungicidal compound I and the fungicidal compound II are from 1:500 to 500:1, preferably from 1:100 to 100:1, more preferably from 1:25 to 25:1 and most preferably from 1:10 to 10:1.

Also most preferred are mixtures comprising pyraclostrobin as compound II and carpropamid as compound I in synergistically effective amounts, wherein, preferably, the ratios by weight for the respective mixtures comprising fungicidal compound I and the fungicidal compound II are from 1:500 to 500:1, preferably from 1:100 to 100:1, more preferably from 1:25 to 25:1 and most preferably from 1:10 to 10:1.

Also most preferred are mixtures comprising pyraclostrobin as compound II and dicyclomet as compound I in synergistically effective amounts, wherein, preferably, the ratios by weight for the respective mixtures comprising fungicidal compound I and the fungicidal compound II are from 1:500 to 500:1, preferably from 1:100 to 100:1, more preferably from 1:25 to 25:1 and most preferably from 1:10 to 10:1.

Also most preferred are mixtures comprising pyraclostrobin as compound II and tricyclazol as compound I in synergistically effective amounts, wherein, preferably, the ratios by weight for the respective mixtures comprising fungicidal compound I and the fungicidal compound II are from 1:500 to 500:1, preferably from 1:100 to 100:1, more preferably from 1:25 to 25:1 and most preferably from 1:10 to 10:1.
Utmost preference is given to mixtures comprising pyraclostrobin as compound I and kasugamycin as compound I in synergistically effective amounts, wherein, preferably, the ratios by weight for the respective mixtures comprising fungicidal compound I and the fungicidal compound II are from 1:500 to 500:1, preferably from 1:100 to 100:1, more preferably from 1:25 to 25:1 and most preferably from 1:10 to 1:1.

Utmost preference is also given to mixtures comprising pyraclostrobin as compound I and carproamid as compound I in synergistically effective amounts, wherein, preferably, the ratios by weight for the respective mixtures comprising fungicidal compound I and the fungicidal compound II are from 1:500 to 500:1, preferably from 1:100 to 100:1, more preferably from 1:25 to 25:1 and most preferably from 1:10 to 1:1.

Utmost preference is also given to mixtures comprising pyraclostrobin as compound I and dicyclomet as compound I in synergistically effective amounts, wherein, preferably, the ratios by weight for the respective mixtures comprising fungicidal compound I and the fungicidal compound II are from 1:500 to 500:1, preferably from 1:100 to 100:1, more preferably from 1:25 to 25:1 and most preferably from 1:10 to 1:1.

Each of the above-mentioned inventive mixtures can further comprise one or more insecticides, fungicides, herbicides.


The agrochemical formulations may also comprise auxiliaries which are customary in agrochemical formulations. The auxiliaries used depend on the particular application form and active substance, respectively.
Examples for suitable auxiliaries are solvents, solid carriers, dispersants or emulsifiers (such as further solubilizers, protective colloids, surfactants and adhesion agents), organic and anorganic thickeners, bactericides, anti-freezing agents, anti-foaming agents, if appropriate colorants and tackifiers or binders (e.g. for seed treatment formulations).

Suitable solvents are water, organic solvents such as mineral oil fractions of medium to high boiling point, such as kerosene or diesel oil, furthermore coal tar oils and oils of vegetable or animal origin, aliphatic, cyclic and aromatic hydrocarbons, e.g. toluene, xylene, paraffin, tetrahydroanaphthalene, alkylated naphthalenes or their derivatives, alcohols such as methanol, ethanol, propanol, butanol and cyclohexanol, glycols, ketones such as cyclohexanone and gamma-butyrolactone, fatty acid dimethylamides, fatty acids and fatty acid esters and strongly polar solvents, e.g. amines such as N-methylpyrrrolidone.

Solid carriers are mineral earths such as silicates, silica gels, talc, kaolins, limestone, lime, chalk, bole, loess, clays, dolomite, diatomaceous earth, calcium sulfate, magnesium sulfate, magnesium oxide, ground synthetic materials, fertilizers, such as, e.g., ammonium sulfate, ammonium phosphate, ammonium nitrate, ureas, and products of vegetable origin, such as cereal meal, tree bark meal, wood meal and nutshell meal, cellulose powders and other solid carriers.

Suitable surfactants (adjuvants, witters, tackifiers, dispersants or emulsifiers) are alkali metal, alkaline earth metal and ammonium salts of aromatic sulfonic acids, such as ligninsulfonic acid (Borresperse® types, Borregard, Norway) phenolsulfonic acid, naphthalenesulfonic acid (Morwet® types, Akzo Nobel, U.S.A.), dibutyl-naphthalene-sulfonic acid (Nekal® types, BASF, Germany), and fatty acids, alkylsulfonates, alkaryl-sulfonates, alkyl sulfates, lauryl ether sulfates, fatty alcohol sulfates, and sulfated hexa-, hepta- and octadecanolates, sulfated fatty alcohol glycol ethers, furthermore condensates of naphthalene or of naphthalenesulfonic acid with phenol and formaldehyde, polyoxy-ethylene octylphenyl ether, ethoxylated isoctylphenol, octylphenol, nonylphenol, alklyphenyl polyglycol ethers, tributylphenyl polyglycol ether, tristearyl-phenyl polyglycol ether, alkylaryl polyether alcohols, alcohol and fatty alcohol/ethylene oxide condensates, ethoxylated castor oil, polyoxyethylene alkyl ethers, ethoxylated polyoxypropylene, lauryl alcohol polyglycol ether acetal, sorbitol esters, lignin-sulfite waste liquors and proteins, denatured proteins, polysaccharides (e.g. methylcellulose), hydrophobically modified starches, polyvinyl alcohols (Mowiol® types, Clariant, Switzerland), polycarboxylates (Sokolan® types, BASF, Germany), polyalkoxylation, polyvinylamines (Lupasol® types, BASF, Germany), polyvinylpyrrolidone and the copolymers thereof.

Examples for thickeners (i.e. compounds that impart a modified flowability to formulations, i.e. high viscosity under static conditions and low viscosity during agitation) are polysaccharides and organic and anorganic clays such as Xanthan gum (Kelzan®, CP Kelco, U.S.A.), Rhodopol® 23 (Rhodia, France), Veegum® (R.T. Vanderbilt, U.S.A.) or Attaclay® (Engelhard Corp., NJ, USA).
Bactericides may be added for preservation and stabilization of the formulation. Examples for suitable bactericides are those based on dichlorophene and benzylalcohol hemi formal (Proxel® from ICI or Acticide® RS from Thor Chemie and Kathon® MK from Rohm & Haas) and isothiazolinone derivatives such as alkylisothiazolinones and benzoisothiazolinones (Acticide® MBS from Thor Chemie).

Examples for suitable anti-freezing agents are ethylene glycol, propylene glycol, urea and glycerin.

