(CONVENTION. By one or more persons and/or a Company.) Form 4

COMMONWEALTH OF AUSTRALIA

Patents Act 1952-1969

CONVENTION APPLICATION FOR A PATENT

(1) Here insert (in full) Name or Names of Applicant or Applicants, followed by Address (es).

xxI/We (1) ESZAKMAGYARORSZAGI VEGYIMUVEK

of Sajobabony, H-3792, Hungary,

a Company incorporated under the laws of Hungary

(2) Here insert Title of Invention.

hereby apply for the grant of a Patent for an invention entitled: (2)

SYNERGISTIC FUNGICIDAL COMPOSITIONS CONTAINING TWO OR THREE ACTIVE INGREDIENTS

(3) Here insert number(s) of basic application(s)

which is described in the accompanying complete specification. This application is a Convention application and is based on the application numbered (3)

2757/88

(4) Here insert Name of basic Country or Countries, and basic date or dates

for a patent or similar protection made in (4) Hungary

on 31st May 1988

APPLICATION ACCEPTED AND AMENDMENTS ALLOWED 21-11-90

xxMy/Our address for service is ~~Messrs. Edwd. Waters & Sons, Patent Attorneys~~ Watermark Patent & Trademark Attorneys,

50 Queen Street, Melbourne, Victoria, Australia.

DATED this 29th day of May 19 89

(5) Signature (s) of Applicant (s) or Seal of Company and Signatures of its Officers as prescribed by its Articles of Association.

(5) ESZAKMAGYARORSZAGI VEGYIMUVEK

by

Louis C. Gebhardt

Registered Patent Attorney

To:

THE COMMISSIONER OF PATENTS.

COMMONWEALTH OF AUSTRALIA

Patents Act 1952-1969

DECLARATION IN SUPPORT OF A CONVENTION APPLICATION FOR A PATENT OR PATENT OF ADDITION

(1) Here insert (in full) Name of Company.

In support of the Convention Application made by(1) ESZAKMAGYARORSZAGI VEGYIMUVEK

(hereinafter referred to as the applicant) for a Patent

(2) Here insert title of Invention.

for an invention entitled:(2) SYNERGISTIC FUNGICIDAL COMPOSITIONS CONTAINING TWO OR THREE ACTIVE INGREDIENTS

(3) Here insert full Name and Address, of Company official authorized to make declaration.

WE ~~I~~, FERENC MOGYORODI and AGNES VALENTENY, both of Sajobabony, H-3792, Hungary

do solemnly and sincerely declare as follows:

1. ~~I am~~ We are authorised by the applicant for the patent to make this declaration on its behalf.

2. The basic application as defined by Section 141 of the Act was made in(4) Hungary on the 31st day of May 1988, by ESZAKMAGYARORSZAGI VEGYIMUVEK

(4) Here insert basic Country or Countries followed by date or dates and basic Applicant or Applicants.

~~On the XXXXXXX day of XXXXXXX 19XXXXXX, by XXXXXXX~~

(5) Here insert (in full) Name and Address of Actual Inventor or Inventors.

3.(5) The persons on the attached sheet

~~is~~/are the actual inventors of the invention and the facts upon which the applicant is entitled to make the application are as follow:

The applicant is the assignee of the said actual inventors

4. The basic application referred to in paragraph 2 of this Declaration was the first application made in a Convention country in respect of the invention the subject of the application.

DECLARED at Budapest, Hungary

this 12th day of May 19 89

(6) Signature.

(6) Dr.Ferenc MOGYORODI Dr. Ágnes VALENTÉNY

To: THE COMMISSIONER OF PATENTS.

MEMBERS OF THE Board of Directors

Edwd. Waters & Sons, Melbourne.

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(12) PATENT ABRIDGMENT (11) Document No. AU-B-35290/89
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 606802

(54) Title
FUNGICIDAL COMPOSITION CONTAINING AN OXATHIAPHOSPHOLANE DERIVATIVE AND A CARBAMATE DERIVATIVE

International Patent Classification(s)
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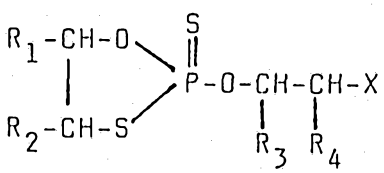
(56) Prior Art Documents
AU 14627/88 A01N 57/36

(57) Claim

1. Synergistic fungicidal compositions containing two or three active ingredients which comprises in an effective amount and in a ratio of (10:1) - (1:10) and (10:1:1) - (1:10:10) respectively 2-/O-(substituted alkyl)-2-thio-1,3,2-oxathiaphospholane of formula (I)



(I)

- wherein

R_1, R_2, R_3 and R_4 stand independently from each other for hydrogen, alkyl having 1 to 6 carbon atoms, alkenyl having 2 to 6 carbon atoms, alkynyl having 2 to 6 carbon atoms,

X is halogen or hydrogen, alkyl having 1 to 6 carbon atoms or mercapto -

and a zinc and manganese (1:1) complex of 8-quinolinolato-dimethyl-dithiocarbamate and/or benomyl as active ingredients in admixture with known carriers and/or additives.

Form 10

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952-69

COMPLETE SPECIFICATION

(ORIGINAL)

606802

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Related Art :

Name of Applicant : ESZAKMAGYARORSZAGI VEGYIMUVEK

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Complete Specification for the invention entitled:

SYNERGISTIC FUNGICIDAL COMPOSITIONS CONTAINING TWO OR THREE ACTIVE INGREDIENTS

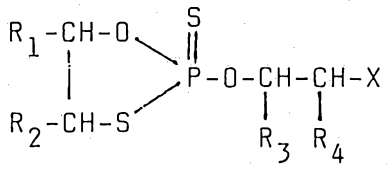
The following statement is a full description of this invention, including the best method of performing it known to :- us

SYNERGISTIC FUNGICIDAL COMPOSITIONS CONTAINING TWO OR THREE ACTIVE INGREDIENTS

The invention relates to synergistic fungicidal compositions containing two or three active ingredients.

The compositions according to the invention can widely be used in case of cereals (wheat, barley, corn, rice), field crops (beans, peas, soya, potato, sunflower), plantations (e.g. cotton, sugar beet, flax), fruits (apples, vine), ornamental plants (e.g. pink) to control pathogenic fungi e.g. different smut fungi, fusarium species, powdery mildew, downy mildew, grey mould, scab etc.

