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(71) Applicant: **VPS-3, INC.** [US/US]; 4505 Emperor Boulevard, Suite 300, Durham, NC 27703 (US).

(72) Inventors: **HUANG, Yi-hsiou**; No. 56, Alley 336, Gusong West Lane, Pingtung City 90071 (CN). **GALLUP, Courtney**; Dow AgroSciences LLC, 9330 Zionsville Road, Indianapolis, IN 46268 (US).

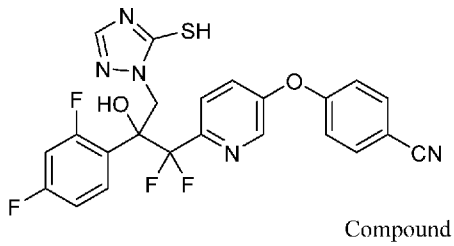
(74) Agent: **HSI, Jeffrey D.**; Wolf, Greenfield & Sacks, P.C., 600 Atlantic Avenue, Boston, MA 02210-2206 (US).

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(54) Title: USE OF A DIFLUORO-(2-HYDROXYPROPYL)PYRIDINE COMPOUND AS A FUNGICIDE FOR CONTROL OF PHYTOPATHOGENIC FUNGI OF RICE



Compound (I)

(57) Abstract: The present disclosure is related to the field of agrochemicals, including compound (I) and its' use to control fungal diseases in rice.

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USE OF A DIFLUORO-(2-HYDROXYPROPYL)PYRIDINE COMPOUND AS A FUNGICIDE FOR CONTROL OF PHYTOPATHOGENIC FUNGI OF RICE

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] The present application claims priority under 35 U.S.C. § 119(e) to U.S. provisional patent application, U.S.S.N. 62/425,581, filed November 22, 2016, the entire contents of which is incorporated herein by reference.

FIELD OF THE INVENTION

[0002] This present disclosure is related to the field of the use of 4-((6-(2-(2,4-difluorophenyl)-1,1-difluoro-2-hydroxy-3-(5-mercapto-1H-1,2,4-triazol-1-yl)propyl)pyridin-3-yl)oxy)benzonitrile to control fungal diseases of rice.

BACKGROUND AND SUMMARY OF THE INVENTION

[0003] Fungicides are compounds, of natural or synthetic origin, which act to protect and cure plants against damage caused by agriculturally-relevant fungi. Generally, no single fungicide is useful in all situations. Consequently, research is ongoing to produce fungicides that may have better performance, are easier to use, and cost less.

[0004] The present disclosure relates to 4-((6-(2-(2,4-difluorophenyl)-1,1-difluoro-2-hydroxy-3-(5-mercapto-1H-1,2,4-triazol-1-yl)propyl)pyridin-3-yl)oxy)benzonitrile (compound I) and its use as a fungicide. Compound I may offer protection against ascomycetes, basidiomycetes, deuteromycetes and oomycetes.

[0005] One embodiment of the present disclosure includes a method of controlling a pathogen-induced disease in a plant that is at risk of being diseased from the pathogen comprising contacting the plant or an area adjacent to the plant with a composition including compound I.

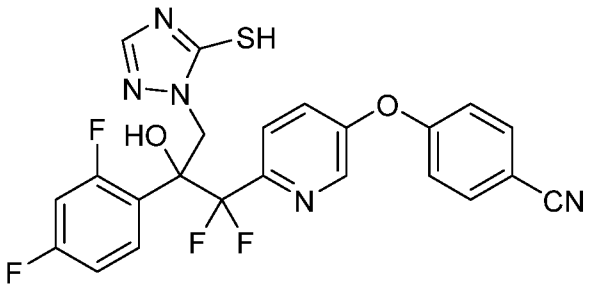
[0006] Another embodiment of the present disclosure is a use of compound I for protection of a plant against attack by a phytopathogenic organism or the treatment of a plant infested by a phytopathogenic organism, comprising the application of compound I, or a composition including compound I to soil, a plant, a part of a plant, foliage, and/or seeds.

[0007] Additionally, another embodiment of the present disclosure is a

composition useful for protecting a plant against attack by a phytopathogenic organism and/or treatment of a plant infested by a phytopathogenic organism comprising compound I and a phytologically acceptable carrier material.

DETAILED DESCRIPTION

[0008] One exemplary embodiment of the present disclosure includes mixture for controlling the growth of fungi, the mixture including compound I:



Compound I

[0009] Compound I of the present disclosure may be applied by any of a variety of known techniques, either as compound I or as formulations comprising compound I. For example, compound I may be applied to the roots, seeds, stems, flowers, or foliage of plants for the control of various fungi, without damaging the commercial value of the plants. Compound I may also be applied as a foliar spray, soil drench, soil injection, seed treatment or water application in aquaculture and floating nursery trays. The material may be applied in the form of any of the generally used formulation types, for example, as solutions, dusts, wettable powders, flowable concentrates, or emulsifiable concentrates.

[0010] Preferably, compound I of the present disclosure is applied in the form of a formulation, including compound I with a phytologically acceptable carrier. Concentrated formulations may be dispersed in water or other liquids for application, or formulations may be dust-like or granular, which may then be applied without further treatment. The formulations can be prepared according to procedures that are conventional in the agricultural chemical art.

[0011] The present disclosure contemplates all vehicles by which compound I may be formulated for delivery and use as a fungicide. Typically, formulations are applied as aqueous suspensions or emulsions. Such suspensions or emulsions may be

produced from water-soluble, water-suspendible, or emulsifiable formulations which are solids, usually known as wettable powders; or liquids, usually known as emulsifiable concentrates, aqueous suspensions, or suspension concentrates. As will be readily appreciated, any material to which compound I may be added may be used, provided it yields the desired utility without significant interference with the activity of compound I as an antifungal agent.

[0012] Wettable powders, which may be compacted to form water-dispersible granules, comprise an intimate mixture including compound I, an inert carrier and surfactants. The concentration of compound I in the wettable powder may be from about 10 percent to about 90 percent by weight based on the total weight of the wettable powder, more preferably about 25 weight percent to about 75 weight percent. In the preparation of wettable powder formulations, compound I may be compounded with any finely divided solid, such as prophyllite, talc, chalk, gypsum, Fuller's earth, bentonite, attapulgite, starch, casein, gluten, montmorillonite clays, diatomaceous earths, purified silicates or the like. In such operations, the finely divided carrier and surfactants are typically blended with compound I and milled.

[0013] Emulsifiable concentrates of compound I may comprise a convenient concentration, such as from about 10 weight percent to about 50 weight percent of compound I, in a suitable liquid, based on the total weight of the concentrate. Compound I may be dissolved in an inert carrier, which is either a water-miscible solvent or a mixture of water-immiscible organic solvents, and emulsifiers. The concentrates may be diluted with water and oil to form spray mixtures in the form of oil-in-water emulsions. Useful organic solvents include aromatics, especially the high-boiling naphthalenic and olefinic portions of petroleum, such as heavy aromatic naphtha. Other organic solvents may also be used, for example, terpenic solvents, including rosin derivatives, aliphatic ketones, such as cyclohexanone, and complex alcohols, such as 2-ethoxyethanol.