Examples for anti-foaming agents are silicone emulsions (such as e. g. Silikon® SRE, Wacker, Germany or Rhodorsil®. Rhodia, France), long chain alcohols, fatty acids, salts of fatty acids, fluoroorganic compounds and mixtures thereof.

Suitable colorants are pigments of low water solubility and water-soluble dyes. Examples to be mentioned und the designations rhodamin B, C. I. pigment red 112, C. I. solvent red 1, pigment blue 15:4, pigment blue 15:3, pigment blue 15:2, pigment blue 15:1, pigment blue 80, pigment yellow 1, pigment yellow 13, pigment red 112, pigment red 48:2, pigment red 48:1, pigment red 57:1, pigment red 53:1, pigment orange 43, pigment orange 34, pigment orange 5, pigment green 36, pigment green 7, pigment white 6, pigment brown 25, basic violet 10, basic violet 49, acid red 51, acid red 52, acid red 14, acid blue 9, acid yellow 23, basic red 10, basic red 108.

Examples for tackifiers or binders are polyvinylpyrrolidons, polyvinylacetates, polyvinyl alcohols and cellulose ethers (Tylose®, Shin-Etsu, Japan).

Powders, materials for spreading and dusts can be prepared by mixing or concomitantly grinding the compounds the respective active compounds present in the inventive mixtures and, if appropriate, further active substances, with at least one solid carrier.

Granules, e. g. coated granules, impregnated granules and homogeneous granules, can be prepared by binding the active substances to solid carriers. Examples of solid carriers are mineral earths such as silica gels, silicates, talc, kaolin, attaclay, limestone, lime, chalk, bole, loess, clay, dolomite, diatomaceous earth, calcium sulfate, magnesia sulfate, magnesium oxide, ground synthetic materials, fertilizers, such as, e. g., ammonium sulfate, ammonium phosphate, ammonium nitrate, ureas, and products of vegetable origin, such as cereal meal, tree bark meal, wood meal and nutshell meal, cellulose powders and other solid carriers.

Examples of formulation types are suspensions (SC, OD, FS), emulsifiable concentrates (EC), emulsions (EW, EO, ES), pastes, pastilles, wettable powders or dusts (WP, SP, SS, WS, DP, DS) or granules (GR, FG, GG, MG), which can be water-soluble or wettable, as well as gel formulations for the treatment of plant propagation materials such as seeds (GF), herein further below exemplified in detail:

1. Composition types for dilution with water

i) Water-soluble concentrates (SL, LS)

10 parts by weight of compounds of the inventive mixtures are dissolved in 90 parts by weight of water or in a water-soluble solvent. As an alternative, wetting agents or other
auxiliaries are added. The active substance dissolves upon dilution with water. In this way, a formulation having a content of 10% by weight of active substance is obtained.

ii) Dispersible concentrates (DC)
20 parts by weight of compounds of the inventive mixtures are dissolved in 70 parts by weight of cyclohexanone with addition of 10 parts by weight of a dispersant, e.g. polyvinylpyrrolidone. Dilution with water gives a dispersion. The active substance content is 20% by weight.

iii) Emulsifiable concentrates (EC)
15 parts by weight of compounds of the inventive mixtures are dissolved in 75 parts by weight of xylene with addition of calcium dodecylbenzenesulfonate and castor oil ethoxylate (in each case 5 parts by weight). Dilution with water gives an emulsion. The composition has an active substance content of 15% by weight.

iv) Emulsions (EW, EO, ES)
25 parts by weight of compounds of the inventive mixtures are dissolved in 35 parts by weight of xylene with addition of calcium dodecylbenzenesulfonate and castor oil ethoxylate (in each case 5 parts by weight). This mixture is introduced into 30 parts by weight of water by means of an emulsifying machine (Ultraturrax) and made into a homogeneous emulsion. Dilution with water gives an emulsion. The composition has an active substance content of 25% by weight.

v) Suspensions (SC, OD, FS)
In an agitated ball mill, 20 parts by weight of compounds of the inventive mixtures are comminuted with addition of 10 parts by weight of dispersants and wetting agents and 70 parts by weight of water or an organic solvent to give a fine active substance suspension. Dilution with water gives a stable suspension of the active substance. The active substance content in the composition is 20% by weight.

vi) Water-dispersible granules and water-soluble granules (WG, SG)
50 parts by weight of compounds of the inventive mixtures are ground finely with addition of 50 parts by weight of dispersants and wetting agents and prepared as water-dispersible or water-soluble granules by means of technical appliances (e.g. extrusion, spray tower, fluidized bed). Dilution with water gives a stable dispersion or solution of the active substance. The composition has an active substance content of 50% by weight.

vii) Water-dispersible powders and water-soluble powders (WP, SP, SS, WS)
75 parts by weight of compounds of the inventive mixtures are ground in a rotor-stator mill with addition of 25 parts by weight of dispersants, wetting agents and silica gel. Dilution with water gives a stable dispersion or solution of the active substance. The active substance content of the composition is 75% by weight.

viii) Gel (GF)
In an agitated ball mill, 20 parts by weight of compounds of the inventive mixtures are comminuted with addition of 10 parts by weight of dispersants, 1 part by weight of a gelling agent wetters and 70 parts by weight of water or of an organic solvent to give a fine suspension of the active substance. Dilution with water gives a stable suspension
of the active substance, whereby a composition with 20% (w/w) of active substance is obtained.

2. Composition types to be applied undiluted
   ix) Dustable powders (DP, DS)
   x) Granules (GR, FG, GG, MG)
   xi) ULV solutions (UL)

5 parts by weight of compounds of the inventive mixtures are ground finely and mixed intimately with 95 parts by weight of finely divided kaolin. This gives a dustable composition having an active substance content of 5% by weight.

0.5 parts by weight of compounds of the inventive mixtures is ground finely and associated with 99.5 parts by weight of carriers. Current methods are extrusion, spray-drying or the fluidized bed. This gives granules to be applied undiluted having an active substance content of 0.5% by weight.

10 parts by weight of compounds of the inventive mixtures are dissolved in 90 parts by weight of an organic solvent, e.g. xylene. This gives a composition to be applied undiluted having an active substance content of 10% by weight.

The agrochemical formulations generally comprise between 0.01 and 95%, preferably between 0.1 and 90%, most preferably between 0.5 and 90%, by weight of active substances. The compounds of the inventive mixtures are employed in a purity of from 90% to 100%, preferably from 95% to 100% (according to NMR spectrum).

The compounds of the inventive mixtures can be used as such or in the form of their compositions, e.g. in the form of directly sprayable solutions, powders, suspensions, dispersions, emulsions, oil dispersions, pastes, dustable products, materials for spreading, or granules, by means of spraying, atomizing, dusting, spreading, brushing, immersing or pouring. The application forms depend entirely on the intended purposes; it is intended to ensure in each case the finest possible distribution of the compounds present in the inventive mixtures.

