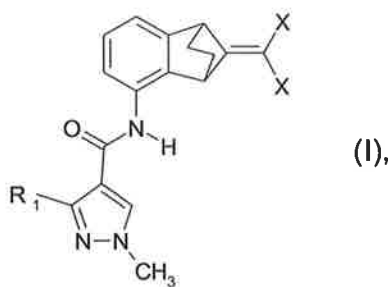


Method of controlling rust diseases

The present invention relates to a method of controlling rust diseases on soybean plants.

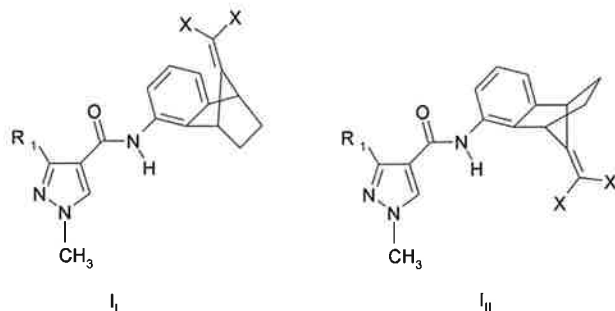
It is known from WO 04/35589 and WO 06/37632 that certain tricyclic amine derivatives and mixtures comprising said amine derivatives have biological activity against phytopathogenic fungi. On the other hand various fungicidal compounds of different chemical classes are widely known as plant fungicides for application in various crops of cultivated plants. However, crop tolerance and activity against phytopathogenic plant fungi do not always satisfy the needs of agricultural practice in many incidents and aspects. For example, in the past in the most important regions for soybean cultures no economically significant phytopathogens were known. However, recently there has been an increase in severe rust infections of soybean crops in South America by the harmful fungus *Phakopsora pachyrhizi* resulting in considerable yield losses. Most customary fungicides are unsuitable for controlling rust in soybeans or their action against *Phakopsora pachyrhizi* is unsatisfactory.

Out of the above-mentioned needs of agricultural practice for increased crop tolerance and/or increased activity against phytopathogenic fungi, such as *Phakopsora pachyrhizi*, there is therefore proposed in accordance with the present invention a method of controlling rust diseases on soybean plants comprising applying to the useful plants, the locus thereof or propagation material thereof a composition comprising a compound of formula (I)



wherein R₁ is difluoromethyl or trifluoromethyl and X is chloro, fluoro or bromo.

The compounds of formula I occur in two different stereoisomers, which are described as the single enantiomers of formulae I_I and I_{II}:



The invention covers all such stereoisomers and mixtures thereof in any ratio. According to the invention "racemic compound of formula (I)" means a racemic mixture of compounds of formula I_I and I_{II}.

A preferred embodiment of the invention is represented by those compositions which comprise a compound of formula (I), wherein R₁ is difluoromethyl. Further preferred compounds of formula (I) are:

3-difluoromethyl-1-methyl-1H-pyrazole-4-carboxylic acid (9-dichloromethylidene-benzonorbornene-5-yl)amide (compound A-1.1); 3-difluoromethyl-1-methyl-1H-pyrazole-4-carboxylic acid (9-difluoromethylidene-benzonorbornene-5-yl)amide (compound A-1.2); and 3-difluoromethyl-1-methyl-1H-pyrazole-4-carboxylic acid (9-dibromomethylidene-benzonorbornene-5-yl)amide (compound A-1.3).

The designation of substituent X as chloro, fluoro or bromo means that both substituents X have the same meanings.

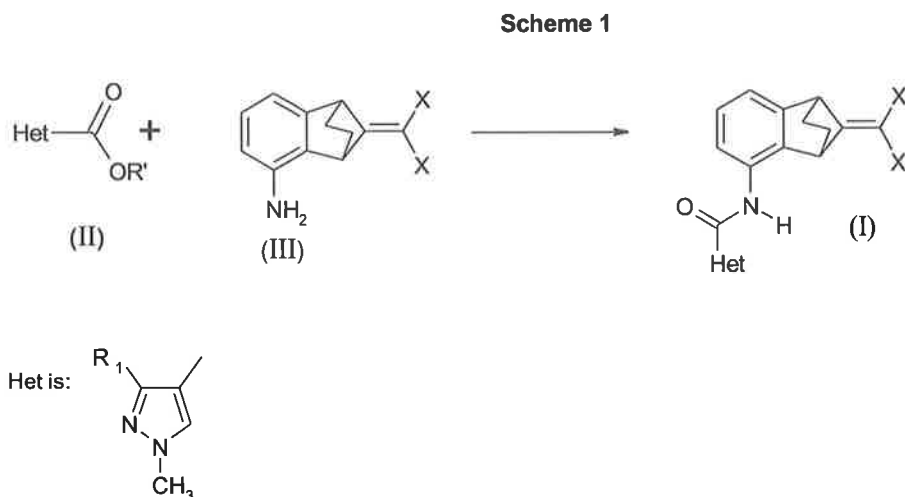
A preferred embodiment of the invention is represented by those compositions which comprise as component A) a compound of formula (I), wherein R₁ is trifluoromethyl. Further preferred compounds of formula (I) are:

1-methyl-3-trifluoromethyl-1H-pyrazole-4-carboxylic acid (9-dichloromethylidene-benzonorborene-5-yl)amide (compound A-1.4);

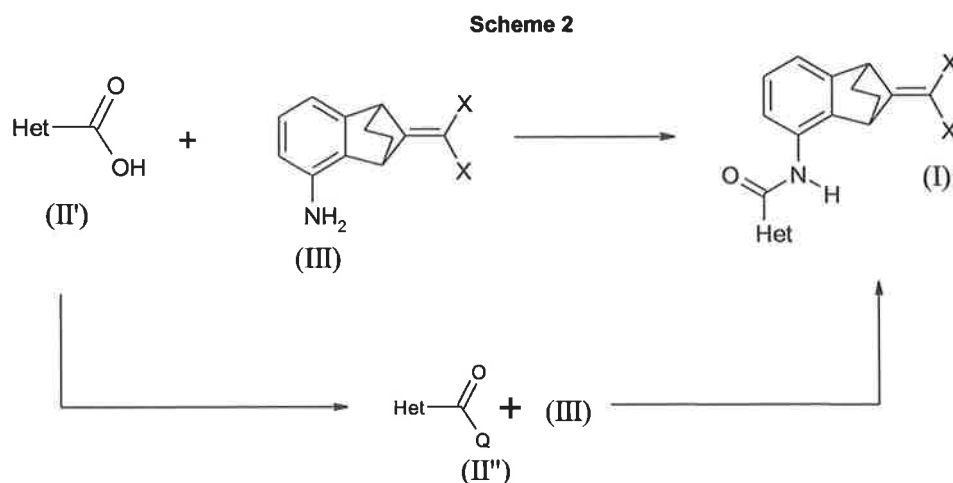
1-methyl-3-trifluoromethyl-1H-pyrazole-4-carboxylic acid (9-difluoromethylidene-benzonorbornene-5-yl)amide (compound A-1.5); and

1-methyl-3-trifluoromethyl-1H-pyrazole-4-carboxylic acid (9-dibromomethylidene-benzonorborene-5-yl)amide (compound A-1.6).

The compounds of formula (I) may be prepared as described below with reference to reaction Schemes 1 to 3.



As shown in Scheme 1, a compound of formula (I), where R_1 and X are as defined above, may be synthesized by reacting a compound of formula (II), R_1 is as defined above and R' is C_{1-5} alkyl, with an aniline of formula (III), where X is as defined above, in the presence of $\text{NaN}(\text{TMS})_2$ at -10°C to ambient temperature, preferably in dry THF, as described by *J. Wang et al. Synlett, 2001, 1485*.