[0014] Emulsifiers which may be advantageously employed herein may be readily determined by those skilled in the art and include various nonionic, anionic, cationic and amphoteric emulsifiers, or a blend of two or more emulsifiers. Examples of nonionic emulsifiers useful in preparing the emulsifiable concentrates include the polyalkylene glycol ethers and condensation products of alkyl and aryl phenols, aliphatic alcohols, aliphatic amines or fatty acids with ethylene oxide, propylene

oxides such as the ethoxylated alkyl phenols and carboxylic esters solubilized with the polyol or polyoxyalkylene. Cationic emulsifiers include quaternary ammonium compounds and fatty amine salts. Anionic emulsifiers include the oil-soluble salts (e.g., calcium) of alkylaryl sulphonic acids, oil-soluble salts or sulfated polyglycol ethers and appropriate salts of phosphated polyglycol ether.

[0015] Representative organic liquids which may be employed in preparing the emulsifiable concentrates of compound I of the present invention are the aromatic liquids such as xylene, propyl benzene fractions; or mixed naphthalene fractions, mineral oils, substituted aromatic organic liquids such as dioctyl phthalate; kerosene; dialkyl amides of various fatty acids, particularly the dimethyl amides of fatty glycols and glycol derivatives such as the *n*-butyl ether, ethyl ether or methyl ether of diethylene glycol, and the methyl ether of triethylene glycol and the like. Mixtures of two or more organic liquids may also be employed in the preparation of the emulsifiable concentrate. Organic liquids include xylene, and propyl benzene fractions, with xylene being most preferred in some cases. Surface-active dispersing agents are typically employed in liquid formulations and in an amount of from 0.1 to 20 percent by weight based on the combined weight of the dispersing agent with compound I. The formulations can also contain other compatible additives, for example, plant growth regulators and other biologically active compounds used in agriculture.

[0016] Aqueous suspensions including compound I may be dispersed in an aqueous vehicle at a concentration in the range from about 5 to about 50 weight percent, based on the total weight of the aqueous suspension. Suspensions are prepared by finely grinding compound I, and vigorously mixing the ground material into a vehicle comprised of water and surfactants chosen from the same types discussed above. Other components, such as inorganic salts and synthetic or natural gums, may also be added to increase the density and viscosity of the aqueous vehicle.

[0017] Compound I may also be applied as a granular formulation, which is particularly useful for applications to the soil. Granular formulations generally contain from about 0.5 to about 10 weight percent, based on the total weight of the granular formulation of compound I, dispersed in an inert carrier which consists entirely or in large part of coarsely divided inert material such as attapulgite, bentonite, diatomite, clay or a similar inexpensive substance. Such formulations are

usually prepared by dissolving compound I in a suitable solvent and applying it to a granular carrier which has been preformed to the appropriate particle size, in the range of from about 0.5 to about 3 mm. A suitable solvent is a solvent in which compound I is substantially or completely soluble. Such formulations may also be prepared by making a dough or paste of the carrier and compound I and solvent, and crushing and drying to obtain the desired granular particle.

[0018] Dusts containing compound I may be prepared by intimately mixing compound I in powdered form with a suitable dusty agricultural carrier, such as, for example, kaolin clay, ground volcanic rock, and the like. Dusts can suitably contain from about 1 to about 10 weight percent of compound I, based on the total weight of the dust.

[0019] The formulations may additionally contain adjuvant surfactants to enhance deposition, wetting and penetration of compound I onto the target crop and organism. These adjuvant surfactants may optionally be employed as a component of the formulation or as a tank mix. The amount of adjuvant surfactant will typically vary from 0.01 to 1.0 percent by volume, based on a spray-volume of water, preferably 0.05 to 0.5 volume percent. Suitable adjuvant surfactants include, but are not limited to ethoxylated nonyl phenols, ethoxylated synthetic or natural alcohols, salts of the esters or sulphosuccinic acids, ethoxylated organosilicones, ethoxylated fatty amines and blends of surfactants with mineral or vegetable oils. The formulations may also include oil-in-water emulsions such as those disclosed in U.S. Patent Application Serial No. 11/495,228, the disclosure of which is expressly incorporated by reference herein.

[0020] The formulations may optionally include combinations that contain other pesticidal compounds. Such additional pesticidal compounds may be fungicides, insecticides, herbicides, nematocides, miticides, arthropodicides, bactericides or combinations thereof that are compatible with the compounds of the present invention in the medium selected for application, and not antagonistic to the activity of the present compounds. Accordingly, in such embodiments, the other pesticidal compound is employed as a supplemental toxicant for the same or for a different pesticidal use. Compound I and the pesticidal compound in the combination can generally be present in a weight ratio of from 1:100 to100:1.

[0021] Compound I of the present disclosure may also be combined with other

fungicides to form fungicidal mixtures and synergistic mixtures thereof. Compound I of the present disclosure is often applied in conjunction with one or more other fungicides to control a wider variety of undesirable diseases. When used in conjunction with other fungicide(s), the presently claimed compound I may be formulated with the other fungicide(s), tank-mixed with the other fungicide(s) or applied sequentially with the other fungicide(s). Such other fungicides may include 2-(thiocyanatomethylthio)-benzothiazole, 2-phenylphenol, 8-hydroxyquinoline sulfate, ametoctradin, amisulbrom, antimycin, *Ampelomyces quisqualis*, azaconazole, azoxystrobin, *Bacillus subtilis*, *Bacillus subtilis* strain QST713, benalaxyl, benomyl, benthiavalicarb-isopropyl, benzylaminobenzene-sulfonate (BABS) salt, bicarbonates, biphenyl, bismerthiazol, bitertanol, bixafen, blasticidin-S, borax, Bordeaux mixture, boscalid, bromuconazole, bupirimate, calcium polysulfide, captafol, captan, carbendazim, carboxin, carpropamid, carvone, chlazafenone, chloroneb, chlorothalonil, chlozolinate, *Coniothyrium minitans*, copper hydroxide, copper octanoate, copper oxychloride, copper sulfate, copper sulfate (tribasic), cuprous oxide, cyazofamid, cyflufenamid, cymoxanil, cyproconazole, cyprodinil, dazomet, debacarb, diammonium ethylenebis-(dithiocarbamate), dichlofluanid, dichlorophen, diclocymet, diclomezine, dichloran, diethofencarb, difenoconazole, difenzoquat ion, diflumetorim, dimethomorph, dimoxystrobin, diniconazole, diniconazole-M, dinobuton, dinocap, diphenylamine, dithianon, dodemorph, dodemorph acetate, dodine, dodine free base, edifenphos, enestrobin, enestroburin, epoxiconazole, ethaboxam, ethoxyquin, etridiazole, famoxadone, fenamidone, fenarimol, fenbuconazole, fenfuram, fenhexamid, fenoxanil, fenpiclonil, fenpropidin, fenpropimorph, fenpyrazamine, fentin, fentin acetate, fentin hydroxide, ferbam, ferimzone, fluazinam, fludioxonil, fluindapyr, flumorph, fluopicolide, fluopyram, fluoroimide, fluoxastrobin, fluquinconazole, flusilazole, flusulfamide, flutianil, flutolanil, flutriafol, fluxapyroxad, folpet, formaldehyde, fosetyl, fosetyl-aluminium, fuberidazole, furalaxyl, furametpyr, guazatine, guazatine acetates, GY-81, hexachlorobenzene, hexaconazole, hymexazol, imazalil, imazalil sulfate, imibenconazole, iminoctadine, iminoctadine triacetate, iminoctadine tris(albesilate), iodocarb, ipconazole, ipfenpyrazolone, iprobenfos, iprodione, iprovalicarb, isofetamide, isoprothiolane, isopyrazam, isotianil, kasugamycin, kasugamycin hydrochloride hydrate, kresoxim-methyl, laminarin, mancopper, mancozeb, mandipropamid, maneb, mefenoxam,