Aqueous application forms can be prepared from emulsion concentrates, pastes or wettable powders (sprayable powders, oil dispersions) by adding water. To prepare emulsions, pastes or oil dispersions, the substances, as such or dissolved in an oil or solvent, can be homogenized in water by means of a wetter, tackifier, dispersant or emulsifier. Alternatively, it is possible to prepare concentrates composed of active substance, wetter, tackifier, dispersant or emulsifier and, if appropriate, solvent or oil, and such concentrates are suitable for dilution with water.

The active substance concentrations in the ready-to-use preparations can be varied within relatively wide ranges. In general, they are from 0.0001 to 10%, preferably from 0.001 to 1% by weight of compounds of the inventive mixtures.
The compounds of the inventive mixtures may also be used successfully in the ultra-low-volume process (ULV), it being possible to apply compositions comprising over 95% by weight of active substance, or even to apply the active substance without additives.

Various types of oils, wetters, adjuvants, herbicides, fungicides, other pesticides, or bactericides may be added to the active compounds, if appropriate not until immediately prior to use (tank mix). These agents can be admixed with the compounds of the inventive mixtures in a weight ratio of 1:100 to 100:1, preferably 1:10 to 10:1.

Compositions of this invention may also contain fertilizers such as ammonium nitrate, urea, potash, and superphosphate, phytotoxicants and plant growth regulators and safeners. These may be used sequentially or in combination with the above-described compositions, if appropriate also added only immediately prior to use (tank mix). For example, the plant(s) may be sprayed with a composition of this invention either before or after being treated with the fertilizers.

The compounds contained in the mixtures as defined above can be applied simultaneously, that is jointly or separately, or in succession, wherein the time interval between the individual applications is selected to ensure that the active substance applied first still occurs at the site of action in a sufficient amount at the time of application of the further active substance(s). The order of application is not essential for working of the present invention.

According to this invention, the compound I and compound II is to be understood to denote, that at least the compound I and compound II occur simultaneously at the site of action (i.e. the harmful fungi to be controlled or their habitats such as infected plants, plant propagation materials, particularly seeds, surfaces, materials or the soil as well as plants, plant propagation materials, particularly seeds, soil, surfaces, materials or rooms to be protected from fungal attack) in an effective amount.

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

In the mixtures of the present invention, the weight ratio of the compounds generally depends from the properties of the compounds of the inventive mixtures.
The compounds of the inventive mixtures can be used individually or already partially or completely mixed with one another to prepare the composition according to the invention. It is also possible for them to be packaged and used further as combination composition such as a kit of parts.

In one embodiment of the invention, the kits may include one or more, including all, components that may be used to prepare a subject agrochemical composition. E.g., kits may include the compound I and compound II and/or an adjuvant component and/or a further pesticidal compound (e.g. insecticide or herbicide) and/or a growth regulator component. One or more of the components may already be combined together or pre-formulated. In those embodiments where more than two components are provided in a kit, the components may already be combined together and as such are packaged in a single container such as a vial, bottle, can, pouch, bag or canister. In other embodiments, two or more components of a kit may be packaged separately, i.e., not pre-formulated. As such, kits may include one or more separate containers such as vials, cans, bottles, pouches, bags or canisters, each container containing a separate component for an agrochemical composition. In both forms, a component of the kit may be applied separately from or together with the further components or as a component of a combination composition according to the invention for preparing the composition according to the invention.

The user applies the composition according to the invention usually from a predosage device, a knapsack sprayer, a spray tank or a spray plane. Here, the agrochemical composition is made up with water and/or buffer to the desired application concentration, it being possible, if appropriate, to add further auxiliaries, and the ready-to-use spray liquor or the agrochemical composition according to the invention is thus obtained. Usually, 50 to 500 liters of the ready-to-use spray liquor are applied per hectare of agricultural useful area, preferably 100 to 400 liters.

According to one embodiment, individual compounds of the inventive mixtures formulated as composition (or formulation) such as parts of a kit or parts of the inventive mixture may be mixed by the user himself in a spray tank and further auxiliaries may be added, if appropriate (tank mix).

In a further embodiment, either individual compounds of the inventive mixtures formulated as composition or partially premixed components, e.g. components comprising the compound I and compound II may be mixed by the user in a spray tank and further auxiliaries and additives may be added, if appropriate (tank mix).

In a further embodiment, either individual components of the composition according to the invention or partially premixed components, e.g. components comprising the compound I and compound II, can be applied jointly (e.g. after tankmix) or consecutively.
As said above, the present invention comprises a method for harmful fungi, wherein the fungi, their habitat, breeding grounds, their locus or the plants to be protected against fungal attack, the soil or plant propagation material (preferably seed) are treated with an fungicidally effective amount of a mixture.

Advantageously, the inventive mixtures are suitable for controlling the following harmful fungi:

*Albugo* spp. (white rust) on ornamentals, vegetables (e.g. *A. Candida*) and sunflowers (e.g. *A. tragopogonis*); *Alternaria* spp. (Alternaria leaf spot) on vegetables, rape (*A. brassicola* or *brassicae*), sugar beets (*A. tenuis*), fruits, rice, soybeans, potatoes (e.g. *A. solani* or *A. alternata*), tomatoes (e.g. *A. solani* or *A. alternata*) and wheat; *Aphanomyces* spp. on sugar beets and vegetables; *Ascocytha* spp. on cereals and vegetables, e.g. *A. tritici* (anthracnose) on wheat and *A. hordei* on barley; *Bipolaris* and *Drechslera* spp. (teleomorph: *Cochliobolus* spp.), e.g. Southern leaf blight (*D. maydis*) or Northern leaf blight (*B. zeicola*) on corn, e.g. spot blotch (*B. sorokiniana*) on cereals and e.g. *B. oryzae* on rice and turf; *Blumeria* (formerly *Erysiphe*) graminis (powdery mildew) on cereals (e.g. on wheat or barley); *Botrytis cinerea* (teleomorph: *Botryotinia fuckeliana*): grey mold on fruits and berries (e.g. strawberries), vegetables (e.g. lettuce, carrots, celery and cabbages), rape, flowers, vines, forestry plants and wheat; *Bremia lactucae* (downy mildew) on lettuce; *Ceratocystis* (syn. *Ophiostoma*) spp. (rot or wilt) on broad-leaved trees and evergreens, e.g. *C. ulmi* (Dutch elm disease) on elms; *Cercospora* spp. (Cercospora leaf spots) on corn (e.g. Gray leaf spot: *C. zeae-maydis*), rice, sugar beets (e.g. *C. beticola*), sugar cane, vegetables, coffee, soybeans (e.g. *C. sojina* or *C. kikuchii*) and rice; *Cladosporium* spp. on tomatoes (e.g. *C. fulvum*): leaf mold and cereals, e.g. *C. herbarum* (black ear) on wheat; *Claviceps purpurea* (ergot) on cereals; *Cochliobolus* (anamorph: *Helminthosporium of Bipolaris*) spp. (leaf spots) on corn (C. carbonum), cereals (e.g. *C. sativus*), anamorph: *B. sorokiniana* and rice (e.g. *C. miyabeanus*), anamorph: *H. oryzae*); *Colletotrichum* (teleomorph: *Glomerella*) spp. (anthracnose) on cotton (e.g. *C. gossypii*), corn (e.g. *C. graminicola*: Anthracnose stalk rot), soft fruits, potatoes (e.g. *C. coccodes*: black dot), beans (e.g. *C. lindemuthianum*) and soybeans (e.g. *C. trunctatum* or *C. gloeosporioides*); *Corticium* spp., e.g. *C. sasakii* (sheath blight) on rice; *Corynespora cassicola* (leaf spots) on soybeans and ornamentals; *Cylindrocladium* spp., e.g. *C. oleaginum* on olive trees; *Cylindrocarpon* spp. (e.g. fruit tree canker or young vine decline, teleomorph: *Nectria* or *Neonectria* spp.) on fruit trees, vines (e.g. *C. liriodendri*, teleomorph: *Neonectria liriodendri*: Black Foot Disease) and ornamentals; *Dematophora* (teleomorph: *Rosellinia*) necatrix (root and stem rot) on soybeans; *Diaporthe* spp., e.g. *D. phaseolorum* (damping off) on soybeans; *Drechslera* (syn. *Helminthosporium*), teleomorph: *Pyrenophora* spp. on corn, cereals, such as barley (e.g. *D. teres*, net blotch) and wheat (e.g. *D. tritici-repentis*: tan spot), rice and turf; Esca (dieback, apoplexy) on vines, caused by *Formitiporia* (syn. *Phellinus*) punctata, *F. mediterranea*, *Phaeomoniella chlamydospora* (earlier *Phaeo-
acremonium chlamydosporum), Phaeoacremonium aleophilum and/or Botryosphaeria obtusa; Elsinoe spp. on pome fruits (E. pyri), soft fruits (E. veneta: anthracnose) and vines (E. ampelina: anthracnose); Entyloma oryzae (leaf smut) on rice; Epicoccum spp. (black mold) on wheat; Erysiphe spp. (powdery mildew) on sugar beets (E. betae), vegetables (e.g. E. pisi), such as cucurbits (e.g. E. cichoracearum), cabbages, rape (e.g. E. cruciferarum); Eutypa lata (Eutypa canker or dieback, anamorph: Cytosporina lata, syn. Libertella blepharis) on fruit trees, vines and ornamental woods; Exserohilum (syn. Helminthosporium) spp. on corn (e.g. E. turcicum); Fusarium (teleomorph: Gibberella) spp. (wilt, root or stem rot) on various plants, such as F. graminearum or F. culmorum (root rot, scab or head blight) on cereals (e.g. wheat or barley), F. oxy- sporum on tomatoes, F. solani on soybeans and F. verticillioides on corn; Gaeumannomyces graminis (take-all) on cereals (e.g. wheat or barley) and corn; Gibberella spp. on cereals (e.g. G. zeae) and rice (e.g. G. fujikuroi: Bakanae disease); Glomerella cingulata on vines, pome fruits and other plants and G. gossypii on cotton; Grain-staining complex on rice; Guignardia bidwellii (black rot) on vines; Gymnosporangium spp. on rosaceous plants and junipers, e.g. G. sabinae (rust) on pears; Helminthosporium spp. (syn. Drechslera, teleomorph: Cochliobolus) on corn, cereals and rice; Hemileia spp., e.g. H. vastatrix (coffee leaf rust) on coffee; Isariopsis clavispora (syn. Cladosporium vitis) on vines; Macrophomina phaseolina (syn. phaseoli) (root and stem rot) on soybeans and cotton; Microdochium (syn. Fusarium) nivale (pink snow mold) on cereals (e.g. wheat or barley); Microsphaera diffusa (powdery mildew) on soybeans; Monilinia spp., e.g. M. laxa, M. fructicola and M. fructigena (bloom and twig blight, brown rot) on stone fruits and other rosaceous plants; Mycosphaerella spp. on cereals, bananas, soft fruits and ground nuts, such as e.g. M. graminicola (anamorph: Septoria tritici, Septoria blotch) on wheat or M. fijiensis (black Sigatoka disease) on bananas; Peronospora spp. (downy mildew) on cabbage (e.g. P. brassicae), rape (e.g. P. parasitica), onions (e.g. P. destructor), tobacco (P. tabacina) and soybeans (e.g. P. manshurica); Phakopsora pachyrhizi and P. meibomiae (soybean rust) on soybeans; Phialophora spp. e.g. on vines (e.g. P. tracheiphila and P. tetraspora) and soybeans (e.g. P. gregata; stem rot); Phoma lingam (root and stem rot) on rape and cabbage and P. betae (root rot, leaf spot and damping-off) on sugar beets; Phomopsis spp. on sunflowers, vines (e.g. P. viticola: can and leaf spot) and soybeans (e.g. stem rot: P. phaseoli, teleomorph: Diaporthe phaseolorum); Physoderma maydis (brown spots) on corn; Phytophthora spp. (wilt, root, leaf, fruit and stem root) on various plants, such as paprika and cucurbits (e.g. P. capsici), soybeans (e.g. P. megasperma, syn. P. sojae), potatoes and tomatoes (e.g. P. infestans: late blight) and broad-leaved trees (e.g. P. ramorum: sudden oak death); Plasmopodiphora brassicae (club root) on cabbage, rape, radish and other plants; Plasmopara spp., e.g. P. viticola (grapevine downy mildew) on vines and P. halstedii on sunflowers; Podosphaera spp. (powdery mildew) on rosaceous plants, hop, pome and soft fruits, e.g. P. leucotricha on apples; Polymyxa spp., e.g. on cereals, such as barley and wheat (P. graminis) and sugar beets (P. betae) and thereby transmitted viral diseases; Pseudocercospora herpotrichoides (eyespot,
teleomorph: *Tapesia yallundae* on cereals, e.g. wheat or barley; *Pseudoperonospora* (downy mildew) on various plants, e.g. *P. cubensis* on cucurbits or *P. humili* on hop; *Pseudopezicula tracheiphila* (red fire disease or 'rotbrenner', anamorph: *Phialophora*) on vines; *Puccinia* spp. (rusts) on various plants, e.g. *P. triticina* (brown or leaf rust), *P. striiformis* (stripe or yellow rust), *P. hordei* (dwarf rust), *P. graminis* (stem or black rust) or *P. recondita* (brown or leaf rust) on cereals, such as e.g. wheat, barley or rye, *P. kuehni* (orange rust) on sugar cane and *P. asparagus* on asparagus; *Pyrenophora* (anamorph: *Drechslera tritic-repentis* (tan spot) on wheat or *P. teres* (net blotch) on barley; *Pyricularia* spp., e.g. *P. oryzae* (teleomorph: *Magnaporthe grisea*, rice blast) on rice and *P. grisea* on turf and cereals; *Pythium* spp. (damping-off) on turf, rice, corn, wheat, cotton, rape, sunflowers, soybeans, sugar beets, vegetables and various other plants (e.g. *P. ultimum* or *P. aphaniidermatum*); *Ramularia* spp., e.g. *R. collo-cygni* (Ramularia leaf spots, Physiological leaf spots) on barley and *R. beticola* on sugar beets; *Rhizoctonia* spp. on cotton, rice, potatoes, turf, corn, rape, potatoes, sugar beets, vegetables and various other plants, e.g. *R. solani* (root and stem rot) on soybeans, *R. solani* (sheath blight) on rice or *R. cerealis* (Rhizoctonia spring blight) on wheat or barley; *Rhizopus stolonifer* (black mold, soft rot) on strawberries, carrots, cabbage, vines and tomatoes; *Rhynchosporium secalis* (scald) on barley, rye and triticale; *Sarocladium oryzae* and *S. attenuatum* (sheath rot) on rice; *Sclerotinia* spp. (stem rot or white mold) on vegetables and field crops, such as rape, sunflowers (e.g. *S. sclerotiorum*) and soybeans (e.g. *S. rolfsii* or *S. sclerotiorum*); *Septoria* spp. on various plants, e.g. *S. glycines* (brown spot) on soybeans, *S. tritici* (Septoria blotch) on wheat and *S. (syn. Stagonospora) nodorum* (Stagonospora blotch) on cereals; *Uncinula* (syn. *Erysipe*) *nectar* (powdery mildew, anamorph: *Oidium tuckeri*) on vines; *Setosphaeria* spp. (leaf blight) on corn (e.g. *S. turcicum*, syn. *Helminthosporium turcicum*) and turf; *Sphacelotheca* spp. (smut) on corn, (e.g. *S. reiliana*: head smut), sorghum and sugar cane; *Sphaerotheca fuliginea* (powdery mildew) on cucurbits; *Spongopora subterra-nea* (powdery scab) on potatoes and thereby transmitted viral diseases; *Stagonospora* spp. on cereals, e.g. *S. nodorum* (Stagonospora blotch, teleomorph: *Leptosphaeria* [syn. *Phaeosphaeria* *nodorum]*) on wheat; *Synchytium endobioticum* on potatoes (potato wart disease); *Taphrina* spp., e.g. *T. deformans* (leaf curl disease) on peaches and *T. pruni* (plum pocket) on plums; *Thielaviopsis* spp. (black root rot) on tobacco, pome fruits, vegetables, soybeans and cotton, e.g. *T. basicola* (syn. *Chalara elegans*); *Tilletia* spp. (common bunt or stinking smut) on cereals, such as e.g. *T. tritici* (syn. *T. caries*, wheat bunt) and *T. controversa* (dwarf bunt) on wheat; *Typhula incarnata* (grey snow mold) on barley or wheat; *Urocystis* spp., e.g. *U. occulta* (stem smut) on rye; *Uromyces* spp. (rust) on vegetables, such as beans (e.g. *U. appendiculatus*, syn. *U. phaseoli*) and sugar beets (e.g. *U. betae*); *Ustilago* spp. (loose smut) on cereals (e.g. *U. nuda* and *U. avenae*), corn (e.g. *U. maydis*: corn smut) and sugar cane; *Venturia* spp. (scab) on apples (e.g. *V. inaequalis*) and pears; and *Verticillium* spp. (wilt) on various plants, such as fruits and ornamentals, vines, soft fruits, vegetables and field crops, e.g. *V. dahliae* on strawberries, rape, potatoes and tomatoes.
The inventive mixtures are also suitable for controlling fungal diseases occurring in the protection of materials (e.g. wood, paper, paint dispersions, fiber or fabrics) and in the protection of stored products. The term "protection of materials" is to be understood to denote the protection of technical and non-living materials, such as adhesives, glues, wood, paper and paperboard, textiles, leather, paint dispersions, plastics, colling lubricants, fiber or fabrics, against the infestation and destruction by harmful microorganisms, such as fungi and bacteria. As to the protection of wood and other materials, the particular attention is paid to the following harmful fungi: Ascomycetes such as Ophiostoma spp., Ceratocystis spp., Aureobasidium pullulans, Sclerotrhoma spp., Chaetomium spp., Humicola spp., Petriella spp., Trichurus spp.; Basidiomycetes such as Coniophora spp., Coriolus spp., Gloeophyllum spp., Lentinus spp., Pleurotus spp., Polystictus spp., Serpula spp. and Tyromyces spp., Deuteromycetes such as Aspergillus spp., Cladosporium spp., Penicillium spp., Trichorma spp., Alternaria spp., Paecilomyces spp. and Zygomycetes such as Mucor spp., and in addition in the protection of stored products the following yeast fungi are worthy of note: Candida spp. and Saccharomyces cerevisiae.