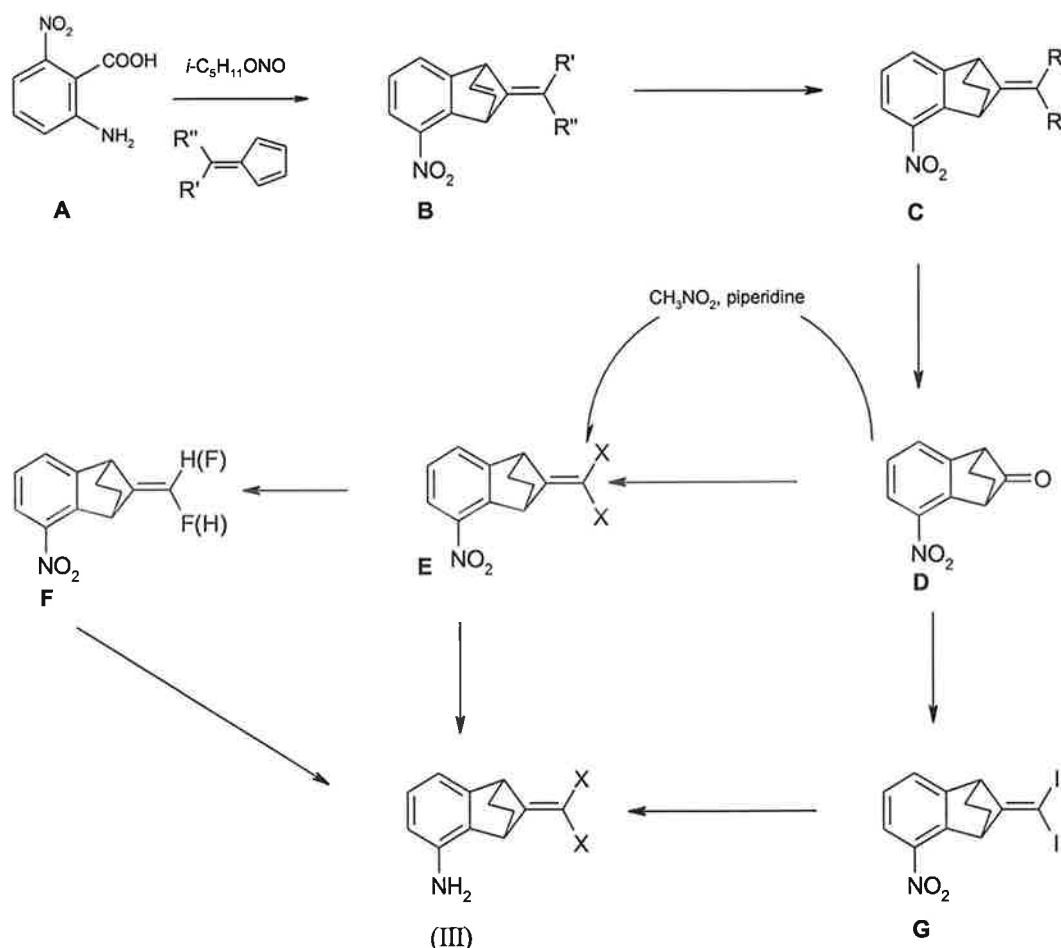


Alternatively, as shown in Scheme 2, a compound of formula (I), where Het is as defined in scheme 1, R_1 and X are as defined above, may be prepared by reacting a compound of formula (II'), where Het is as defined above, with an aniline of formula (III), where X is as defined above, in the presence of an activating agent, such as BOP-Cl (bis-(2-oxo-3-oxazolidinyl)-phosphinic acid), and two equivalents of a base, such as triethylamine, in a solvent, such as dichloromethane (as described, for example, by *J. Cabré et al, Synthesis 1984, 413*) or by reacting a compound of formula (II''), where Het is as defined above and Q

is chloro, fluoro or bromo, with an aniline of formula (III), where X is as defined above, in the presence of one equivalent of a base, such as triethylamine or sodium or potassium carbonate or bicarbonate, in a solvent, such as dichloromethane, ethyl acetate or *N,N*-dimethylformamide, preferably at -10 to 30°C. The compound of formula (II'') is obtained from a compound of formula (II') by treatment with a halogenating agent such as thionyl chloride, thionyl bromide, oxalyl chloride, phosgene, SF₄/HF, DAST ((diethylamino)sulphur trifluoride), or Deoxo-Fluor® ([bis(2-methoxyethyl)amino]sulphur trifluoride) in a solvent such as toluene, dichloromethane or acetonitrile.

The compounds (II) and (II') are generally known compounds and may be prepared as described in the chemical literature or obtained from commercial sources. The compound (III) is a novel compound and may be prepared as described with reference to Scheme 3.

Scheme 3



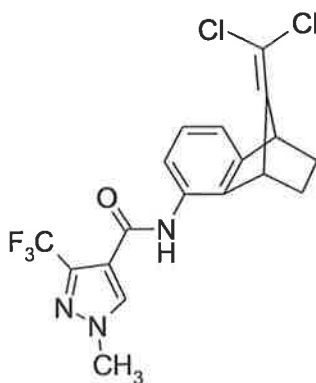
As shown in Scheme 3, the compound of formula (III) may be prepared by a *Bechamp* reduction or by other established methods, for example, by selective catalytic hydrogenation, of the nitro-compounds (E), (F) and (G).

The 9-dihalomethylidene-5-nitro-benzonorbornenes (E), where X is chloro, bromo or fluoro, may be obtained by the *Wittig* olefination of the ketones (D) with *in situ* generated dihalomethylidene phosphoranes $R'''_3P=C(R^4)R^5$, where R''' is triphenyl, tri C_{1-4} alkyl or tridimethylamine and X is halo, according to or by analogy with the procedures described by H-D. Martin *et al*, *Chem. Ber.* 118, 2514 (1985), S.Hayashi *et al*, *Chem. Lett.* 1979, 983, or M. Suda, *Tetrahedron Letters*, 22, 1421 (1981).

Compounds of formula (I) may be obtained as described in examples H1 to H7.