The compositions according to the invention contain in a total amount of 10 - 90 % by weight and in a ratio of (10:1) - (1:10) and (10:1:1) - (1:10:10), respectively, 2-(O-/substituted alkyl/-2-thio-1,3,2--oxathia-phospholane derivative of formula (I) -



(I)

wherein

R_1, R_2, R_3 and R_4 stand independently from each other for hydrogen, alkyl having 1 to 6 carbon atoms, alkenyl having 2 to 6 carbon atoms, alkynyl having 2 to 6 carbon atoms,

X is halogen or hydrogen, alkyl having 1 to 6 carbon atoms or mercapto -

and a manganese and zinc complex of 8-quinolinolato--dimethyl-dithiocarbamate complex (Mn:Zn = 1:1) and/or benomyl (1-butyl-carbamoyl-benzimidazole-2-methyl-carbamate) as active ingredients in admixture with known solid or liquid carriers and other additives, preferably emulsifying, dispersing and wetting agents.

The 2-O-(substituted alkyl)-2-thio-1,3,2--oxathiaphospholane derivatives of formula (I) are known from Hungarian Patent Application No. 1650/87 and can be used to control different pathogenic fungi of cultivated plants (e.g. paprika, tomato, wheat, corn, sunflower, sugar beet, cotton), e.g. Alternaria spp., Fusarium spp., Phytophthora infestans, powdery mildew.

The manganese and zinc complex of 8-quinolinolato--dimethyl-dithiocarbamate (Mn+Zn = 1:1) and its fungicidal activity is described in the HU-PS No. 171,736. The known composition containing said complex as active ingredient (Kelokarb 80 WP) can be used for treating winter wheat sowing-seeds in an amount of 2 kg/to.

The composition containing benomyl as active ingredient (Chinoin Fundazol 50 WP) can be used e.g. in autumn and spring cereals against powdery mildew of cereals and fusarium rot of cereals, in sugar beet against cercospora leaf spot, in alfalfa against downy mildew of alfalfa, against different plate diseases

of sunflower, in orchards e.g. in apples and pears against powdery mildew, monilia and scab in strawberry, raspberry, in vine against grey mould, in vegetables, e.g. in paprika, cucumber and root vegetables against powdery mildew, in ornamental plants, e.g. in pink against fusarium, botrytis and penicillium either alone or in combination with other known fungicides, e.g. Quinolate V-4X, Dithane M-45, Orthocid 50 WP, Daconil W-75.

During our experiments it has been investigated how the fungicidal activity of 2-(O-substituted alkyl)--2-thio-1,3,2-oxathiaphospholane-derivatives changes when admixing it with other, known, commercially available compositions. Different seeds (winter wheat, autumn and spring barley, corn, sunflower, soya, cotton, sugar beet, rice, pears), tubers (e.g. potato) or shoots (e.g. apple, vine) were treated with compounds of formula (I), with known fungicides and with the mixture thereof. After seed dressing, spraying and treatment of the soil the amount of the germinated plants, the length of the roots, the rate of the infection and the yield were determined and it has been found that the activity of compounds of formula (I) is generally the same as that of other known compositions, however, the activity of the combinations is significantly increased. Particular good activity has been observed when combining the compound of formula (I) with Kelokarb - which results in an increase of the activity spectrum - and with

benomyl, which results in a significant decrease of the effective dose of benomyl having systemic activity.

The present invention therefor provides synergistic fungicidal compositions containing two or three active ingredients in a total amount of 10 - 90 % by weight and in a ratio of (10:1) - (1:10) and (10:1:1) - (1:10:10), respectively, 2-(O-substituted alkyl)--2-thio-1,3,2-oxathia-phospholane derivative of formula (I) - wherein R_1, R_2, R_3, R_4 and X are the same as mentioned above - and Mn+Zn (1:1) complex of 8--quinolinolato-dimethyl-dithiocarbamate and/or benomyl in admixture with solid or liquid carriers and optionally with other additives, preferably emulsifying, dispersing or wetting agents.

A carrier in a composition according to the invention is any material with which the active ingredient is formulated to facilitate application to the locus to be treated, which may for example be a plant, seed or soil, or to facilitate storage, transport or handling. A carrier may be a solid or a liquid including a material which is normally gaseous but which has been compressed to form a liquid and any of the carriers normally used in formulating pesticidal and fungicidal compositions may be used.

Suitable solid carriers include e.g. synthetic silicates, diatomaceous earth, talc, kaolin , siliceous earth etc.

Suitable liquid carriers include e.g. optionally halogenated hydrocarbons, aromatic hydrocarbons, dimethyl formamide, vaseline oil.

Agricultural compositions are often formulated and transported in a concentrated form which is subsequently diluted by the user before application. The presence of small amount of a carrier which is a surface-active agent facilitates this process.

A surface-active agent may be an emulsifying agent, a dispersing agent or a wetting agent; it may be nonionic or ionic. Preferably e.g. fatty alcohol-polyethylene glycol ether, the mixture of dodecylbenzene sulfonic acid-Ca salts and polyoxyethylene alkyl phenols, cresol-formaldehyde condensate, sulfite lye powder etc. are used. The compositions of the invention may for example be formulated as wettable powders, dusts, granules, solutions, emulsifiably concentrates, emulsions, suspensions, suspension concentrates. The emulsifiably concentrates, wettable powders and dusts are preferred.

The invention further provides a method of controlling pests and fungi, which comprises applying a composition according to the invention in a sufficient amount to the plant.

The preferred compounds of formula (I) used as one of the active ingredients in the composition according to the invention are summarized in Table I.

Table I

No.	R_1	R_2	R_3	R_4	X	n_D^{23}
1.	H	H	H	H	Cl	1.5602
2.	H	H	H	H	Br	1.5857
3.	H	H	H	H	J	1.5971
4.	CH_3	H	H	H	Cl	1.5702
5.	CH_3	H	H	H	Br	1.5804
6.	CH_3	H	H	H	J	1.5906
7.	H	CH_3	H	H	Cl	1.5804
8.	H	CH_3	H	H	Br	1.5902
9.	H	CH_3	H	H	J	1.5908
10.	H	H	CH_3	H	Cl	1.5503
11.	H	H	CH_3	H	Br	1.5603
12.	H	H	CH_3	H	J	1.5704
13.	H	H	H	CH_3	Cl	1.5572
14.	H	H	H	CH_3	Br	1.5704
15.	H	H	H	CH_3	J	1.5804
16.	CH_3	CH_3	H	H	Cl	1.5724
17.	CH_3	CH_3	H	H	Br	1.5904
18.	CH_3	CH_3	H	H	J	1.5908
19.	CH_3	H	CH_3	H	Cl	1.5422
20.	CH_3	H	CH_3	H	Br	1.5627
21.	CH_3	H	CH_3	H	J	1.5828
22.	CH_3	H	H	CH_3	Cl	1.5422

Table I

(contd.)