mepanipyrim, mepronil, meptyl-dinocap, mercuric chloride, mercuric oxide, mercurous chloride, metalaxyl, metalaxyl-M, metam, metam-ammonium, metam-potassium, metam-sodium, metconazole, methasulfocarb, methyl iodide, methyl isothiocyanate, metiram, metominostrobin, metrafenone, mildiomycin, myclobutanil, nabam, nitrothal-isopropyl, nuarimol, octhilinone, ofurace, oleic acid (fatty acids), orysastrobin, oxadixyl, oxathiapiprolin, oxine-copper, oxpoconazole fumarate, oxycarboxin, pefurazoate, penconazole, pencycuron, penflufen, pentachlorophenol, pentachlorophenyl laurate, penthiopyrad, phenylmercury acetate, phosphonic acid, phthalide, picoxystrobin, polyoxin B, polyoxins, polyoxorim, potassium bicarbonate, potassium hydroxyquinoline sulfate, probenazole, prochloraz, procymidone, propamocarb, propamocarb hydrochloride, propiconazole, propineb, proquinazid, prothioconazole, pydiflumeton, pyraclostrobin, pyrametostrobin, pyraoxystrobin, pyraziflumid, pyrazophos, pyribencarb, pyributicarb, pyrifenox, pyrimethanil, pyriofenone, pyroquilon, quinoclamine, quinoxyfen, quintozene, *Reynoutria sachalinensis* extract, sedaxane, silthiofam, simeconazole, sodium 2-phenylphenoxide, sodium bicarbonate, sodium pentachlorophenoxide, spiroxamine, sulfur, SYP-Z048, tar oils, tebuconazole, tebufloquin, tecnazene, tetraconazole, thiabendazole, thifluzamide, thiophanate-methyl, thiram, tiadinil, tolclofos-methyl, tolylfluanid, triadimefon, triadimenol, triazoxide, tricyclazole, tridemorph, trifloxystrobin, triflumizole, triforine, triticonazole, validamycin, valifenalate, valiphenal, vinclozolin, zineb, ziram, zoxamide, *Candida oleophila*, *Fusarium oxysporum*, *Gliocladium* spp., *Phlebiopsis gigantea*, *Streptomyces griseoviridis*, *Trichoderma* spp., (*RS*)-*N*-(3,5-dichlorophenyl)-2-(methoxymethyl)-succinimide, 1,2-dichloropropane, 1,3-dichloro-1,1,3,3-tetrafluoroacetone hydrate, 1-chloro-2,4-dinitronaphthalene, 1-chloro-2-nitropropane, 2-(2-heptadecyl-2-imidazolin-1-yl)ethanol, 2,3-dihydro-5-phenyl-1,4-dithi-ine 1,1,4,4-tetraoxide, 2-methoxyethylmercury acetate, 2-methoxyethylmercury chloride, 2-methoxyethylmercury silicate, 3-(4-chlorophenyl)-5-methylrhodanine, 4-(2-nitroprop-1-enyl)phenyl thiocyanateme, ampropylfos, anilazine, azithiram, barium polysulfide, Bayer 32394, benodanil, benquinox, bentaluron, benzamacril; benzamacril-isobutyl, benzamorf, benzovindiflupyr, binapacryl, bis(methylmercury) sulfate, bis(tributyltin) oxide, buthiobate, cadmium calcium copper zinc chromate sulfate, carbamorph, CECA, chlobenthiazone, chloraniformethan, chlorfenazole, chlorquinox, climbazole,

copper bis(3-phenylsalicylate), copper zinc chromate, coumoxystrobin, cufraneb, cupric hydrazinium sulfate, cuprobam, cyclafuramid, cypendazole, cyprofuram, decafentin, dichlobentiazox, dichlone, dichlozoline, diclobutrazol, dimethirimol, dinocton, dinosulfon, dinoterbon, dipymetitrone, dipyrithione, ditalimfos, dodicin, drazoxolon, EBP, enoxastrobin, ESBP, etaconazole, etem, ethirim, fenaminosulf, fenaminstrobin, fenapanil, fenitropan, fenpicoxamid, fluotrimazole, flufenoxystrobin, furcarbanil, furconazole, furconazole-cis, furmecyclox, furophanate, glyodine, griseofulvin, halacrinate, Hercules 3944, hexylthiofos, ICIA0858, ipfentrifluconazole, isofetamid, isopamphos, isovaledione, mandestrobin, mebenil, mecarbinzid, mefentrifluconazole, metazoxolon, methfuroxam, methylmercury dicyandiamide, metsulfovax, milneb, mucochloric anhydride, myclozolin, *N*-3,5-dichlorophenyl-succinimide, *N*-3-nitrophenylitaconimide, natamycin, *N*-ethylmercurio-4-toluenesulfonanilide, nickel bis(dimethyldithiocarbamate), OCH, oxathiapiprolin, phenylmercury dimethyldithiocarbamate, phenylmercury nitrate, phosdiphen, prothiocarb; prothiocarb hydrochloride, pydiflumetofen, pyracarbolid, pyraziflumid, pyridinitril, pyrisoxazole, pyroxychlor, pyroxyfur, quinacetol, quinacetol sulfate, quinazamid, quinconazole, quinofumelin, rabenzazole, salicylanilide, SSF-109, sultropen, tecoram, thiadifluor, thicyofen, thiochlorfenphim, thiophanate, thioquinox, tioxymid, triamiphos, triarimol, triazbutil, trichlamide, triclopyricarb, triflumezopyrim, urbacid, zarilamid, and any combinations thereof.