EXAMPLE 1

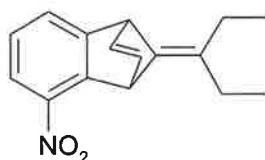
This Example illustrates the preparation of 1-methyl-3-trifluoromethyl-1H-pyrazole-4-carboxylic acid (9-dichloromethylidene-benzonorbornene-5-yl)amide (compound A-1.4):



9-Dichloromethylene-5-amino-benzonorbornene (175 mg, 0.729 mmol, prepared as described in Example 6) in dichloromethane (10ml) was reacted with 1-methyl-3-trifluoromethyl-1H-pyrazole-carboxylic acid (170mg, 0.874 mmol, 1.2 eq.) in the presence of bis-(2-oxo-3-oxazolidinyl)-phosphinic acid chloride (278 mg, 1.09 mmol, 1.5 eq.) and triethylamine (184 mg, 1.821 mmol, 2.5 eq.) at ambient temperature under stirring for 23 hours. The reaction mixture was extracted with saturated sodium bicarbonate solution and saturated brine, dried over Na_2SO_4 and purified on silica gel in ethyl acetate-hexane-(1:1). 210 mg (69% of theory) of 1-methyl-3-trifluoromethyl-1H-pyrazole-4-carboxylic acid (9-dichloromethylidene-benzonorbornene-5-yl)amide (compound A-1.4, m.p. 179-181 °C) was obtained.

EXAMPLE 2

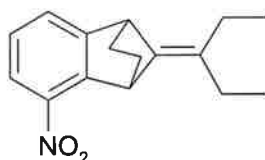
This Example illustrates the preparation of 9-(3-pentylidene)-5-nitro-benzonorbornadiene:



To a well stirred solution of isopentyl nitrite (2.31 ml, 1.3 eq.) in dimethoxyethane (50 ml) at 58°C a mixture of 6-nitroanthranilic acid (2.76 g, 1 eq.) and 6,6-diethylfulvene (6.45 g of 79% purity, 2.5 eq.) dissolved in 25 ml dimethoxyethane was added dropwise within 8 minutes whilst the temperature rose to 67°C. After 30 minutes the dark reaction mixture was evaporated and purified on silica gel in hexane-ethyl acetate-(20:1) to give 3.02 g (78%) of the desired product as an oil that solidified at room temperature (m.p. 60-61°C).

EXAMPLE 3

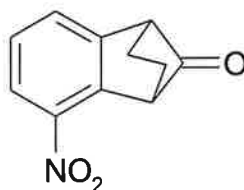
This Example illustrates the preparation of 9-(3-pentylidene)-5-nitro-benzonorbornene:



9-(3-pentylidene)-5-nitro-benzonorbornadiene (7.97 g prepared as described in Example 2) in THF (70ml) was hydrogenated at 20°C in the presence of Rh(PPh₃)₃Cl (*Wilkinson's* catalyst; 0.8 g). The reaction ceased after uptake of one equivalent of hydrogen. Evaporation and filtration of the crude on silica gel in ethyl acetate-hexane-(100:2) gave the desired product as an oil (7.90 g) that solidified on standing at room temperature (m.p. 69-56 °C).

EXAMPLE 4

This Example illustrates the preparation of 9-Oxo-5-nitro-benzonorbornene

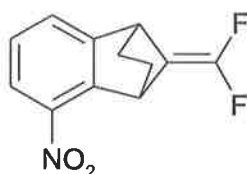


9-(3-pentylidene)-5-nitro-benzonorbornene (7.0 g, 27.2 mmol; prepared as described in Example 3) dissolved in dichloromethane (300 ml) and methanol (5ml) was ozonized (2.8 l O₂/min, 100 Watt, corresponding to 9.7 g O₃ / h) at -70°C until a persistent blue colour was observed (after approximately 15 minutes). The reaction mixture was flushed with nitrogen gas. Triphenylphosphine (8.4 g, 32.03 mmol, 1.18 eq.) was added and the temperature was

allowed to warm up to 20-25°C. After evaporation of the solvent the residue was purified on silica gel in hexane-EtOAc-3:1 to give 5.2 g of Compound 36.01 (m.p. 112-114 °C).

EXAMPLE 5

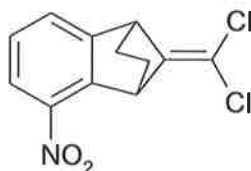
This Example illustrates the preparation of 9-difluoromethylidene-5-nitro-benzonorbornene



To a solution of dibromodifluoromethane (6.30 g, 30 mmol) at 0°C in THF (50 ml) was added tris-(dimethylamino)-phosphane (10.1 g at 97%, equivalent to 11.2 ml, 60 mmol) in THF (30 ml) within 20 minutes. To the resulting suspension, after stirring for 1 hour at room temperature, was added dropwise a solution of 9-oxo-5-nitro-benzonorbornene (6.10g, 30mmol; prepared as described in Example 4) in THF (20ml) within 25 minutes followed by stirring for 21 hours. The suspension was poured onto ice-water and extracted with ethyl acetate. Purification on silica gel in ethyl acetate-hexane-(1:4) yielded 4.675 g of 9-difluoromethylidene-5-nitro-benzonorbornene (m.p. 99-101°C).