No.	R_1	R_2	R_3	R_4	X	n_D^{23}
23.	CH_3	H	H	CH_3	Br	1.5623
24.	CH_3	H	H	CH_3	J	1.5738
25.	H	CH_3	H	CH_3	Cl	1.5422
26.	H	CH_3	H	CH_3	Br	1.5628
27.	H	CH_3	H	CH_3	J	1.5923
28.	H	H	CH_3	CH_3	Cl	1.5524
29.	H	H	CH_3	CH_3	Br	1.5623
30.	H	H	CH_3	CH_3	J	1.5729
31.	H	CH_3	CH_3	CH_3	Cl	1.5672
32.	H	CH_3	CH_3	CH_3	Br	1.6264
33.	H	CH_3	CH_3	CH_3	J	1.5962
34.	CH_3	CH_3	CH_3	H	Cl	1.5762
35.	CH_3	CH_3	CH_3	H	Br	1.5804
36.	CH_3	CH_3	CH_3	H	J	1.5960
37.	CH_3	H	CH_3	CH_3	Cl	1.5878
38.	CH_3	H	CH_3	CH_3	Br	1.5906
39.	CH_3	H	CH_3	CH_3	J	1.5908
40.	CH_3	CH_3	H	CH_3	Cl	1.5670
41.	CH_3	CH_3	H	CH_3	Br	1.5702
42.	CH_3	CH_3	H	CH_3	J	1.5706
43.	CH_3	CH_3	CH_3	CH_3	Cl	1.5662

Table I.

(contd.)

No.	R_1	R_2	R_3	R_4	X	n_D^{23}
44.	CH_3	CH_3	CH_3	CH_3	Br	1.5708
45.	CH_3	CH_3	CH_3	CH_3	J	1.5706
46.	H	H	H	CH_3	H	1.5529
47.	CH_3	H	H	CH_3	H	1.5806
48.	H	CH_3	H	CH_3	H	1.5706
49.	H	H	CH_3	CH_3	H	1.5604
50.	H	H	H	CH_3	CH_3	1.5448
51.	H	C_2H_5	H	CH_3	H	1.5253
52.	CH_3	H	H	CH_3	CH_3	1.5224
53.	CH_3	CH_3	CH_3	CH_3	H	1.5352
54.	CH_3	CH_3	CH_3	CH_3	CH_3	1.5352
55.	H	H	H	H	H	1.5529
56.	H	H	H	H	SH	1.5572
57.	H	H	CH_3	H	H	1.5369
58.	H	H	H	H	C_2H_5	1.5352
59.	H	H	H	C_2H_5	H	1.5539
60.	CH_3	H	H	C_2H_5	H	1.5816
61.	H	CH_3	H	H	C_2H_5	1.5726
62.	H	H	CH_3	C_2H_5	H	1.5614
63.	CH_3	CH_3	H	H	C_2H_5	1.5252
64.	CH_3	H	H	C_2H_5	H	1.5234

Table I.

(contd.)

No.	R_1	R_2	R_3	R_4	X	n_D^{23}
65.	CH_3	CH_3	CH_3	C_3H_7	H	1.5362
66.	CH_3	CH_3	CH_3	C_2H_5	H	1.5372
67.	H	H	H	i-C_3H_7	H	1.5518

The fungicidal compositions according to the invention are illustrated by the following non-limiting examples. In the Examples - unless otherwise stated - the amounts of the components are always given in % by weight.

Example 1

Wettable powder (10 WP)

In a laboratory blender 9 % of compound 1 of Table I (hereinafter I/1) is sprayed under stirring onto 25 % of Sipernat 50 (synthetic silicate carrier), thereafter 1 % of benomyl or zinc, manganese complex of 8-quinolinolato-dimethyl-dithiocarbamate as active ingredient, 55 % of kaolin as carrier, 2 % of Netzer IS (aliphatic sulfonic acid Na-salt) as wetting agent, 3 % of Dispergiermittel 1494 (cresol/formaldehyde condensate) and 5 % of sulfite waste powder as dispersing agents are added. Thereafter the mixture thus obtained

is homogenized under stirring and finely ground in a laboratory biting cross mill (type Alpine 63 C). The wettable powder thus obtained contains compound I/1 and benomyl or zinc, manganese complex of 8-quinolinolato-dimethyl-dithiocarbamate in a total amount of 10 % and in a ratio of 9:1.

Following the above procedure but using any other compound of Table I and benomyl or zinc, manganese complex of 8-quinolinolato-dimethyl-dithiocarbamate similar 10 WP compositions may be obtained.

Example 2

Wettable powder (20 WP)

In the apparatus according to Example 1, 35 % of kaolin and 40 % of silicic acid as carriers, 15 % of compound I/1, 5 % of benomyl or 8-quinolinolato-dimethyl-dithiocarbamate complex as active ingredients, 2.5 % fatty alcohol sulfate and 2.5 % of ligninsulfonate-Ca-salt as wetting agents are admixed and further the procedure of Example 1 is followed. The wettable powder thus obtained contains the two active ingredients in a total amount of 20 % and in a ratio of 3:1.

Example 3

Wettable powder (45 WP)

In the apparatus according to Example 1 30 % of compound I/1 is sprayed onto 45 % of Sipernat 50 carrier and 15 % of benomyl or zinc, manganese

complex of 8-quinolinolato-dimethyl-dithiocarbamate as active ingredient, 2 % of Netzer IS as wetting agent, 3 % of dispergiermittel 1494 and 5 % of sulfite waste powder as dispersing agents are added and further the procedure of Example 1 is followed. The wettable powder thus obtained contains the two active ingredients in a total amount of 45 % and in a ratio of 2:1.

Following the above procedure but using any other compound of Table I similar 45 WP compositions containing two active ingredients may be obtained.

Example 4

Wettable powder (50 WP)

The procedure of Example 3 is followed but 40 % of Sipernat 50 carrier, 25 % of any compound of Table I and 25 % of benomyl or zinc, manganese complex of 8-quinolinolato-dimethyl-dithiocarbamate are used. The wettable powder thus obtained contains the active ingredients in a total amount of 50 % and in a ratio of 1:1.

Example 5

Wettable powder (50 WP)

In the apparatus according to Example 1 45 % of siliceous earth as carrier, 5 % of compound I/1, 45 % of 8-quinolinolato-dimethyl-dithiocarbamate as active ingredients, 2.5 % of ligninsulfonic acid Ca-salt and 2.5 % of fatty alcohol sulfate as wetting

agents are admixed and further the procedure of Example 1 is followed. the wettable powder thus obtained contains compound I/1 and zinc, manganese complex of 8--quinolinolato-dimethyl-dithiocarbamate active ingredients in a total amount of 50 % and in a ratio of 1:9.