[0022] Additionally, compound I of the present invention may be combined with other pesticides, including insecticides, nematicides, miticides, arthropodicides, bactericides or combinations thereof that are compatible with compound I of the present invention in the medium selected for application, and not antagonistic to the activity of compound I, to form pesticidal mixtures and synergistic mixtures thereof. Compound I of the present disclosure may be applied in conjunction with one or more other pesticides to control a wider variety of undesirable pests. When used in conjunction with other pesticides, the presently claimed compound I may be formulated with the other pesticide(s), tank mixed with the other pesticide(s) or applied sequentially with the other pesticide(s). Typical insecticides include, but are not limited to: 1,2-dichloropropane, abamectin, acephate, acetamiprid, acethion, acetoprole, acrinathrin, acrylonitrile, alanycarb, aldicarb, aldoxycarb, aldrin, allethrin, allosamidin, allyxycarb, alpha-cypermethrin, alpha-ecdysone, alpha-endosulfan,

amidithion, aminocarb, amiton, amiton oxalate, amitraz, anabasine, athidathion, azadirachtin, azamethiphos, azinphos-ethyl, azinphos-methyl, azothoate, barium hexafluorosilicate, barthrin, bendiocarb, benfuracarb, bensultap, beta-cyfluthrin, beta-cypermethrin, bifenthrin, bioallethrin, bioethanomethrin, biopermethrin, bistrifluron, borax, boric acid, bromfenvinfos, bromocyclen, bromo-DDT, bromophos, bromophos-ethyl, bufencarb, buprofezin, butacarb, butathiofos, butocarboxim, butonate, butoxycarboxim, cadusafos, calcium arsenate, calcium polysulfide, camphechlor, carbanolate, carbaryl, carbofuran, carbon disulfide, carbon tetrachloride, carbophenothion, carbosulfan, cartap, cartap hydrochloride, chlorantraniliprole, chlorbicyclen, chlordane, chlordecone, chlordimeform, chlordimeform hydrochloride, chlorethoxyfos, chlorfenapyr, chlorfenvinphos, chlorfluazuron, chlormephos, chloroform, chloropicrin, chlorphoxim, chlorprazophos, chlorpyrifos, chlorpyrifos-methyl, chlorthiophos, chromafenozide, cinerin I, cinerin II, cinerins, cismethrin, cloethocarb, closantel, clothianidin, copper acetoarsenite, copper arsenate, copper naphthenate, copper oleate, coumaphos, coumithoate, crotamiton, crotoxyphos, crufomate, cryolite, cyanofenphos, cyanophos, cyanthoate, cyantraniliprole, cyclethrin, cycloprothrin, cyfluthrin, cyhalothrin, cypermethrin, cyphenothrin, cyromazine, cythioate, DDT, decarbofuran, deltamethrin, demephion, demephion-O, demephion-S, demeton, demeton-methyl, demeton-O, demeton-O-methyl, demeton-S, demeton-S-methyl, demeton-S-methylsulphon, diafenthiuron, dialifos, diatomaceous earth, diazinon, dicapthon, dichlofenthion, dichlorvos, dicresyl, dicrotophos, dicyclanil, dieldrin, diflubenzuron, dilor, dimefluthrin, dimefox, dimetan, dimethoate, dimethrin, dimethylvinphos, dimetilan, dinex, dinex-diclexine, dinoprop, dinosam, dinotefuran, diofenolan, dioxabenzofos, dioxacarb, dioxathion, disulfoton, dithicrofos, d-limonene, DNOC, DNOC-ammonium, DNOC-potassium, DNOC-sodium, doramectin, ecdysterone, emamectin, emamectin benzoate, EMPC, empenthrin, endosulfan, endothion, endrin, EPN, epofenonane, eprinomectin, esdepalléthrine, esfenvalerate, etaphos, ethiofencarb, ethion, ethiprole, ethoate-methyl, ethoprophos, ethyl formate, ethyl-DDD, ethylene dibromide, ethylene dichloride, ethylene oxide, etofenprox, etrimfos, EXD, famphur, fenamiphos, fenazaflor, fenchlorphos, fenethacarb, fenfluthrin, fenitrothion, fenobucarb, fenoxacrim, fenoxycarb, fenpirithrin, fenpropathrin, fensulfothion, fenthion, fenthion-ethyl, fenvalerate, fipronil, flonicamid, flubendiamide, flucofuron, flucycloxuron,

flucythrinate, flufenerim, flufenoxuron, flufenprox, fluvalinate, fonofos, formetanate, formetanate hydrochloride, formothion, formparanate, formparanate hydrochloride, fosmethilan, fospirate, fosthietan, furathiocarb, furethrin, gamma-cyhalothrin, gamma-HCH, halfenprox, halofenozide, HCH, HEOD, heptachlor, heptenophos, heterophos, hexaflumuron, HHDN, hydramethylnon, hydrogen cyanide, hydroprene, hyquincarb, imidacloprid, imiprothrin, indoxacarb, iodomethane, IPSP, isazofos, isobenzan, isocarbophos, isodrin, isofenphos, isofenphos-methyl, isoprocarb, isoprothiolane, isothioate, isoxathion, ivermectin, jasmolin I, jasmolin II, jodfenphos, juvenile hormone I, juvenile hormone II, juvenile hormone III, kelevan, kinoprene, lambda-cyhalothrin, lead arsenate, lepimectin, leptophos, lindane, lirimfos, lufenuron, lythidathion, malathion, malonoben, mazidox, mecarbam, mecarphon, menazon, mephosfolan, mercurous chloride, mesulfenfos, metaflumizone, methacrifos, methamidophos, methidathion, methiocarb, methocrotophos, methomyl, methoprene, methoxychlor, methoxyfenozide, methyl bromide, methyl isothiocyanate, methylchloroform, methylene chloride, metofluthrin, metolcarb, metoxadiazone, mevinphos, mexacarbate, milbemectin, milbemycin oxime, mipafox, mirex, molosultap, monocrotophos, monomehypo, monosultap, morphothion, moxidectin, naftalofos, naled, naphthalene, nicotine, nifluridide, nitenpyram, nithiazine, nitrilacarb, novaluron, noviflumuron, omethoate, oxamyl, oxydemeton-methyl, oxydeprofos, oxydisulfoton, para-dichlorobenzene, parathion, parathion-methyl, penfluron, pentachlorophenol, permethrin, phenkapton, phenothrin, phenthoate, phorate, phosalone, phosfolan, phosmet, phosnichlor, phosphamidon, phosphine, phoxim, phoxim-methyl, pirimetaphos, pirimicarb, pirimiphos-ethyl, pirimiphos-methyl, potassium arsenite, potassium thiocyanate, pp'-DDT, prallethrin, precocene I, precocene II, precocene III, primidophos, profenofos, profluralin, promacyl, promecarb, propaphos, propetamphos, propoxur, prothidathion, prothiofos, prothoate, protrifenbute, pyraclofos, pyrafluprole, pyrazophos, pyresmethrin, pyrethrin I, pyrethrin II, pyrethrins, pyridaben, pyridalyl, pyridaphenthion, pyrifluquinazon, pyrimidifen, pyrimitate, pyriprole, pyriproxyfen, quassia, quinalphos, quinalphos-methyl, quinothion, rafoxanide, resmethrin, rotenone, ryania, sabadilla, schradan, selamectin, silafluofen, silica gel, sodium arsenite, sodium fluoride, sodium hexafluorosilicate, sodium thiocyanate, sophamide, spinetoram, spinosad, spiromesifen, spirotetramat, sulcofuron, sulcofuron-sodium, sulfluramid, sulfotep,