EXAMPLE 6

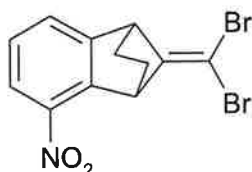
This Example illustrates the preparation of 9-Dichloromethylidene-5-nitro-benzonorbornene



Dry carbon tetrachloride (5.9 g, 33 mmol) was reacted with triphenylphosphine (14.46 g, 55.1 mmol) in dichloromethane (30 ml) at room temperature for 1 hour. 9-Oxo-5-nitro-benzonorbornene (5.60g, 27.56mmol; prepared as described in Example 4) in dichloromethane (10 ml) was added dropwise and stirred for 20 hours at room temperature. After aqueous work-up (ice-water) and extraction with dichloromethane, the crude product was purified on silica gel in ethyl acetate-hexane-(1:4) to obtain of the desired 9-Dichloromethylidene-5-nitro-benzonorbornene (1.83 g; m.p. 136-137 °C). Some starting material (4.06 g) was recovered.

EXAMPLE 7

This Example illustrates the preparation of 9-Dibromomethylidene-5-nitro-benzonorbornene



Carbon tetrabromide (4.66 g at 98%, 13.8 mmol) was reacted under stirring with triphenylphosphine (7.23 g, 27.6 mmol) in dichloromethane (50 ml) for 50 minutes at room temperature. 9-Oxo-5-nitro-benzonorbornene (2.8 g, 13.8 mmol; prepared as described in Example 4) in dichloromethane (10 ml) was added dropwise and stirred over night at room temperature. Aqueous work-up (ice-water) and extraction with dichloromethane followed by column chromatography (ethyl acetate-hexane-(1:9) of the crude product yielded the desired product 9-Dibromomethylidene-5-nitro-benzonorbornene (2.1 g; m.p. 153-155 °C).

Table 1

Table 1 shows melting point and NMR data, all with CDCl_3 as the solvent, unless otherwise stated, for compounds of formula (I). In the table, temperatures are given in degrees Celsius, "NMR" means nuclear magnetic resonance spectrum and the following abbreviations are used:

m.p. = melting point

b.p. = boiling point.

s = singlet

br = broad

d = doublet

dd = doublet of doublets

t = triplet

q = quartet

m = multiplet

ppm = parts per million

THF = tetrahydrofuran

Compound	m.p (°C)	¹ H-NMR proton shifts δ (ppm) (CDCl_3)
A-1.1	179-181	8.06 (s,1H), 7.69 (d overlapped by brd signal, exchangeable with D_2O , 2H), 7.18 (t,1H), 7.06 (d,1H), 4.00 (s,3H), 3.96 (m, 2H), 2.12 (m, 2H), 1.51 (m,1H), 1.39 (m,1H).
A-1.2	137-143	8.06 (s,1H), 7.68 (brd, exchangeable with D_2O ,1H), 7.67 (d,1H), 7.14 (d,1H), 4.00 (s,3H), 3.94 (m,2H), 2.06 (m,2H), 1.48 (m,1H), 1.36 (m,1H).
A-1.3	198-200	8.06 (s,1H), 7.71 (d,1H), 7.68 (brd, exchangeable with D_2O ,1H), 7.18 (t,1H), 7.05 (d,1H), 4.00 (s,3H), 3.95 (m,1H), 3.93 (m,1H), 2.12 (m,2H), 1.50 (m,1H), 1.38 (m,1H).

A-1.4	183-188	7.78 (d,1H), 7.70 (brd, exchangeable with D ₂ O,1H), 7.39 (brd s,1H), 7.16 (t,1H), 7.01 (d overlapped from brd s, 2H), 4.00 (m,1H), 3.94 (m,1H), 3.72 (s,3H), 2.10 (m, 2H), 1.51 (m,1H), 1.38 (m,1H).
A-1.5	133-135	7.76 (d,1H), 7.70 (brd, exchangeable with D ₂ O,1H), 7.39 (brd s,1H), 7.13 (t,1H), 7.01 (brd s,1H), 7.00 (d,1H), 3.98 (m, 1H), 3.93 (m,1H), 3.72 (s,3H), 2.04 (m,2H), 1.49 (m,1H), 1.36 (m,1H).
A-1.6	155-158	7.79 (d,1H), 7.70 (brd, exchangeable with D ₂ O,1H), 7.39 (brd s,1H), 7.17 (t,1H), 7.02 (d,1H), 7.01 (brd s,1H), 3.98 (m,1H), 3.91 (m,1H), 3.72 (s,3H), 2.11 (m,2H), 1.50 (m,1H), 1.39 (m,1H).

The term "locus" of a useful plant as used herein is intended to embrace the place on which the useful plants are growing, where the plant propagation materials of the useful plants are sown or where the plant propagation materials of the useful plants will be placed into the soil. An example for such a locus is a field, on which crop plants are growing.