Example 6

Wettable powder (50 WP)

In the apparatus according to Example 1 10 % of Sipernat 50 and 30 % of kaolin as carriers, 10 % of compound I/1 and 40 % of benomyl as active ingredients, 2 % of Netzer IS as wetting agent, 3 % of Dispergiermittel 1494 and 5 % of sulfite waste powder as dispersing agent are admixed and further the procedure of Example 1 is followed. The wettable powder thus obtained contains compound I/1 and benomyl as active ingredients in a total amount of 50 % and in a ratio of 1:4.

Example 7

Wettable powder (55 WP)

In the apparatus according to Example 1 10 % of Sipernat 50 and 25 % of siliceous earth as solid carriers are admixed, thereafter 5 % of compound I/1 is sprayed onto it, then the mixture thus obtained is admixed with 50 % of zinc, manganese complex of 8-quinolinolato-dimethyl-dithiocarbamate or benomyl

as active ingredient, 2 % of Netzer IS as wetting agent, 3 % of Dispergiermittel 1494 and 5 % of sulfite waste powder as dispersing agents are added and homogenized and ground in Alpine 63 C mill. The wettable powder thus obtained contains compound I/1 and benomyl or zinc, manganese complex of 8-quinolinolato-dimethyl-dithiocarbamate in a total amount of 55 % and in a ratio of 1:10.

Following the above procedure but using any other compound of Table I similarly 55 WP compositions, containing two active ingredients may be obtained.

Example 8

Wettable powder (60 WP)

In the apparatus according to Example 1 20 % of compound I/1 is sprayed onto 15 % of Wessalon S (synthetic silicate) as carrier and 15 % of siliceous earth as further carrier, 40 % of benomyl or zinc, manganese complex of 8-quinolinolato-dimethyl-dithiocarbamate as further active ingredient, 2 % of Netzer IS as wetting agent, 3 % of Dispergiermittel 1494 and 5 % of sulfite waste powder as dispersing agents are added and further the procedure of Example 1 is followed. The wettable powder thus obtained contains the two active ingredients in a total amount of 60 % and in a ratio of 1:2.

Example 9

Wettable powder (80 WP)

In the apparatus according to Example 1 11 % of Sipernat 50 as carrier, 40 % of compound I/8 benomyl or and 40 % of zinc, manganese complex of 8-quinolinolato--dimethyl-dithiocarbamate as active ingredients, 2 % of Netzer IS as wetting agent, 3 % of Dispergiermittel 1494 and 4 % of sulfite waste powder as dispersing agents are admixed and further the procedure of Example 1 is followed. The wettable powder thus obtained contains the two active ingredients in a total amount of 80 % and in a ratio of 1:1.

Following the above procedure but using instead of compound I/8 compounds 1, 9, 13, 15, 21, 24, 26, 29 or 33, similarly 80 WP compositions containing two active ingredients may be obtained.

Example 10

Oily suspension (50 FW)

In a mixture containing 25 % of compound I/1 as active ingredient, 40 % of vaseline oil (technical grade), 8 % of Emulsogen M (fatty alcohol-polyethylene glycol ether) and 2 % of Atlox 4856 B (mixture of dodecylbenzene sulfonic acid Ca-salt and polyoxyethylene alkyl phenols) as emulsifying agents 25 % of benomyl or zinc, manganese complex of 8-quinolinolato-dimethyl--dithiocarbamate) is suspended and the mixture obtained finely ground in a laboratory ball mill. The oily sus-

pension thus obtained contains compound I/1 and benomyl or zinc, manganese complex of 8-quinolinolato-dimethyl-dithiocarbamate as active ingredients in a total amount of 50 % and in a ratio of 1:1.

Following the above procedure but using instead of compound I/1 compounds 2, 3, 4, 5, 6, 7, 10, 11, 12, 14, 16, 17, 18, 19, 20, 22, 23, 25, 27, 28, 30, 31, 32 of Table 1, similarly 50 FW compositions containing two active ingredients may be obtained.

Example 11

Oily suspension (50 FW)

In the mixture containing 40 % of compound I/1, as active ingredient 40 % of technical grade vaseline oil, 8 % of Emulsogen M and 2 % of Atlox 4856 B as emulsifying agents, 10 % of benomyl as active ingredient is suspended and further the procedure of Example 10 is followed. The oily suspension thus obtained contains compound I/1 and benomyl as active ingredients in a total amount of 50 % and in a ratio of 4:1.

Following the above procedure but using any other compound of Table I, and benomyl as active ingredients, similarly 50 FW compositions may be obtained.

Example 12

Oily suspension (60 FW)

In the mixture containing 40 % of compound I/1, as active ingredient 30 % of technical grade

vaseline oil, 7 % of Emulsogen M and 3 % of Atlox 4856 B as emulsifying agents 20 % of benomyl or zinc, manganese complex of 8-quinolinolato-(dimethyl-dithiocarbamate) as active ingredient is suspended and further the procedure of Example 10 is followed. The oily suspension thus obtained contains compound I/1 and benomyl or zinc manganese complex of 8-quinolinolato-dimethyl--dithiocarbamate as active ingredients in a total amount of 60 % and in a ratio of 2:1.

Exaple 13

Wettable powder (20 WP)

In the apparatus according to Example 1 2.5 % of compound I/1 is sprayed onto 75 % of siliceous earth as carrier thereafter 7.5 % of benomyl and 10 % of zinc, manganese complex of 8-quinolinolato-dimethyl--dithiocarbamate as active ingredients, 2.5 % of lignine sulfonic acid Ca-salt and 2.5 % of fatty alcohol sulfate as wetting agents are added and further the procedure of Example 1 is followed. The wettable powder thus obtained contains the three active ingredients (compound I/1, benomyl, zinc, manganese complex of 8-quinolinolato--dimethyl-dithiocarbamate in a total amount of 20 % and in a ratio of 1:3:4.

Example 14

Wettable powder (45 WP)

In the apparatus according to Example 1

5 % of compound I/1 is sprayed onto 50 % of siliceous earth as carrier, thereafter 10 % of benomyl and 30 % of zinc, manganese complex of 8-quinolinolato-dimethyl--dithiocarbamate as active ingredients, 2.5 % of lignin-sulfonic acid Ca-salt and 2.5 % of fatty alcohol sulfate as wetting agents are added and further the procedure of Example 1 is followed. The wettable powder thus obtained contains the three active ingredients in a total amount of 45 % and in a ratio of 1:2:6.

Example 15

Wettable powder (55 WP)

In the apparatus according to Example 1 5 % of compound I/1 as active ingredient is sprayed onto 25 % of siliceous earth and 10 % of Sipernat 50 as carriers thereafter 10 % of benomyl and 40 % of zinc, manganese complex of 8-quinolinolato-dimethyl--dithiocarbamate as active ingredients, 2 % of Netzer IS as wetting agent, 3 % of Dispergiermittel 1494 and 5 % of sulfite waste powder as dispersing agents are added and further the procedure of Example 1 is followed. The wettable powder thus obtained contains the three active ingredients in a total amount of 55 % and in a ratio of 1:2:8.