In general, "fungicidally effective amount" means the amount of the inventive mixtures or of compositions comprising the mixtures needed to achieve an observable effect on growth, including the effects of necrosis, death, retardation, prevention, and removal, destruction, or otherwise diminishing the occurrence and activity of the target organism. The fungicidally effective amount can vary for the various mixtures / compositions used in the invention. A fungicidally effective amount of the mixtures / compositions will also vary according to the prevailing conditions such as desired fungicidal effect and duration, weather, target species, locus, mode of application, and the like.

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

In a particular preferred embodiment, the invention further relates to a method of combating phytopathogenic fungi on rice comprising application of the inventive mixtures, preferably application of such mixtures in paddy rice fields, comprising the treatment with an inventive mixture as defined above. Especially preferred mixtures for that purpose are those mentioned above, in particular the most and utmost preferred mixtures comprising pyraclostrobin as compound I and a fungicidal compound II is selected from the group consisting of kasugamycin, carproamid, dicyclomet, wherein, preferably, the ratios by weight for the respective mixtures comprising fungicidal compound I and the fungicidal compound II are from 1:500 to 500:1, preferably from 1:100 to 100:1, more preferably from 1:25 to 25:1 and most preferably from 1:10 to 10:1.

Preferably, the phytopathogenic fungi on rice comprising the fungi mentioned above and additionally comprising further species in rice are

Alternaria species on rice, Bipolaris (e.g. Bipolaris oryzae), and Drechslera species on rice, Cercospora oryzae, Cochliobolus miyabeanus, Curvularia lunata, Sarocladium oryzae, S attenuatum, Entyloma oryzae, Fusarium spp such as Fusarium semitectum (and/or moniliforme Gibberella fujikuroi (bakanae), Grainstaining complex (various pathogens), and/or Pythium spp. Helminthosporium. spp, for example Helminthosporium oryzae, Microdochium oryzae, Pyricularia grisea (syn. Pyricularia oryzae), Rhizoctonia species, for example Rhizoctonia solani (syn in rice Pellicularia sasakii), Corticium sasakii and Ustilaginoidea virens.