The term "plant propagation material" is understood to denote generative parts of the plant, such as seeds, which can be used for the multiplication of the latter, and vegetative material, such as cuttings or tubers, for example potatoes. There may be mentioned for example seeds (in the strict sense), roots, fruits, tubers, bulbs, rhizomes and parts of plants. Germinated plants and young plants which are to be transplanted after germination or after emergence from the soil, may also be mentioned. These young plants may be protected before transplantation by a total or partial treatment by immersion. Preferably "plant propagation material" is understood to denote seeds.

The compositions according to the invention can be applied to the phytopathogenic microorganisms, the useful plants, the locus thereof or the propagation material thereof. The compositions according to the invention may be applied before or after infection of the useful plants, the propagation material thereof by the microorganisms.

The amount of a composition according to the invention to be applied, will depend on various factors, such as the compounds employed; the subject of the treatment, such as, for example plants, soil or seeds; the type of treatment, such as, for example spraying, dusting or seed dressing; the purpose of the treatment, such as, for example prophylactic or therapeutic; the type of fungi to be controlled or the application time.

When the compositions according to the invention are used for treating seed, rates of 0.001 to 50 g of a compound of formula I per kg of seed, preferably from 0.01 to 10g per kg of seed, are generally sufficient.

The composition of the invention may be employed in any conventional form, for example in the form of a twin pack, a powder for dry seed treatment (DS), an emulsion for seed treatment (ES), a flowable concentrate for seed treatment (FS), a solution for seed treatment (LS), a water dispersible powder for seed treatment (WS), a capsule suspension for seed treatment (CF), a gel for seed treatment (GF), an emulsion concentrate (EC), a suspension concentrate (SC), a suspo-emulsion (SE), a capsule suspension (CS), a water dispersible granule (WG), an emulsifiable granule (EG), an emulsion, water in oil (EO), an emulsion, oil in water (EW), a micro-emulsion (ME), an oil dispersion (OD), an oil miscible flowable (OF), an oil miscible liquid (OL), a soluble concentrate (SL), an ultra-low volume suspension (SU), an ultra-low volume liquid (UL), a technical concentrate (TK), a dispersible concentrate (DC), a wettable powder (WP) or any technically feasible formulation in combination with agriculturally acceptable adjuvants.

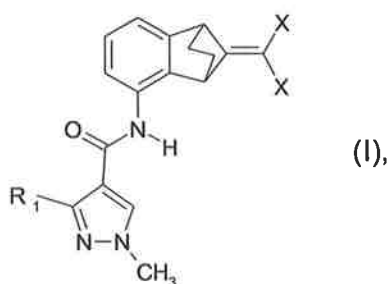
Such compositions may be produced in conventional manner, e.g. by mixing the active ingredients with at least one appropriate inert formulation adjuvant (for example, diluents, solvents, fillers and optionally other formulating ingredients such as surfactants, biocides, anti-freeze, stickers, thickeners and compounds that provide adjuvancy effects). Also conventional slow release formulations may be employed where long lasting efficacy is intended. Particularly formulations to be applied in spraying forms, such as water dispersible concentrates (e.g. EC, SC, DC, OD, SE, EW, EO and the like), wettable powders and granules, may contain surfactants such as wetting and dispersing agents and other compounds that provide adjuvancy effects, e.g. the condensation product of formaldehyde with naphthalene sulphonate, an alkylarylsulphonate, a lignin sulphonate, a fatty alkyl sulphate, and ethoxylated alkylphenol and an ethoxylated fatty alcohol.

The compositions according to the invention may also comprise further pesticides, such as, for example, fungicides, insecticides or herbicides.

A seed dressing formulation is applied in a manner known per se to the seeds employing the compositions according to the invention and a diluent in suitable seed dressing formulation form, e.g. as an aqueous suspension or in a dry powder form having good adherence to the seeds. Such seed dressing formulations are known in the art. Seed dressing formulations may contain the single active ingredients or the combination of active ingredients in encapsulated form, e.g. as slow release capsules or microcapsules.

In general, the formulations include from 0.01 to 90% by weight of active agent, from 0 to 20% agriculturally acceptable surfactant and 10 to 99.99% solid or liquid formulation inerts and adjuvant(s), the active agent consisting of at least a compound of formula I and optionally other active agents, particularly microbiocides or conservatives or the like. Concentrated forms of compositions generally contain in between about 2 and 80%, preferably between about 5 and 70% by weight of active agent. Application forms of formulation may for example contain from 0.01 to 20% by weight, preferably from 0.01 to 5% by weight of active agent. Whereas commercial products will preferably be formulated as concentrates, the end user will normally employ diluted formulations.

Surprisingly it has been found that compounds of formula (I)



wherein R_1 is difluoromethyl or trifluoromethyl and X is chloro, fluoro or bromo; have good activity against soybean rust diseases, such as diseases caused by *Phakopsora pachyrhizi* and/or *Phakopsora meibomiaae*.