Following the above procedure but using any other compound of Table I similarly WP compositions, containing three active ingredients may be obtained.

Example 16

Wettable powder (80 WP)

In the apparatus according to Example 1 10 % of compound I/1 is sprayed onto 11 % of Sipernat as carrier and thereafter 20 % of benomyl and 50 % of zinc, manganese complex of 8-quinolinolato-dimethyl--dithiocarbamate as active ingredients, 2 % of Netzer IS as wetting agent, 3 % of Dispergiermittel 1494 and 4 % of sulfite waste powder as dispersing agents are added and further the procedure of Example 1 is followed. The wettable powder thus obtained contains the three active ingredients in a total amount of 80 % and in a ratio of 1:2:5.

Example 17

Emulsifiable concentrate (20 EC)

In a flask equipped with a stirrer 70 % of xylene, 20 % of a compound I/1 as active ingredient, 5 % of alkyl phenyl polyethylene glycol ether and 5 % of alkyl polyglycol ether as emulsifying agents are added under stirring, stirred until clear solution is obtained and optionally filtered. The emulsifiable concentrate thus obtained contains the compound I/1 in an amount of 20 %.

Following the above procedure but using any other compound of Table 1, similarly 20 EC composition may be obtained.

Example 18

Emulsifiable concentrate (50 EC)

In the apparatus according to Example 17 50 % of compound I/1 is admixed with 5 % of polyethylene glycol (Carbovax 1000, polymerisation grade of 1000) and with 10 % of the adduct of ethylene oxide and di(isohexyl-isoheptyl) phenol as emulsifying agents thereafter the emulsion thus obtained is completed to 100 % with benzene. The emulsifiable concentrate thus obtained contains 50 % of active ingredients.

Following the above procudere but using any other compound of Table 1 similarly 50 EC compositions may be obtained.

The activity of the fungicidal compositions according to the invention containing two or three active ingredients has been tasted on various plants, against different fungi under laboratory and field conditions in comparison with known fungicidal compositions. The experiments and results thereof are shown in the following biological Examples.

Example 19

Fungicidal activity against bunt smut on winter wheat seeds

The composition according to the invention containing two active ingredients was tested under laboratory conditions on winter wheat (variety of MV-8) against bunt smut (Tilletia spp).

The seeds were infected with 0.2 % of bunt smut spore, thereafter seed dressed using compound I/1 (2-(O-2'-chloroethyl)-2-thio-1,3,2-oxathiaphospholane, in form of a composition prepared according to Example 17), Kelokarb 80 WP (80 % of zinc, manganese complex of 8-quinolinolato-dimethyl-dithiocarbamate, Agrocit 50 WP (50 % of 1-butyl-carbamoyl-benzimidazole-2-methyl-carbamate) and the combinations thereof. The following treatments were carried out:

1.) Untreated control

2.) Compound I/1 1 kg/to seed

3.) Agrocit 50 WP 2 kg/to

4.) Kelokarb 80 WP 2 kg/to

5.) Compound I/1. 0.25 kg/to + Agrocit 50 WP 1.5 kg/to

6.) Compound I/1. 0.50 kg/to + Agrocit 50 WP 1.0 kg/to

7.) Compound I/1. 0.75 kg/to + Agrocit 50 WP 0.5 kg/to

8.) Compound I/1. 0.25 kg/to + Kelokarb 80 WP 1.5 kg/to

9.) Compound I/1. 0.50 kg/to + Kelokarb 80 WP 1.0 kg/to

10.) Compound I/1. 0.75 kg/to + Kelokarb 80 WP 0.5 kg/to

Seed impressions were made for every treatment respectively, using 4 x 100 seeds and 5 and 10 days/later the sporulation ratio was determined on every impression. The results obtained are summarized in Table II.

Table II.

No. of the treatments	Rate of the sporulation in %	
	on the 5th day after treatment	on the 10th day after treatment
1.	75.3	82.9
2.	12.4	20.1
3.	19.7	28.3
4.	22.4	30.1
5.	6.8	19.1
6.	3.8	7.3
7.	8.4	13.1
8.	9.7	18.3
9.	0.6	2.4
10.	2.9	5.6

The data of the Table II clearly show that the compound I/1 alone and the two known commercially available seed dressing agents are less active against bunt smut than the combinations thereof. Particularly active is the composition according to the invention containing compound I/1 and zinc, manganese complex of 8-quinolinolato-dimethyl-dithiocarbamate in a ratio of 1:2 (treatment No. 9).

Example 20

Fungicidal activity against diseases of winter barley at germ stage

The experiments were carried out on winter barley (variety of GK-Szeged) in plots of 20 m^2. The intrinsic infection of seeds caused by Fusarium spp. was 19 %. The seed dressing was carried out by 2-(O--2'-chloroethyl)-2-thio-4-methyl-1,3,2-oxathiophospholane (compound I/7 in form of composition of Example 17), Kelokarb 80 WP, Dithane M 45 (80 % of /zinc, manganese/ ethylene-bis(dithiocarbamate)) and by the combination of these compositions. The treatments were as follows:

1.) Untreated control

2.) Compound I/7. 1 kg/to seed

3.) Kelokarb 80 WP 2 kg/to

4.) Dithane M-45 1.25 kg/to

5.) Compound I/7. 0.25 kg/to + Kelokarb 80 WP 1.5 kg/to

6.) Compound I/7. 0.50 kg/to + Kelokarb 80 WP 1.0 kg/to

7.) Compound I/7. 0.75 kg/to + Kelokarb 80 WP 0.5 kg/to

8.) Compound I/7. 0.25 kg/to + Dithane M-45 0.9375 kg/to

9.) Compound I/7. 0.50 kg/to + Dithane M-45 0.625 kg/to

10.) Compound I/7. 0.75 kg/to + Dithane M-45 0.3125 kg/to

200 seeds per treatment were incubated in wet chamber, thereafter the number of germinated healthy seeds was determined. In field experiments the number of the emerging plants was determined at the 2-4 leaves stage of the barley plants on a section of 3x5 m.

The results obtained are summarized in Table III.

Table III.