In a more preferred embodiment of the method of combating phytopathogenic fungi in paddy rice fields, the phytopathogenic fungi are Pyricularia grisea (syn. Pyricularia oryzae) and/or Rhizoctonia species, in particular Rhizoctonia solani (syn in rice Pellicularia sasakii).
In the above-referred methods for combating fungi on rice, the amount of fungicide is usually in the range from 20 per 500 g/ha.

As said above, the present invention comprises a method for improving the health of plants, wherein the plant, the locus where the plant is growing or is expected to grow or plant propagation material, from which the plant grows, is treated with an plant health effective amount of an inventive mixture.

The term "plant health effective amount" denotes an amount of the inventive mixtures, which is sufficient for achieving plant health effects as defined hereinbelow. More exemplary information about amounts, ways of application and suitable ratios to be used is given below. Anyway, the skilled artisan is well aware of the fact that such an amount can vary in a broad range and is dependent on various factors, e.g. the treated cultivated plant or material and the climatic conditions.

The term "effective amount" comprises the terms "plant health effective amount" and/or "fungicidally effective amount" as the case may be.

"Locus" means a plant, plant propagation material (preferably seed), soil, area, material or environment in which a fungi is growing or may grow.

When preparing the mixtures, it is preferred to employ the pure active compounds, to which further active compounds against pests, such as insecticides, herbicides, fungicides or else herbicidal or growth-regulating active compounds or fertilizers can be added as further active components according to need.

The inventive mixtures are employed by treating the fungi or the plants, plant propagation materials (preferably seeds), materials or soil to be protected from fungal attack with a fungicidally effective amount of the active compounds. The application can be carried out both before and after the infection of the materials, plants or plant propagation materials (preferably seeds) by the fungi.

Peferalby, the inventive mixtures are employed by treating the fungi or the plants or soil to be protected from fungicidal attack via foliar application with a fungicidally effective amount of the active compounds. Also herein, the application can be carried out both before and after the infection of the plants by the fungi.

In the method of combating harmful fungi depending on the type of compound and the desired effect, the application rates of the mixtures according to the invention are from 0.1 g/ha to 10000 g/ha, preferably 2 g/ha to 2500 g/ha, more preferably from 5 to 1000 g/ha, most preferably from 10 to 750 g/ha, in particular from 20 to 500 g/ha.
In the context of the present invention, the term plant refers to an entire plant, a part of the plant or the propagation material of the plant.

Plants and as well as the propagation material of said plants, which can be treated with the inventive mixtures include all genetically modified plants or transgenic plants, e.g. crops which tolerate the action of herbicides or fungicides or insecticides owing to breeding, including genetic engineering methods, or plants which have modified characteristics in comparison with existing plants, which can be generated for example by traditional breeding methods and/or the generation of mutants, or by recombinant procedures.

For example, mixtures according to the present invention can be applied (as seed treatment, spray treatment, in furrow or by any other means) also to plants which have been modified by breeding, mutagenesis or genetic engineering including but not limiting to agricultural biotech products on the market or in development (cf. http://www.bio.org/speeches/pubs/er/agri_products.asp). Genetically modified plants are plants, which genetic material has been so modified by the use of recombinant DNA techniques that under natural circumstances cannot readily be obtained by cross breeding, mutations or natural recombination. Typically, one or more genes have been integrated into the genetic material of a genetically modified plant in order to improve certain properties of the plant. Such genetic modifications also include but are not limited to targeted post-transitional modification of protein(s), oligo- or polypeptides e.g. by glycosylation or polymer additions such as prenylated, acetylated or farnesylated moieties or PEG moieties.

Plants that have been modified by breeding, mutagenesis or genetic engineering, e.g. have been rendered tolerant to applications of specific classes of herbicides, such as auxin herbicides such as dicamba or 2,4-D; bleacher herbicides such as hydroxylphenylpyruvate dioxygenase (HPPD) inhibitors or phytoene desaturase (PDS) inhibitors; acetoacetate synthase (ALS) inhibitors such as sulfonyl ureas or imidazolinones; enolpyruvylshikimate-3-phosphate synthase (EPSPS) inhibitors, such as glyphosate; glutamine synthetase (GS) inhibitors such as glufosinate; protoporphyrinogen-IX oxidase inhibitors; lipid biosynthesis inhibitors such as acetyl CoA carboxylase (ACCase) inhibitors; or oxynil (i.e. bromoxynil or oxynil) herbicides as a result of conventional methods of breeding or genetic engineering. Furthermore, plants have been made resistant to multiple classes of herbicides through multiple genetic modifications, such as resistance to both glyphosate and glufosinate or to both glyphosate and a herbicide from another class such as ALS inhibitors, HPPD inhibitors, auxin herbicides, or ACCase inhibitors. These herbicide resistance technologies are e.g. described in Pest Managem. Sci. 61, 2005, 246; 61, 2005, 258; 61, 2005, 277; 61, 2005, 269; 61, 2005, 286; 64, 2008, 326; 64, 2008, 332; Weed Sci. 57, 2009, 108; Austral. J. Agricult. Res.
58, 2007, 708; Science 316, 2007, 1185; and references quoted therein. Several cultivated plants have been rendered tolerant to herbicides by conventional methods of breeding (mutagenesis), e.g. Clearfield® summer rape (Canola, BASF SE, Germany) being tolerant to imidazolinones, e.g. imazamox, or ExpressSun® sunflowers (DuPont, USA) being tolerant to sulfonyl ureas, e.g. tribenuron. Genetic engineering methods have been used to render cultivated plants such as soybean, cotton, corn, beans and rape, tolerant to herbicides such as glyphosate and glufosinate, some of which are commercially available under the trade names RoundupReady® (glyphosate-tolerant, Monsanto, U.S.A.), Cultivate® (imidazolinone tolerant, BASF SE, Germany) and LibertyLink® (glufosinate-tolerant, Bayer CropScience, Germany).

Furthermore, plants are also covered that are by the use of recombinant DNA techniques capable to synthesize one or more insecticidal proteins, especially those known from the bacterial genus Bacillus, particularly from Bacillus thuringiensis, such as δ-endotoxins, e.g. Cry1A(b), Cry1A(c), CryL, Cry1F(a2), Cry2A(b), Cry3A, Cry3B(b) or Cry9c; vegetative insecticidal proteins (VIP), e.g. VIP1, VIP2, VIP3 or VIP3A; insecticidal proteins of bacteria colonizing nematodes, e.g. Photorhabdus spp. or Xenorhabdus spp.; toxins produced by animals, such as scorpion toxins, arachnid toxins, wasp toxins, or other insect-specific neurotoxins; toxins produced by fungi, such Streptomyces toxins, plant lectins, such as pea or barley lectins; agglutinins; proteinase inhibitors, such as trypsin inhibitors, serine protease inhibitors, patatin, cystatin or papain inhibitors; ribosome-inactivating proteins (RIP), such as ricin, maize-RIP, abrin, luffin, saporin or bryodin; steroid metabolism enzymes, such as 3-hydroxysteroid oxidase, ecdysteroid-IDP-glycosyl-transferase, cholesterol oxidases, ecdysone inhibitors or HMG-CoA-reductase; ion channel blockers, such as blockers of sodium or calcium channels; juvenile hormone esterase; diuretic hormone receptors (helicokinin receptors); stilben synthase, bibenzyl synthase, chinonases or gluconases. In the context of the present invention these insecticidal proteins or toxins are to be understood expressly also as pre-toxins, hybrid proteins, truncated or otherwise modified proteins.