Accordingly an aspect of the present invention is a method of controlling rust diseases on soybean plants, which comprises applying to the soybean plants, the locus thereof or propagation material thereof a composition comprising a compound of formula (I).

Preferred is a method, which comprises applying to the soybean plants or to the locus thereof a composition comprising a compound of formula (I), preferably to the soybean plants.

Further preferred is a method, which comprises applying to the propagation material of the soybean plants a composition comprising a compound of formula (I).

The methods according to the invention also allow good control of other harmful fungi frequently encountered in soybean plants. The most important fungal diseases in soybeans being *Phakopsora pachyrhizi*, *Microsphaera diffusa*, *Cercospora kikuchi*, *Cercospora sojina*, *Septoria glycines* and *Colletotrichum truncatum*, some of which comprise the so-called "late season disease complex", and furthermore *Rhizoctonia solani*, *Corynespora cassiicola*, *Sclerotinia sclerotiorum* and *Sclerosium rolfsii*.

Further characteristics of compositions comprising compounds of formula (I), their application methods to soybeans and their use rates are as described for compositions comprising compounds of formula (I) as described above. Their application can be both before and after the infection of the soybean plants or parts thereof with the fungi. The treatment is preferably carried out prior to the infection. When a compound of formula (I) is used on its own, the application rates in the method according to the invention are as described above, e.g. typical are rates of 5 to 2000 g a.i./ha, particularly 10 to 1000 g a.i./ha, e.g. 50, 75, 100 or 200 g a.i./ha. Compounds of formula (I) can be applied to the soybean plants once or more than once during a growing season. For use in the method according to the invention, the compounds of formula (I) can be converted into the customary formulations described above, e.g. solutions, emulsions, suspensions, dusts, powders, pastes and granules. The use form will depend on the particular intended purpose; in each case, it should ensure a fine and even distribution of the compound of formula (I).

The term "soybean plant" includes all soybean plants and all varieties, including transgenic plants. The term "soybean plant" includes especially glyphosate tolerant soybean plants.

By "glyphosate tolerant" is meant that the plants for use in the methods are resistant to glyphosate application or tolerant of glyphosate. Glyphosate tolerant plants are made tolerant to glyphosate by conventional breeding or having a transgenic event that provides

glyphosate resistance. Some examples of such preferred transgenic plants having transgenic events that confer glyphosate resistance are described in U.S. Pat. Nos. 5,914,451; 5,866,775; 5,804,425; 5,776,760; 5,633,435; 5,627,061; 5,463,175; 5,312,910; 5,310,667; 5,188,642; 5,145,783; 4,971,908 and 4,940,835. The use of "stacked" transgenic events in the plant is also contemplated.

Stacked transgenic events including additional herbicide-resistant traits such as resistance to HPPD-inhibitors, sulfonyl-ureas, glufosinate and bromoxynil are widely used and described in readily available resources. The stacked transgenic events may also be directed to other pesticide resistant traits, such as insecticide, nematicide, fungicide, etc resistance, which may be made by conventional breeding or introducing a transgenic event.

Lines of transgenic glyphosate tolerant crop plants contemplated for use in the methods of the present invention include, for example, Roundup Ready® Soybean 40-3-2.

A "transgenic plant" refers to a plant that contains genetic material not found (i.e. "exogenous") in a wild-type plant of the same species, variety or cultivar. The genetic material may include a transgene, an insertional mutagenesis event (such as by transposon or T-DNA insertional mutagenesis), an activation tagging sequence, a mutated sequence, a homologous recombination event or a sequence modified by chimeraplasty. Typically, the foreign genetic material has been introduced into the plant by human manipulation, but any method can be used as one of skill in the art recognizes. A transgenic plant may contain an expression vector or cassette. The expression cassette typically comprises a polypeptide-encoding sequence operably linked (i. e., under regulatory control of) to appropriate inducible or constitutive regulatory sequences that allow for the expression of the polypeptide. The expression cassette can be introduced into a plant by transformation or by breeding after transformation of a parent plant. As previously described a plant refers to a whole plant, including seedlings and mature plants, as well as to a plant part, such as seed, fruit, leaf, or root, plant tissue, plant cells or any other plant material, e. g., a plant explant, as well as to progeny thereof, and to in vitro systems that mimic biochemical or cellular components or processes in a cell.

The Examples which follow serve to illustrate the invention, "active ingredient" denotes a compound of formula I

Formulation Examples

Wettable powders

	a)	b)
active ingredient	25 %	75 %
sodium lignosulfonate	5 %	-
sodium lauryl sulfate	3 %	5 %
sodium diisobutyl naphthalenesulfonate (7-8 mol of ethylene oxide)	-	10 %
highly dispersed silicic acid	5 %	10 %
kaolin	62 %	-

The active ingredient is thoroughly mixed with the other formulation components and the mixture is thoroughly ground in a suitable mill, affording wettable powders that can be diluted with water to give suspensions of the desired concentration.