No. of the treatment	Germination in %	Infection % Fusarium spp.	Infection % Alternaria spp.	No. of plants per m	No. of plants %
1.	95.5	19.0	31.0	52.4	100.0
2.	99.5	3.7	4.5	54.8	104.6
3.	99.0	4.1	5.2	54.9	104.8
4.	99.5	5.3	6.8	53.7	102.5
5.	99.0	1.3	0	56.3	107.4
6.	99.0	0.5	0	56.9	108.6
7.	99.5	0.5	0	56.6	108.0
8.	99.5	2.0	3.0	55.9	106.7
9.	99.5	0	0	56.7	108.2
10.	99.0	0.5	0	56.7	108.2

The data of Table III clearly show that compound I/7 - neither alone nor in combination with the other two commercially available seed dressing agents - is phytotoxic to the seeds. The combinations protect the seeds against the pathogenic fungi and increase the emergence % in comparison with the treated control as well as with the compositions containing only a single active ingredient.

Example 21

Fungicidal activity against diseases of corn at germ stage

The experiments were carried out on hybride seed (variety of Pi 3747) in plots of 20 m^2.

The instrinsic infection of seeds caused by Fusarium spp was 23 % and the capability of germinating was 94 %. The seed dressings were carried out by 2-(O-2'-chloroethyl)-2-thio-4,5-dimethyl-1,3,2-oxathiaphospholane (compound I/16, in form of composition of Example 17), BF-51 90 WSC (90 % of 3-isononyl-oxy-propyl-ammonium-methylphosphonate), TMTD (50 % of tetramethyl-tiurame disulfide), Kelokarb 80 WP and by the combinations of these compositions. The treatments were as follows:

1.) Untreated control
2.) Compound I/16, 1 kg/to seed
3.) TMTD 2 kg/to
4.) BF-51 90 WSC 1.1 l/to
5.) Kelokarb 80 WP 2 kg/to
6.) Compound I/16 0.5 kg/to + TMTD 1 kg/to
7.) Compound I/16 0.5 kg/to + BF-51 90 WSC 0.55 l/to
8.) Compound I/16 0.5 kg/to + Kelokarb 80 WP 1.0 kg/to

200 seeds per treatment were incubated in wet chamber and the rate of infection was determined under laboratory conditions.

200 seeds per treatment were sown on field plots and at 2-leaves stage of the plants the number of plants emerging from 200 seeds was determined. The results obtained are summarized in Table IV.

Table IV.

No. of treatments	Infection %			No. of emerged plants	
	Fusarium spp.	Penicillium spp.	Aspergillus spp.	pieces/200 seeds	%
1.	23.0	17.0	5.5	181	100
2.	5.3	2.1	0	190	104.9
3.	7.9	6.8	5.6	185	102.2
4.	5.7	4.2	3.1	189	104.4
5.	7.5	6.5	4.9	184	101.7
6.	1.5	0	0	196	108.3
7.	0	0	0	198	109.4
8.	2.0	0	0	197	108.8

The data of Table IV. clearly show that compound I/16 in combination with the three different, commercial seed dressing materials protects the seeds of corn against fungal infection and increases the emergence %.

Example 22

Fungicidal activity against diseases of sunflower at germ stage

The experiments were carried out on sunflower seeds (variety of GK 70) in plots of 20 m^2 using 200 pieces of seed in every treatment. The seed dressings were carried out by 2-(O-1'-methyl-2'-chloroethyl)--2-thio-4,5-dimethyl-1,3,2-oxathiaphospholane (compound I/34, in form of composition of Example 17), Sandofan 25 WP (25 % 2-methoxy-N-(2-oxo-1,3-oxazolidine-3-yl)--acet-2,6-oxylidide), Apron 35 SD (35 % of DL-N-(2,6--dimethyl-phenyl)-N-(2'-methoxy-acetyl)-alanine methyl-ester), Kelokarb 80 WP and by the combinations of these compositions. The treatments were the following:

1.) Untreated control
2.) Sandofan 25 WP 2 kg/to seed
3.) Apron 35 SD 3 kg/to
4.) Compound I/34. 0.5 kg/to
5.) Kelokarb 80 WP 2.0 kg/to
6.) Compound I/34 0.25 kg/to + Sandofan 25 WP 1 kg/to
7.) Compound I/34 0.50 kg/to + Apron 35 SD 1.5 kg/to
8.) Compound I/34 0.50 kg/to + Kelokarb 80 WP 1.0 kg/to

When evaluating the experiments the values of infection % were determined in laboratory conditions and in field the number of plants - emerging from 200 seeds - was determined at the 2-leaves stage. The results obtained are summarized in Table V.

Table V.

No. of treatments	Infection %		No. of emerged plants	
	Botrytis spp.	Alternaria spp.	pieces/200 seeds	%
1.	29.0	16.0	152	100.0
2.	19.0	11.0	158	103.9
3.	18.0	12.0	158	103.9
4.	15.0	11.0	156	102.6
5.	20.0	11.0	157	103.4
6.	7.0	3.0	169	111.2
7.	5.0	7.0	170	111.8
8.	5.0	4.0	174	114.5

The data of Table V. clearly show that the activity of compound I/34 and the three commercially available compositions alone is inferior to that of the combinations of these materials. The composition containing compound of Formula (I) and zinc, manganese complex of 8-quinolinolato-dimethyl-dithiocarbamate in a ratio of 1:2 (treatment No. 8) shows a particular good activity, i.e. the infection % has significantly been reduced and the emergence % has significantly been increased.

Example 23

Fungicidal activity against diseases of soya at germ stage

The experiments were carried out in 4 replicate in plots of 2 m^2. The seed dressings were carried out by 2-(O-n-propyl)-2-thio-1,3,2-oxathia-phosphulane (compound I/46, in form of composition of Example 17), Kolfugo 25 FW (25 % of 2-methoxycarbonyl-amino-benz-imidazole), Orthocid 50 WP (50 % of N-trichloro-methyl-thio-tetrahydrophtalimide), Kelokarb 80 WP and by the combinations of these materials. The treatments were as follows:

1.) Untreated control
2.) Compound I/46 1.0 kg/to seed
3.) Kolfugo 25 FW 3.0 l/to
4.) Orthocid 50 WP 2.0 kg/to
5.) Kelokarb 80 WP 2.0 kg/to
6.) Compound I/46 0.375 kg/to + Kolfugo 25 FW 1.5 l/to
7.) Compound I/46 0.50 kg/to + Orthocid 50 WP 1.0 kg/to
8.) Compound I/46 0.25 kg/to + Kelokarb 80 WP 1.5 kg/to
9.) Compound I/46 0.50 kg/to + Kelokarb 80 WP 1.0 kg/to
10.) Compound I/46 0.75 kg/to + Kelokarb 80 WP 0.5 kg/to

Just before the sowing the seeds were also treated witn Nitrofix vaccine in an amount of 2.0 kg/to. The germination % was determined on 200 seeds in laboratory conditions. By the field experiments the emergence % as well as the number of the root tubers and the crop

were determined. The results obtained are summarized in Table VI.

Table VI.