sulfoxaflor, sulfuryl fluoride, sulprofos, tau-fluvalinate, tazimcarb, TDE, tebufenozide, tebufenpyrad, tebupirimfos, teflubenzuron, tefluthrin, temephos, TEPP, terallethrin, terbufos, tetrachloroethane, tetrachlorvinphos, tetramethrin, tetramethylfluthrin, theta-cypermethrin, thiacloprid, thiamethoxam, thicrofos, thiocarboxime, thiocyclam, thiocyclam oxalate, thiodicarb, thiofanox, thiometon, thiosultap, thiosultap-disodium, thiosultap-monosodium, thuringiensin, tolfenpyrad, tralomethrin, transfluthrin, transpermethrin, triarathene, triazamate, triazophos, trichlorfon, trichlormetaphos-3, trichloronat, trifenofos, triflumuron, trimethacarb, triprene, vamidothion, vaniliprole, XMC, xylylcarb, zeta-cypermethrin, zolaprofos, and any combinations thereof.

[0023] Additionally, compound I of the present invention may be combined with herbicides that are compatible with compound I of the present invention in the medium selected for application, and not antagonistic to the activity of compound I to form pesticidal mixtures and synergistic mixtures thereof. The fungicidal compound I of the present disclosure may be applied in conjunction with one or more herbicides to control a wide variety of undesirable plants. When used in conjunction with herbicides, the presently claimed compound I may be formulated with the herbicide(s), tank mixed with the herbicide(s) or applied sequentially with the herbicide(s). Typical herbicides include, but are not limited to: 4-CPA; 4-CPB; 4-CPP; 2,4-D; 3,4-DA; 2,4-DB; 3,4-DB; 2,4-DEB; 2,4-DEP; 3,4-DP; 2,3,6-TBA; 2,4,5-T; 2,4,5-TB; acetochlor, acifluorfen, aclonifen, acrolein, alachlor, allidochlor, alloxydim, allyl alcohol, alorac, ametridione, ametryn, amibuzin, amicarbazone, amidosulfuron, aminocyclopyrachlor, aminopyralid, amiprofos-methyl, amitrole, ammonium sulfamate, anilofos, anisuron, asulam, atraton, atrazine, azafenidin, azimsulfuron, aziprotryne, barban, BCPC, beflubutamid, benazolin, bencarbazone, benfluralin, benfuresate, bensulfuron, bensulide, bentazone, benzadox, benzfendizone, benzipram, benzobicyclon, benzofenap, benzofluor, benzoylprop, benzthiazuron, bicyclopyrone, bifenox, bilanafos, bispyribac, borax, bromacil, bromobonil, bromobutide, bromofenoxim, bromoxynil, brompyrazon, butachlor, butafenacil, butamifos, butenachlor, buthidazole, buthiuron, butralin, butroxydim, buturon, butylate, cacodylic acid, cafenstrole, calcium chlorate, calcium cyanamide, cambendichlor, carbasulam, carbetamide, carboxazole chlorprocarb, carfentrazone, CDEA, CEPC, chlomethoxyfen, chloramben, chloranocryl, chlorazifop, chlorazine,

chlorbromuron, chlorbufam, chloreturon, chlorfenac, chlorfenprop, chlorflurazole, chlorflurenol, chloridazon, chlorimuron, chlornitrofen, chloropon, chlorotoluron, chloroxuron, chloroxynil, chlorpropham, chlorsulfuron, chlorthal, chlorthiamid, cinidon-ethyl, cinmethylin, cinosulfuron, cisanilide, clethodim, cliodinate, clodinafop, clofop, clomazone, clomeprop, cloprop, cloproxydim, clopyralid, cloransulam, CMA, copper sulfate, CPMF, CPPC, credazine, cresol, cumyluron, cyanatryn, cyanazine, cycloate, cyclosulfamuron, cycloxydim, cycluron, cyhalofop, cyperquat, cyprazine, cyprazole, cypromid, daimuron, dalapon, dazomet, delachlor, desmedipham, desmetryn, di-allate, dicamba, dichlobenil, dichloralurea, dichlormate, dichlorprop, dichlorprop-P, diclofop, diclosulam, diethamquat, diethatyl, difenopenten, difenoxuron, difenzoquat, diflufenican, diflufenzopyr, dimefuron, dimepiperate, dimethachlor, dimethametryn, dimethenamid, dimethenamid-P, dimexano, dimidazon, dinitramine, dinofenate, dinoprop, dinosam, dinoseb, dinoterb, diphenamid, dipropetryn, diquat, disul, dithiopyr, diuron, DMPA, DNOC, DSMA, EBEP, eglinazine, endothal, epronaz, EPTC, erbon, esprocarb, ethalfluralin, ethametsulfuron, ethidimuron, ethiolate, ethofumesate, ethoxyfen, ethoxysulfuron, etinofen, etnipromid, etobenzanid, EXD, fenasulam, fenoprop, fenoxaprop, fenoxaprop-P, fenoxasulfone, fenteracol, fenthiaprop, fentrazamide, fenuron, ferrous sulfate, flamprop, flamprop-M, flazasulfuron, florasulam, fluazifop, fluazifop-P, fluazolate, flucarbazone, flucetosulfuron, fluchloralin, flufenacet, flufenican, flufenpyr, flumetsulam, flumezin, flumiclorac, flumioxazin, flumipropyn, fluometuron, fluorodifen, fluoroglycofen, fluoromidine, fluoronitrofen, fluothiuron, flupoxam, flupropacil, flupropanate, flupyrsulfuron, fluridone, flurochloridone, fluroxypyr, flurtamone, fluthiacet, fomesafen, foramsulfuron, fosamine, furyloxyfen, glufosinate, glufosinate-P, glyphosate, halosafen, halosulfuron, haloxydine, haloxyfop, haloxyfop-P, hexachloroacetone, hexaflurate, hexazinone, imazamethabenz, imazamox, imazapic, imazapyr, imazaquin, imazethapyr, imazosulfuron, indanofan, indaziflam, iodobonil, iodomethane, iodosulfuron, ioxynil, ipazine, ipfencarbazone, iprymidam, isocarbamid, isocil, isomethiozin, isonoruron, isopolinate, isopropalin, isoproturon, isouron, isoxaben, isoxachlortole, isoxaflutole, isoxapyrifop, karbutilate, ketospiradox, lactofen, lenacil, linuron, MAA, MAMA, MCPA, MCPA-thioethyl, MCPB, mecoprop, mecoprop-P, medinoterb, mefenacet, mefluidide, mesoprazine, mesosulfuron, mesotrione, metam, metamifop, metamitron, metazachlor,