Powders for dry seed treatment

	a)	b)
active ingredient	25 %	75 %
light mineral oil	5 %	5 %
highly dispersed silicic acid	5 %	-
kaolin	65 %	-
talc	-	20

The active ingredient is thoroughly mixed with the other formulation components and the mixture is thoroughly ground in a suitable mill, affording powders that can be used directly for seed treatment.

Emulsifiable concentrate

active ingredient	10 %
octylphenol polyethylene glycol ether (4-5 mol of ethylene oxide)	3 %
calcium dodecylbenzenesulfonate	3 %
castor oil polyglycol ether (35 mol of ethylene oxide)	4 %
cyclohexanone	30 %
xylene mixture	50 %

Emulsions of any required dilution, which can be used in plant protection, can be obtained from this concentrate by dilution with water.

<u>Dustable powders</u>	a)	b)
active ingredient	5 %	6 %
talcum	95 %	-
kaolin	-	94 %

Ready-for-use dusts are obtained by mixing the active ingredient with the carriers and grinding the mixture in a suitable mill. Such powders can also be used for dry dressings for seed.

<u>Extruded granules</u>	<u>% w/w</u>
active ingredient	15 %
sodium lignosulfonate	2 %
sodium alkyl naphthalene sulfonate	1 %
kaolin	82 %

The active ingredient is mixed and ground with the other formulation components, and the mixture is moistened with water. The mixture is extruded and then dried in a stream of air.

Suspension concentrate

active ingredient	40 %
propylene glycol	10 %
nonylphenol polyethylene glycol ether (15 mol of ethylene oxide)	6 %
sodium lignosulfonate	10 %
carboxymethylcellulose	1 %
silicone oil (in the form of a 75 % emulsion in water)	1 %
water	32 %

The finely ground active ingredient is intimately mixed with the other formulation components, giving a suspension concentrate which can be diluted in water at any desired rate. Using such dilutions, living plants as well as plant propagation material can be treated and protected against infestation by microorganisms, by spraying, pouring or immersion.

Flowable concentrate for seed treatment

active ingredient	40 %
propylene glycol	5 %
copolymer butanol PO/EO	2 %
tristyrenephenole ethoxylate (with 10-20 moles EO)	2 %

1,2-benzisothiazolin-3-one	0.5 %
monoazo-pigment calcium salt	5 %
silicone oil (in the form of a 75 % emulsion in water)	0.2 %
water	45.3 %

The finely ground active ingredient is intimately mixed with the other formulation components, giving a suspension concentrate which can be diluted further in water to be applied to seeds. Using such dilutions, propagation material can be treated and protected against infestation by microorganisms, by spraying, pouring or immersion.

Biological Examples

Example B-1: Action against Asian soybean rust (*Phakopsora pachyrhizi*) - Leaf disc test

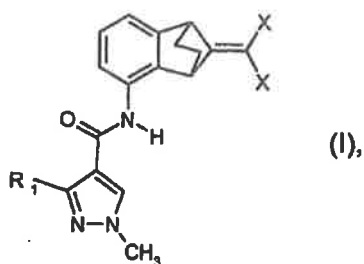
Whole soybean plants (variety brand Williams82) are treated with the recited active ingredients 4 weeks after planting. 1 day after spraying leaf disks are cut from the first trifoliate leaf. Five repetitions at each rate are conducted. The leaf disks are inoculated with *Phakopsora pachyrhizi* (Asian soybean rust) one day after treatment. Evaluation of the leaf disks is conducted fourteen days after inoculation and the mean percent infestation of the five repetitions is calculated. Standard EC100 formulations are used. The rates of the active ingredients used are given in Table B1 as g active ingredient (a.i.)/ha.

Table B1: Action against Asian soybean rust

% Control of <i>Phakopsora pachyrhizi</i>			
g.ai./ha	Cpd A-1.1	Cpd A-1.2	Cpd A-1.3
250	87	94	93
125	82	44	54
62.5	36	54	36
31.25	36	39	36

Claims

1. A method of controlling rust diseases on soybean plants, which comprises applying to the useful plants, the locus thereof or propagation material thereof a composition comprising a compound of formula (I)



wherein R₁ is difluoromethyl or trifluoromethyl and X is chloro, fluoro or bromo.

2. A method according to claim 1, wherein the rust phytopathogen is *Phakopsora pachyrhizi*.

3. A method according to claim 1, wherein component (A) is a compound of formula (I), wherein R₁ is difluoromethyl.

4. A method according to claim 1, wherein component (A) is a compound of formula (I), wherein R₁ is difluoromethyl and X is chloro.

5. A method according to claim 1, wherein component (A) is a compound of formula (I), wherein R₁ is difluoromethyl and X is fluoro.

6. A method according to claim 1, wherein component (A) is a compound of formula (I), wherein R₁ is difluoromethyl and X is bromo.