No. of treatments	Germinating %	Emergence %	Weight of root tubers g/30 plants	Crop (kg/m^2)
1.	92.0	74.0	0.053	1.15
2.	95.0	81.0	0.049	1.16
3.	94.0	78.0	0.037	1.19
4.	94.0	82.0	0.040	1.22
5.	95.0	80.0	0.046	1.19
6.	97.0	86.0	0.047	1.20
7.	97.0	88.0	0.049	1.24
8.	96.0	85.0	0.045	1.22
9.	98.0	91.0	0.047	1.27
10.	97.0	86.0	0.044	1.23

The data of Table VI clearly show that the combinations of compound I/46 and the three commercially available seed dressing agents increase the germination %, the emergence % as well as the crop in comparison with the untreated control and with the treatments carried out by compositions containing only a single active ingredient without any decreasing in the number of Rhizobium tubers. The composition according to the

invention containing compound of formula (I) and zinc, manganese complex of 8-quinolinolato-dimethyl-dithiocarbamate in a ratio of 1:2 (treatment No. 9). shows a particularly good activity.

Example 24

Fungicidal activity against diseases of cotton at germ stage

The experiments were accomplished in glass house. The seed dressings were carried out by 2-(O--2'-SH-ethyl)-2-thio-1,3,2-oxathiaphospholane (compound I/56, in form of composition of Example 17), Quinolate 15 (15 % of copper oxyquinolate), Topsion M 70 WP (70 % of 1,2-bis-(3-methoxycarbonyl tioureido)-benzene), Kalokarb 80 WP and by the combinations of the materials. The treatments were the following:

1.) Untreated control

2.) Compound I/56 1 kg/to seed

3.) Quinolate 15 2 kg/to

4.) Topsin-M 70 WP 2 kg/to

5.) Kelokarb 80 WP 2 kg/to

6.) Compound I/56 0.15 kg/to + Quinolate 15 1 kg/to

7.) Compound I/56 0.70 kg/to + Topsin-M 70 WP 1 kg/to

8.) Compound I/56 0.25 kg/to + Kelokarb 80 WP 1.5 kg/to

9.) Compound I/56 0.50 kg/to + Kelokarb 80 WP 1.0 kg/to

10.) Compound I/56 1.0 kg/to + Kelokarb 80 WP 0.5 kg/to

200 seeds were sown per treatment and the emergence % of cotton plants was determined. The results obtained are summarized in Table VII.

Table VII.

No. of treatments	Emergence %
1.	43.0
2.	68.0
3.	69.0
4.	70.0
5.	61.0
6.	83.0
7.	88.0
8.	87.0
9.	96.0
10.	94.0

The data of Table VII clearly show that the compound I/56 and the three commercially available compositions possess less activity alone against the disease of cotton at germ stage than the combinations of these materials. The composition containing compound of formula (I) and the zinc, manganese complex of 8-quinolinolato-dimethyl-dithiocarbamate in ratios of 1:2 and 2:1 (treatment Nos. 9 and 10) is particularly effective.

Example 25

Fungicidal activity against fungal diseases of spring barley

The experiments were carried out in plots 10 m^2 and for the seed dressings 2-(O-n-butyl)-2-thio--4,5-dimethyl-1,3,2-oxathiaphospholane (compound I/63, in form of composition of Example 17), Baytan F (15 % of 1-(4-chlorophenoxy)-1-(1H-1,2,4-triazol-1-yl)-3,3--dimethyl-2-butanone + 2 % of 2-(2-furyl)-benzimidazole), Trifumine 30 WP (30 % of 4-chloro-trifluoro-N-1-(1H--imidazol-1-yl)-2-propoxy-ethylidine-(O-toluylidine), Kelokarb 80 WP and the combinations of these materials were used. The treatments were as follows:

1.) Untreated control
2.) Baytan F 2.0 kg/to seed
3.) Trifumine 30 WP 5.0 kg/to
4.) Kelokarb 80 WP 2.0 kg/to
5.) Compound I/63 1.0 kg/to
6.) Compound I/63 0.5 kg/to + Baytan F 1.0 kg/to
7.) Compound I/63 0.75 kg/to + Trifumine 30 WP 2.5 kg/to
8.) Compound I/63 0.5 kg/to + Kelokarb 80 WP 1.0 kg/to

The effect of the treatments was determined on a section of 10 x 1 m by determining the emergence % at earing of corn, the rate of infection, caused by powdery mildew and Helminthosporium, on every leaf level from which the infection index (F_i) was determined using the following scale:

0	no symptom
1	5 % or less infection
2	6-10 % infection
3	11-25 % infection
4	26-50 % infection
5	51-75 % infection
6	76-100 % infection

wherein the values of infection % mean the ratio of the surfaces of healthy and infected leaves and the average values of leaf-surfaces - belonging to four leaf-levels - covered by mycelia respectively. On the basis of the data obtained the infection index (F_i) was calculated using the following equation:

$$F_i = \frac{a_i \times f_i}{n}$$

wherein a_i is the infection value according to the above scale, f_i is the frequency thereof and n is the number of the plants.

The results obtained are summarized in Table VIII.

Table VIII.

No. of treatments	Number of sprang plants per m	Infection index (F_i) Helmintho-sporium	Powdery mildew	Yield to/ha
1.	56.1	1.88	2.93	4.77
2.	57.3	1.43	0.83	5.06
3.	56.4	1.43	2.20	4.78
4.	56.6	1.79	2.46	4.80
5.	56.8	1.65	1.94	4.88
6.	59.4	1.03	0.03	5.36
7.	57.7	1.14	1.20	5.12
8.	57.9	1.57	1.89	5.01

The data of table VIII clearly show that by the use of the composition containing two active ingredients the emergence of the spring barley can be increased, the rate of the infection caused by powdery mildew and Helminthosporium can be reduced in comparison with the untreated control and with the treatments carried out by a composition containing only one active ingredient. Due to these effects enhanced crop can also be obtained.