metazosulfuron, metflurazon, methabenzthiazuron, methalpropalin, methazole, methiobencarb, methiozolin, methiuron, methometon, methoprotryne, methyl bromide, methyl isothiocyanate, methyldymron, metobenzuron, metobromuron, metolachlor, metosulam, metoxuron, metribuzin, metsulfuron, molinate, monalide, monisouron, monochloroacetic acid, monolinuron, monuron, morfamquat, MSMA, naproanilide, napropamide, naptalam, neburon, nicosulfuron, nipyraclofen, nitralin, nitrofen, nitrofluorfen, norflurazon, noruron, OCH, orbencarb, *ortho*-dichlorobenzene, orthosulfamuron, oryzalin, oxadiargyl, oxadiazon, oxapyrazon, oxasulfuron, oxaziclomefone, oxyfluorfen, parafluron, paraquat, pebulate, pelargonic acid, pendimethalin, penoxsulam, pentachlorophenol, pentanochlor, pentoxazone, perfluidone, pethoxamid, phenisopham, phenmedipham, phenmedipham-ethyl, phenobenzuron, phenylmercury acetate, picloram, picolinafen, pinoxaden, piperophos, potassium arsenite, potassium azide, potassium cyanate, pretilachlor, primisulfuron, procyazine, prodiamine, profluazol, profluralin, profoxydim, proglinazine, prometon, prometryn, propachlor, propanil, propaquizafop, propazine, propham, propisochlor, propoxycarbazone, propyrisulfuron, propyzamide, prosulfalin, prosulfocarb, prosulfuron, proxan, prynachlor, pydanon, pyraclonil, pyraflufen, pyrasulfotole, pyrazolynate, pyrazosulfuron, pyrazoxyfen, pyribenzoxim, pyributicarb, pyriclor, pyridafol, pyridate, pyriftalid, pyriminobac, pyrimisulfan, pyrithiobac, pyroxasulfone, pyroxsulam, quinclorac, quinmerac, quinoclamine, quinonamid, quizalofop, quizalofop-P, rhodethanil, rimsulfuron, saflufenacil, S-metolachlor, sebuthylazine, secbumeton, sethoxydim, siduron, simazine, simeton, simetryn, SMA, sodium arsenite, sodium azide, sodium chlorate, sulcotrione, sulfallate, sulfentrazone, sulfometuron, sulfosulfuron, sulfuric acid, sulglycapin, swep, TCA, tebutam, tebuthiuron, tefuryltrione, tembotrione, tepraloxydim, terbacil, terbucarb, terbuchlor, terbumeton, terbuthylazine, terbutryn, tetrafluron, thenylchlor, thiazafluron, thiazopyr, thidiazimin, thidiazuron, thiencarbazone-methyl, thifensulfuron, thiobencarb, tiocarbazil, tioclorim, topramezone, tralkoxydim, triafamone, tri-allate, triasulfuron, triaziflam, tribenuron, tricamba, triclopyr, tridiphane, trietazine, trifloxysulfuron, trifluralin, triflusulfuron, trifop, trifopsime, trihydroxytriazine, trimeturon, tripropindan, tritac, tritosulfuron, vernolate, and xylachlor.

[0024] One embodiment of the present disclosure is a method for the control

or prevention of fungal attack. This method comprises applying to the soil, plant, roots, foliage, seed or locus of the fungus, or to a locus in which the infestation is to be prevented (for example applying to cereal or rice plants), a fungicidal effective amount of compound I. Compound I is suitable for treatment of various plants at fungicidal levels, while exhibiting low phytotoxicity. Compound I may be useful both in a protectant and/or an eradicant fashion.

[0025] Compound I has been found to have significant fungicidal effects on phytopathogenic fungi of rice. These diseases include, but are not limited to, *Pyricularia oryzae*, which causes rice blast; *Rhizoctonia solani*, which causes sheath blight of rice; *Cochliobolus miyabeanus*, which causes brown spot of rice; and *Gaeumannomyces graminis* var. *graminis*, which causes crown sheath rot of rice; particularly for agricultural use. Compound I is particularly effective for use with agricultural crops and horticultural plants.

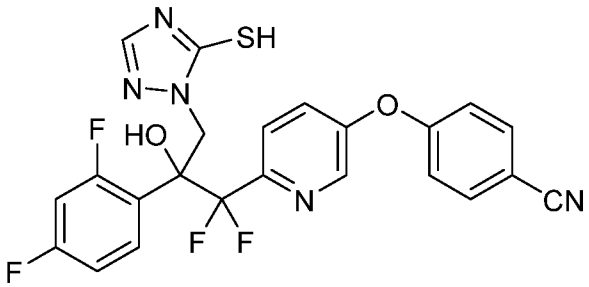
[0026] It will be understood by those in the art that the efficacy of the compound for the foregoing fungi establishes the general utility of compound I as a fungicide. In particular, the composition is effective in controlling a variety of undesirable fungi that infect useful plant crops. The composition maybe used against a variety of *Ascomycete* and *Basidiomycete* fungi, including for example the following representative fungi species: Aggregate sheath spot (*Ceratobasidium oryzae-sativae*, *Rhizoctonia oryzae-sativae*) black kernel (*Curvularia lunata*, *Cochliobolus lunatus*) blast, leaf, neck, nodal and collar (*Pyricularia grisea*, *Pyricularia oryzae*, *Magnaporthe grisea*), brown spot (*Cochliobolus miyabeanus*, *Bipolaris oryzae*), crown sheath rot (*Gaeumannomyces graminis*), eyespot (*Drechslera gigantea*), smuts (*Ustilaginoidea virens*, *Tilletia barclayana*, *Neovossia horrida*, *Entyloma oryzae*), leaf scald (*Microdochium oryzae*, *Rhynchosporium oryzae*), narrow brown leaf spot (*Cercospora janseana*, *Cercospora oryzae*, *Sphaerulina oryzina*), pecky rice, kernel spotting (*Cochliobolus miyabeanus*, *Curvularia* spp., *Fusarium* spp., *Microdochium oryzae*, *Sarocladium oryzae*), root rots (*Fusarium* spp.), seedling blight (*Cochliobolus miyabeanus*, *Curvularia* spp., *Fusarium* spp., *Rhizoctonia solani*, *Sclerotium rolfsii*, *Athelia rolfsii*), sheath blight (*Thanatephorus cucumeris*, *Rhizoctonia solani*), sheath rot (*Sarocladium oryzae*, *Acrocylindrium oryzae*), sheath spot (*Rhizoctonia oryzae*), Stackburn, Alternaria leaf spot (*Alternaria padwickii*) and stem rot (*Magnaporthe salvinii*, *Sclerotium oryzae*).

[0027] Compound I has a broad range of efficacy as a fungicide. The exact amount of the active material to be applied is dependent not only on the specific active material being applied, but also on the particular action desired, the fungal species to be controlled, and the stage of growth thereof, as well as the part of the plant or other product to be contacted with the compound. Thus, compound I, and formulations containing the same, may not be equally effective at similar concentrations or against the same fungal species.