Hybrid proteins are characterized by a new combination of protein domains, (see, e.g. WO 02/015701). Further examples of such toxins or genetically modified plants capable of synthesizing such toxins are disclosed, e.g., in EP-A 374 753, WO 93/007278, WO 95/34656, EP-A 427 529, EP-A 451 878, WO 03/18810 und WO 03/52073. The methods for producing such genetically modified plants are generally known to the person skilled in the art and are described, e.g. in the publications mentioned above.

These insecticidal proteins contained in the genetically modified plants impart to the plants producing these proteins tolerance to harmful pests from all taxonomic groups of arthropods, especially to beetles (Coleoptera), two-winged insects (Diptera), and moths (Lepidoptera) and to nematodes (Nematoda). Genetically modified plants capable to synthesize one or more insecticidal proteins are, e.g., described in the publications mentioned above, and some of which are commercially available such as YieldGard® (corn cultivars producing the CrylAb toxin), YieldGard® Plus (corn cultivars producing
Cry1 Ab and Cry3Bb1 toxins), Starlink® (corn cultivars producing the Cry9c toxin), Hercules® RW (corn cultivars producing Cry34Ab1, Cry35Ab1 and the enzyme Phosphinothricin-N-Acetyltransferase [PAT]); NuCOTN® 33B (cotton cultivars producing the Cry1 Ac toxin), Bollgard® I (cotton cultivars producing the Cry1 Ac toxin), Bollgard® II (cotton cultivars producing Cry1Ac and Cry2Ab2 toxins); VIPCOT® (cotton cultivars producing a VIP-toxin); NewLeaf® (potato cultivars producing the Cry3A toxin); Bt-Xtra®, NatureGard®, KnockOut®, BiteGard®, Protecta®, Bt1 1 (e. g. Agrisure® CB) and Bt176 from Syngenta Seeds SAS, France, (corn cultivars producing the Cry1 Ab toxin and PAT enzyme), MIR604 from Syngenta Seeds SAS, France (corn cultivars producing a modified version of the Cry3A toxin, c.f. WO 03/01 881 0), MON 863 from Monsanto Europe S.A., Belgium (corn cultivars producing the Cry3Bb1 toxin), IPC 531 from Monsanto Europe S.A., Belgium (cotton cultivars producing a modified version of the Cry1Ac toxin) and 1507 from Pioneer Overseas Corporation, Belgium (corn cultivars producing the Cry1 F toxin and PAT enzyme).

Furthermore, plants are also covered that are by the use of recombinant DNA techniques capable to synthesize one or more proteins to increase the resistance or tolerance of those plants to bacterial, viral or fungal pathogens. Examples of such proteins are the so-called "pathogenesis-related proteins" (PR proteins, see, e. g. EP-A 392 225), plant disease resistance genes (e. g. potato cultivars, which express resistance genes acting against Phytophthora infestans derived from the mexican wild potato Solanum bulbocastanum) or T4-lysozym (e. g. potato cultivars capable of synthesizing these proteins with increased resistance against bacteria such as Erwinia amylovora). The methods for producing such genetically modified plants are generally known to the person skilled in the art and are described, e. g. in the publications mentioned above.

Furthermore, plants are also covered that are by the use of recombinant DNA techniques capable to synthesize one or more proteins to increase the productivity (e. g. bio mass production, grain yield, starch content, oil content or protein content), tolerance to drought, salinity or other growth-limiting environmental factors or tolerance to pests and fungal, bacterial or viral pathogens of those plants. Furthermore, plants are also covered that contain by the use of recombinant DNA techniques a modified amount of substances of content or new substances of content, specifically to improve human or animal nutrition, e. g. oil crops that produce health-promoting long-chain omega-3 fatty acids or unsaturated omega-9 fatty acids (e. g. Nexera® rape, DOW Agro Sciences, Canada).

Furthermore, plants are also covered that contain by the use of recombinant DNA techniques a modified amount of substances of content or new substances of content, specifically to improve raw material production, e. g. potatoes that produce increased amounts of amylopectin (e. g. Amflora® potato, BASF SE, Germany).

In a further embodiment of the invention, the inventive mixtures are used for the protection of the seed and the seedlings' roots and shoots, preferably the seeds.
Seed treatment can be made into the seedbox before planting into the field.

For seed treatment purposes, the weight ration in the inventive mixtures generally depends from the properties of the compounds of the inventive mixtures.

Compositions, which are especially useful for seed treatment are e.g.:

A Soluble concentrates (SL, LS)
D Emulsions (EW, EO, ES)
E Suspensions (SC, OD, FS)
F Water-dispersible granules and water-soluble granules (WG, SG)
G Water-dispersible powders and water-soluble powders (WP, SP, WS)
H Gel-Formulations (GF)
I Dustable powders (DP, DS)

These compositions can be applied to plant propagation materials, particularly seeds, diluted or undiluted. These compositions can be applied to plant propagation materials, particularly seeds, diluted or undiluted. The compositions in question give, after two-to-tenfold dilution, active substance concentrations of from 0.01 to 60% by weight, preferably from 0.1 to 40% by weight, in the ready-to-use preparations. Application can be carried out before or during sowing. Methods for applying or treating agrochemical compounds and compositions thereof, respectively, on to plant propagation material, especially seeds, are known in the art, and include dressing, coating, pelleting, dusting and soaking application methods of the propagation material (and also in furrow treatment). In a preferred embodiment, the compounds or the compositions thereof, respectively, are applied on to the plant propagation material by a method such that germination is not induced, e.g. by seed dressing, pelleting, coating and dusting.

In the treatment of plant propagation material (preferably seed), the application rates of the inventive mixture are generally for the formulated product (which usually comprises from 10 to 750 g/l of the active(s)).

The invention also relates to the propagation products of plants, and especially the seed comprising, that is, coated with and/or containing, a mixture as defined above or a composition containing the mixture of two or more active ingredients or a mixture of two or more compositions each providing one of the active ingredients. The plant propagation material (preferably seed) comprises the inventive mixtures in an amount of from 0.1 g to 10 kg per 100 kg of plant propagation material (preferably seed), preferably 0.1 g to 1 kg per 100 kg of plant propagation material (preferably seed).
For example, the ratio by weight for compound I is herein preferably between 0.5 - 200 g/100kg plant propagation material (preferably seed), more preferred 1 to 50 g/100kg plant propagation material (preferably seed) and most preferred 1 to 20 g/100kg plant propagation material (preferably seed).