[0028] Compound I is effective in use with plants in a disease-inhibiting and phytologically acceptable amount. The term "disease-inhibiting and phytologically acceptable amount" refers to an amount of a compound that kills or inhibits the plant disease for which control is desired, but is not significantly toxic to the plant. This amount will generally be from about 0.1 to about 1000 ppm (parts per million), with 1 to 500 ppm being preferred. The exact concentration of compound required varies with the fungal disease to be controlled, the type of formulation employed, the method of application, the particular plant species, climate conditions, and the like. A suitable application rate is typically in the range from about 0.10 to about 4 pounds/acre (about 0.01 to 0.45 grams per square meter, g/m^2).

[0029] Any range or desired value given herein may be extended or altered without losing the effects sought, as is apparent to the skilled person for an understanding of the teachings herein.

Examples:



Compound I

Field assessment of *Pyricularia oryzae* (PYRIOR) in rice:

[0030] A fungicidal treatment containing an EC formulation of compound I plus an adjuvant (Agnique BP-420, 50% w/w at 0.3% v/v), was sprayed on rice plants (ORYSP) twice at the growth stages 14-15 (29 days after planting) and 15-16 (application B, 7 day interval) at rates of 50, 100, 150 and 200 grams active ingredient

per hectare (g ai/ha). The experimental plots were inoculated with *Pyricularia oryzae* 2 days after the first application at growth stage BBCH 15 of rice. The treatment was part of an experimental trial designed as a randomized complete block with four replications and a plot of approximately 2 x 1 m. Compound I was applied at water volume of 600 L/ha, using a backpack precision plot sprayer (BKPCKAIR, HCWHIRL Nozzle) and pressurized at 30 psi.

[0031] Disease severity was recorded as a percentage of visual diseased foliage on whole plot. Rice blast infection was assessed three times, 7 days after application A (DAAA) plus 7 and 14 DAAB.The disease infection was recorded following EPPO PP1/ 26 guideline prescriptions. Area under the disease progress curve (AUDPC) was calculated for each plot using the sets of recorded severity data. Relative AUDPC (% control based on AUDPC) was calculated as percent of the nontreated control. Results are given in **Table 1**.

Field assessment of *Rhizoctonia solani* (RHIZSO) in rice:

[0032] A fungicidal treatment containing an EC formulation of compound I plus an adjuvant (Agnique BP-420, 50% w/w at 0.3% v/v), was sprayed on rice plants (ORYSP) twice at the growth stages BBCH 59-61 (flowering stage, 71 days after planting) and 61 (application B, 7 day interval) at rates of 50, 100, 150 and 200 grams active ingredient per hectare (g ai/ha). The experimental plots were inoculated with *Rhizoctonia solani* 2 days after the first application at growth stage BBCH 59 of rice. The treatment was part of an experimental trial designed as a randomized complete block with four replications and a plot of approximately 2 x 1 m. Compound I was applied at water volume of 800 L/ha, using a backpack precision plot sprayer (BKPCKAIR, HCWHIRL Nozzle) and pressurized at 30 psi.

[0033] Disease infection percentage was calculated as (lesion lengths)/(total sheath lengths) x 100% on 6 plants per plot randomly. Sheath blight infection was assessed three times, 7 days after application A (DAAA) plus 7 and 14 DAAB. The disease infection was recorded following EPPO PP1/ 26 guideline prescriptions. Area under the disease progress curve (AUDPC) was calculated for each plot using the sets of recorded infection data. Relative AUDPC (% control based on AUDPC) was calculated as percent of the nontreated control. Results are given in **Table 1**.

Field assessment of *Cochliobolus miyabeanus* (COCHMI) in rice:

[0034] A fungicidal treatment containing an EC formulation of compound I plus an adjuvant (Agnique BP-420, 50% w/w), was sprayed twice on rice plants (ORYSA) at 7-day intervals at rates of 50, 75, 100, 125 and 150 grams active ingredient per hectare (g ai/ha) under natural infection of *Cochliobolus miyabeanus*. The applications were made as early curative treatments, with the first application coming at the vegetative stage (50 to 70 DAP; max tillering to booting). The treatments were part of an experimental trial designed as a randomized complete block with four replications and a plot of approximately 5 x 2 m. Compound I was applied at water volume of 150 L/ha, using a backpack precision plot sprayer.

[0035] Disease assessments were made every seven days until three weeks after the second application. Disease severity was recorded as a percentage of visual diseased foliage on whole plot and as a percentage of visual infection on the rice panicles. Area under the disease progress curve (AUDPC) was calculated for each plot using the sets of recorded severity data. Relative AUDPC (% control based on AUDPC) was calculated as percent of the nontreated control. Also included in the study is the effect on efficacy of the addition of two adjuvants at varied rates: Agnique BP-420 (50% w/w) at rates from 0.05% to 0.3%; and Agnique BP-420 (50% w/w) plus MSO (methylated seed oil) at rates from 0.25% to 0.75%. Results are given in **Tables 2** and **3**.

Field assessment of *Gaeumannomyces graminis* var. *graminis* (GAEUGR) in rice:

[0036] A fungicidal treatment containing an EC formulation of compound I plus an adjuvant (Agnique BP-420, 50% w/w), was sprayed three times on rice plants (ORYSA) at 7-day intervals at rates of 100, 150 and 200 grams active ingredient per hectare (g ai/ha) under natural infection of GAEUGR. The applications were made as preventative treatments, with no infection at the time of application. The first symptoms of DAEUGR were observed after three applications. The treatments were part of an experimental trial designed as a randomized complete block with four replications and a plot of approximately 5 x 2 m. Compound I was applied at water volume of 150 L/ha, using a backpack precision plot sprayer.

[0037] Disease assessments were made every seven days until three weeks after the third application. Disease severity was recorded as a percentage of visual disease infection of the basal area (10 tiller per site, 4 sites per plot). Area under the disease progress curve (AUDPC) was calculated for each plot using the sets of recorded severity

data. Relative AUDPC (% control based on AUDPC) was calculated as percent of the nontreated control. Also included in the study is the effect on efficacy of the addition of two adjuvants at varied rates: Agnique BP-420 (50% w/w) at rates from 0.1% to 0.4%; and Agnique BP-420 (50% w/w) plus MSO (methylated seed oil at 0.63% v/v) at rates from 0.5% to 1.5%). Results are given in **Table 4**.

In each of the following Tables the rating scale of percent control based on AUDPC is as follows:

% Control	Rating
76 – 100	A
51 – 75	B
26 – 50	C
1 – 25	D
Not tested	E

Table 1: Efficacy of Compound I against Rice Blast and Sheath Blight of Rice.[a]

	Disease (% Control)	
Rate (g ai/ha)	PYRIOR[b,c]	RHIZSO[c,d]
50	C	D
100	B	C
150	A	C
200	A	B

[a]Percent control based on Area Under Disease Progression Curve (AUDPC)
[b]PYRIOR – rice blast, *Pyricularia oryzae*
[c]Adjuvant – Agnique BP-420 (50% w/w at 0.3% v/v)
[d]RHIZSO – sheath blight of rice, *Rhizoctonia solani*

Table 2: Efficacy of Compound I and Commercial Standards against Brown Spot of Rice Blast (COCHMI, *Cochliobolus miyabeanus*).