For example, the ratio by weight of compound I is herein preferably between 1 - 2000 g/1 00kg plant propagation material (preferably seed), more preferred 10 to 1000 g/1 00kg plant propagation material (preferably seed), most preferred 25 to 750 g/1 00kg plant propagation material (preferably seed) and utmost preferred 50:500 g/1 00kg plant propagation material (preferably seed).

The separate or joint application of the compounds of the inventive mixtures is carried out by spraying or dusting the seeds, the seedlings, the plants or the soils before or after sowing of the plants or before or after emergence of the plants.

The invention is further illustrated, but not limited by the following examples.

Example 1 - Activity against leaf blotch on wheat caused by Septoria tritici (Septtrr)
The stock solutions were mixed according to the ratio, pipetted onto a micro titer plate (MTP) and diluted with water to the stated concentrations. A spore suspension of Septoria tritici in an aqueous biomalt or yeast-bactopeptone-glycerine solution was then added. The plates were placed in a water vapor-saturated chamber at a temperature of 18°C. Using an absorption photometer, the MTPs were measured at 405 nm 7 days after the inoculation.

The results are shown below in Table 1. The measured parameters were compared to the growth of the active compound-free control variant (100%) and the fungus-free and active compound-free blank value to determine the relative growth in % of the pathogens in the respective active compounds. The expected efficacies of active compound mixtures were determined using Colby's formula [R.S. Colby, "Calculating synergistic and antagonistic responses of herbicide combinations", Weeds 15, 20-22 (1967)] and compared with the observed efficacies and demonstrate the synergism of the inventive mixtures.

Table 1

<table>
<thead>
<tr>
<th>Active compound / mixture</th>
<th>Concentration (ppm)</th>
<th>Mixture</th>
<th>Observed efficacy</th>
<th>Calculated efficacy* (%)</th>
<th>Synergism (%)</th>
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<td>Kasugamycin</td>
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<td></td>
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<tr>
<td>Pyraclostrobin</td>
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<td>1 : 250</td>
<td>44</td>
<td>25</td>
<td>19</td>
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<tr>
<td>Kasugamycin</td>
<td>0.25</td>
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</table>
*) according to Colby
Claims

1. Mixtures comprising, as active components,

5 1) one fungicidal compound I selected from the group consisting of kasugamycin, carpropamid, dicyclomet, tricyclazol mepronil, tecloftalam, thifluzamide, diflumetorim, binapacryl, dinobuton, ferimzone, bitertanol, diniconazol-m, imiben-conazol, simeconazol, pefurazoate, piperase, nuarimol, pyrifenox, triforin, aldimorph, dodemorphacetat, piperalin, ochthilinon, oxolinsaure, diethofencarb, pencycuron, fluopicoloid, pyrophenon, blasticidin-S, mildiomyacin, streptomycin, oxytetracyclin, validamycin a, fluoroimid, edifenphos, iprobenfos, pyrazophos, isoprothiolane, dicloran, quintozene, tecnazen, tolclofos-methyl, biphenyl, etridiazol, flumorph, ferbam, metam, anilazin, dichlofluanid, dichlorophen, flusulfamid, guazatin, guazatin-acetat, validamycin, polyoxin b, pyroquilon, tiadinil, bronopol, chinomethionat, debacarb, diclomezin, difenzoquat, difenzoquatmethylsulfat, diphenylamin, flume- tover, flusulfamid, methasulfocarb, nitrapyrin, nitrothal-isopropyl, proquina- zid, tebufluquin, tecloftalam and triazoxid; and

10 2) pyraclostrobin as compound II;

in synergistic effective amounts.

2. The mixture according to claim 1, wherein compound I is selected from the group consisting of kasugamycin, carpropamid, dicyclomet and tricyclazol.

15 3. The mixture according to claim 1, wherein compound I is selected from the group consisting of kasugamycin, carpropamid or dicyclomet.

4. The mixture according to any of claims 1 to 4, wherein the ratio by weight of compound I : I is from 1:500 to 500:1.

20 5. The mixture according to any of claims 1 to 4, wherein the ratio by weight of compound I : II is from 1:100 to 100:1.

30 6. The mixture according to any of claims 1 to 4, wherein the ratio by weight of compound I : II is from 1:10 to 10:1.

35 7. A fungicidal composition, comprising a liquid or solid carrier and a mixture as defined in any of claims 1 to 6.
8. A method for controlling fungi, wherein the fungi, their habitat, breeding grounds, their locus or the plants to be protected against fungal attack, the soil or plant propagation material are treated with an effective amount of a mixture as defined in any of claims 1 to 7.

9. The method as claimed in claim 8, wherein the method comprises the control of phytopathogenic fungi on rice.

10. The method as claimed in claim 9, wherein the method comprises the control of phytopathogenic fungi in paddy rice fields by application of a mixture as claimed in any of claims 1 to 7.

11. A method for protection of plant propagation material from fungi comprising contacting the plant propagation materials with a mixture as defined in any of claims 1 to 7 in phungicidally effective amounts.

12. A method as claimed in claims 8 to 12, wherein the compounds as defined in any of claims 1 to 7 are applied simultaneously, that is jointly or separately, or in succession.

13. Plant propagation material, comprising the mixture as defined in any of claims 1 to 7 in an amount of from 0.01 g to 10 kg per 100 kg of plant propagation materials.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

INV. A01N47/24 A01N43/16 A01P3/00

ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<tr>
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<td>DATABASE CA [Online] CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; ZHENG, JINGMIN ET AL: &quot;Synergistic fungicide composition containing thifluzamide and one of kresoxim-methyl, amistar, pyraclostrobin or ZJ0712&quot;, XP002641594, retrieved from STN Database access on no. 153:450035 the whole document &amp; CN 101 828 560 A (SHAANXI SUNGER ROAD BIO-SCIENCE CO., LTD., PEOP. REP. CHINA) 15 September 2010 (2010-09-15)</td>
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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 document or to show a difference in principle or in the state of the art or for any other reason

"O" document referring to an oral proceedings, 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 to have been obvious to the skilled person before it.

"Y" document of particular relevance; the claimed invention could not be considered to have been obvious to the skilled person before it.

"A" document member of the same patent family

Date of the actual completion of the international search

8 March 2012

Date of mailing of the international search report

22/03/2012

Name and mailing address of the ISA

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Fax: (+31-70) 340-3016

Authorized officer

Gbtz, Gerhard

Form PCT/ISA/210 (second sheet) (April 2005)
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<td>WO 97/42821 AI (BASF AKTIENGESELLSCHAFT, GERMANY) 20 November 1997 (1997-11-20) claim 1 examples 17, 18</td>
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