Composition[a]	Rate (g ai/ha)[b]	Percent Control[c]	
		Plot	Panicle
Amistar Top[d]	200 +125	B	B
Compound I	150	B	B
Propiconazole	125	B	B
Compound I	125	C	B
Compound I	100	C	C
Compound I	75	C	C
Compound I	50	C	C

[a]Compound I Adjuvant – Agnique BP-420 (50% w/w at 0.3% v/v)
[b]Grams of active ingredient per hectare
[c]Percent control based on Area Under Disease Progression Curve (AUDPC)
[d]Azoxystrobin (200) + difenoconazole (125)

Table 3: Effect of Adjuvants on the Efficacy of Compound I and Commercial Standards against Brown Spot of Rice Blast (COCHMI, *Cochliobolus miyabeanus*).

Composition	Rate[a] (g ai/ha)	Adjuvant (% v/v)[b]	% Control[c]
Compound I	150	A (0.3%)	A
Compound I	100	A (0.2%)	B
Compound I	50	A (0.15%)	B
Compound I	50	B (0.75%)	B
Compound I	50	B (0.5%)	B
Compound I	50	A (0.1%)	B
Compound I	50	A (0.05%)	B
Compound I	50	B (0.25%)	B
Amistar Top[d]	100 + 63	Inex-A (0.15%)	B
Compound I	50	None	C

[a]Grams of active ingredient per hectare
[b]Adjuvant A: Agnique BP-420 (50% w/w); Adjuvant B: Agnique BP-420 (50% w/w) + MSO (methylated seed oil @ 0.63% v/v)
[c]Percent control based on Area Under Disease Progression Curve (AUDPC) of visual infection on the plant
[d]Azoxystrobin (100) + difenoconazole (63)

Table 4: Efficacy of Compound I and Commercial Standards for the Control of GAEUGR (*Gaeumannomyces graminis* var. *graminis*) in Rice.

Composition	Rate[a] (g ai/ha)	Adjuvant (% v/v)[b]	% Control[c]
Compound I	200	A (0.4%)	A
Fenbuconazole	144	Inex-A (0.15%)	B
Compound I	150	A (0.3%)	B
Compound I	100	A (0.2%)	B
Compound I	100	A (0.3%)	B
Compound I	100	B (1.0%)	B
Compound I	100	A (0.1%)	B
Compound I	100	B (0.5%)	B
Compound I	100	B (1.5%)	B
Amistar Top[d]	100 + 63	Inex-A (0.15%)	C
Compound I	100	None	C

[a]Grams of active ingredient per hectare

[b]Adjuvant A: Agnique BP-420 (50% w/w); Adjuvant B: Agnique BP-420 (50% w/w) + MSO (methylated seed oil @ 0.63% v/v)

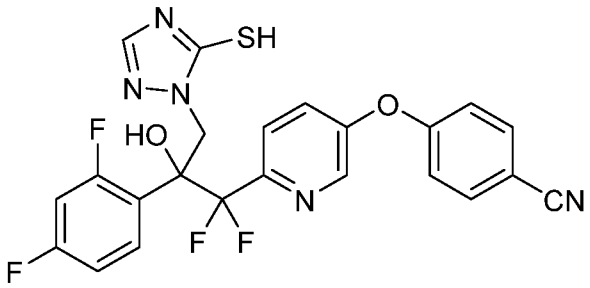
[c]Percent control based on Area Under Disease Progression Curve (AUDPC) of visual infection on the plant

[d]Azoxystrobin (100) + difenoconazole (63)

CLAIMS

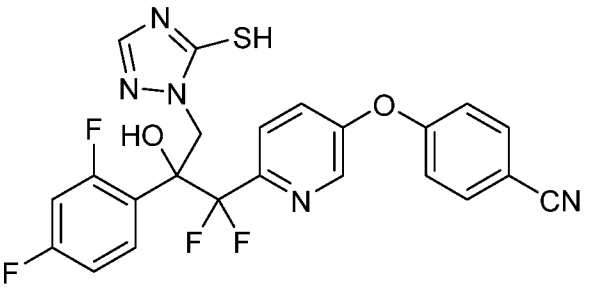
WHAT IS CLAIMED IS:

1. A method of controlling fungal diseases in a rice plant that is at risk of being diseased comprising contacting one of the plant and an area adjacent to the plant with a composition including compound I.



Compound I

2. The method of Claim 1 wherein the composition is



Compound I

3. The method of claim 1, wherein the composition further includes at least one of one additional agriculturally active ingredient selected from the group consisting of: insecticide, an herbicide, and a fungicide.

4. The method of claim 1, wherein the fungal pathogen is selected from the group consisting of the causal agents of rice blast (*Pyricularia oryzae*), sheath blight of rice (*Rhizoctonia solani*), brown spot of rice (*Cochliobolus miyabeanus*) and crown sheath rot of rice (*Gaeumannomyces graminis* var. *graminis*).

5. The method of claim 2, wherein the composition further includes at least one of one additional agriculturally active ingredient selected from the group consisting of: insecticide, an herbicide, and a fungicide.

6. The method of claim 2, wherein the fungal pathogen is selected from the group consisting of the causal agents of rice blast (*Pyricularia oryzae*), sheath blight of rice (*Rhizoctonia solani*), brown spot of rice (*Cochliobolus miyabeanus*) and crown sheath rot of rice (*Gaeumannomyces graminis* var. *graminis*).

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2017/062984

A. CLASSIFICATION OF SUBJECT MATTER

A01N 43/653(2006.01)i

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 43/653; C07D 249/12; C07D 405/06; C07D 403/06; C07D 257/04; A01N 43/713; A61K 31/44; C07D 401/06; A01N 43/40

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal), STN(Registry, Caplus), Google & keywords: fungal diseases, rice plant, fungicide, pathogen

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2014-193974 A1 (VIAMET PHARMACEUTICALS, INC.) 04 December 2014 See claim 1; Table 1; page 25, lines 18-23; page 32, lines 13-25; page 39, lines 25-34; page 40, lines 1-4.	1-6
A	US 8748461 B2 (HOEKSTRA, W. J. et al.) 10 June 2014 See claims 3, 26-28; columns 31-32.	1-6
A	WO 2010-146113 A1 (BASF SE) 23 December 2010 See the whole document.	1-6
A	WO 93-07139 A1 (PFIZER LIMITED et al.) 15 April 1993 See the whole document.	1-6
PX	WO 2016-187201 A2 (VIAMET PHARMACEUTICALS, INC.) 24 November 2016 See claims 1, 8; paragraph [00133]; Table 1; Example 2.	1-6

☐ 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 application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 March 2018 (26.03.2018)	**26 March 2018 (26.03.2018)**

Name and mailing address of the ISA/KR
International Application Division
Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea
Facsimile No. +82-42-481-8578

Authorized officer
JANG, Gijeong
Telephone No. +82-42-481-8364

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2017/062984

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