Example 26

Fungicidal activity against fungal diseases of winter barley

The experiments were carried out on plots of 50 m^2. The seeds of the winter barley were infected by loose smut. To get protection against the loose smut (Ustilago nuda) and against powdery mildew of barley (Erysiphe graminis hordei) seed dressings were carried out using 2-(O-2'-bromoethyl)-2-thio-1,3,2-oxathiaphospholane (compound I/2, in form of composition of Example 17), Milstem (500 g/l of 5-n-butyl-2-ethyl-amino-6-hydroxy-4-methyl-pyrimidine), Kelokarb 80 WP and with the combinations of these materials. The treatments were as follows:

1.) Untreated control
2.) Compound I/2 1 kg/to seed
3.) Milstem 5.0 l/to
4.) Kelokarb 80 WP 2.0 kg/to
5.) Compound I/2 0.5 kg/to + Milstem 3.0 l/to
6.) Compound I/2 0.75 kg/to + Milstem 2.0 l/to
7.) Compound I/2 0.25 kg/to + Milstem 4.0 l/to
8.) Compound I/2 0.25 kg/to + Kelokarb 80 WP 1.5 kg/to
9.) Compound I/2 0.50 kg/to + Kelokarb 80 WP 1.0 kg/to
10.) Compound I/2 0.75 kg/to + Kelokarb 80 WP 0.5 kg/to
11.) Compound I/2 0.5 kg/to + Kelokarb 80 WP 1.0 kg/to + + Milstem 2.5 l/to

12.) Compound I/2 0.25 kg/to + Kelokarb 80 WP 1.5 kg/to + + Milstem 3.0 l/to

13.) Compound I/2 1.0 kg/to + Kelokarb 80 WP 0.75 kg/to + + Milstem 1.0 l/to

The phytotoxic effects of treatments were evaluated by determining the emergence % at the 2-4 leaves stage of barley. The rate of infection caused by powdery mildew was determined at flowering, using the scale and the infection index described in Example 25. The rate of infection caused by smut fungi was evaluated at flowering by determining the number of ears. The results obtained are summarized in Table IX.

Table IX.

No. of treatments	No. of emerged plants per m	No. of ears infected by loose smut pieces/plot	Infection indes F_i for powdery mildew
1.	53.6	50.5	3.64
2.	56.7	3.3	2.11
3.	54.8	49.3	0.85
4.	55.0	8.7	3.13
5.	55.2	6.5	0.49
6.	56.3	5.3	0.56

Table IX.

(contd.)

No. of treatments	No. of emerged plants per m	No. of ears infected by loose smut pieces/plot	Infection indes F_i for powdery mildew
7.	54.9	10.2	0.68
8.	56.9	2.3	2.91
9.	57.8	0.0	2.30
10.	56.9	0.0	2.02
11.	57.7	0.0	0.57
12.	57.2	3.0	0.51
13.	56.9	0.0	0.66

The data of Table IX clearly show that none of the compositions containing two or three active ingredients is phytotoxic to the winter barley as the values of emergence % are in all cases higher than that of the untreated control. The compositions containing two or three ingredients provide protection for winter barley against both powdery mildew and loose smut. Such simultaneous effect cannot be obtained by the use of compositions containing only one active ingredient.

Example 27

Fungicidal activity against disease of sugar beet at germ stage

Under laboratory conditions sugar beet seeds were treated using 2-(O-2'-chloroethyl)-2-thio-1,3,2--oxathiaphospholane (compound I/1, in form of composition of Example 17), Kelokarb 80 WP, Benguinox (1,4--benzoquinone-N-benzoyl-hydrazone-oxime) and with the combinations of these materials. The treatments were as follows:

1.) Untreated control
2.) Compound I/1 125 g/to seed
3.) Compound I/1 250 g/to
4.) Compound I/1 500 g/to
5.) Compound I/1 1000 g/to
6.) Kelokarb 80 WP 2.0 kg/to
7.) Benguinox 50 g/to
8.) Benguinox 100 g/to
9.) Benguinox 200 g/to
10.) Benguinox 400 g/to
11.) Benguinox 800 g/to
12.) Benguinox 800 g/to + Compound I/1 125 g/to
13.) Compound I/1 125 g/to + Benguinox 400 g/to
14.) Compound I/1 250 g/to + Benguinox 400 g/to
15.) Compound I/1 250 g/to + Benguinox 200 g/to
16.) Compound I/1 500 g/to + Benguinox 200 g/to
17.) Compound I/1 500 g/to + Benguinox 100 g/to

18.) Compound I/1 1000 g/to + Benguinox 100 g/to

19.) Compound I/1 1000 g/to + Benguinox 50 g/to

20.) Compound I/1 500 g/to + Kelokarb 80 WP 1.0 kg/to + + Benguinox 50 g/to

21.) Compound I/1 250 g/to + Kelokarb 80 WP 0.75 kg/to + + Benguinox 50 g/to

22.) Compound I/1 750 g/to + Kelokarb 80 WP 0.5 kg/to + + Benguinox 50 g/to

23.) Compound I/1 250 g/to + Kelokarb 80 WP 0.5 kg/to + + Benguinox 200 g/to

24.) Compound I/1 500 g/to + Kelokarb 80 WP 0.25 kg/to + + Benguinox 400 g/to

10 treated seeds were sown in every pot and the temperature thereof was kept at 6 - 8 ^{o}C and the water-content at 70 - 90 %, to provide favourable life conditions for pathogenic fungi of sugar beets at the germ stage (Pythium spp, Rizochtonia spp). The compositions were evaluated on the basis of emergence %. The results obtained are summarized in Table X.

Table X.

No. of treatments	Emergence %
1.	37.9
2.	49.8

Table X.

(contd.)

No. of treatments	Emergence %
3.	63.1
4.	69.4
5.	52.3
6.	57.6
7.	36.5
8.	40.7
9.	43.2
10.	53.2
11.	60.9
12.	88.6
13.	87.9
14.	83.2
15.	81.6
16.	84.1
17.	85.2
18.	81.3
19.	82.5
20.	90.2
21.	87.1
22.	89.3
23.	80.4
24.	87.6

The data of Table X clearly show that the value of emergence % significantly increases after carrying out seed dressing with a composition containing compound I/1, with Kelokarb or with Benguinox. However, this effect may further be enhanced if the seed dressings are carried out with the compositions according to the invention containing two or three active ingredients.

Example 28

Fungicidal activity against diseases of rice at the germ stage

The experiments were carried out on plots of 25 m^2. For seed dressing 2-(O-2'-chloroethyl-2-thio--1,3,2-oxathiaphospholane (compound I/1 in form of composition of Example 17), Tachigaren 70 (70 % of 3-hydroxy-5-methyl-isoxazole), Kelokarb 80 WP and the combinations of these materials were used. The treatments were as follows:

1.) Untreated control

2.) Compound I/1 1.0 kg/to seed

3.) Tachigaren 70 3.0 kg/to

4.) Kelokarb 80 WP 2.0 kg/to

5.) Compound I/1 0.5 kg/to + Tachigaren 70 1.5 kg/to

6.) Compound I/1 0.75 kg/to + Tachigaren 70 1.0 kg/to

7.) Compound I/1 0.5 kg/to + Kelokarb 80 WP 1.0 kg/to

8.) Compound I/1 0.5 kg/to + Kelokarb 80 WP 1.0 kg/to + + Tachigaren 70 1.0 kg/to

The plants were evaluated at 2-leaves stage by determining the number of plants in a section of 10 x 1 m in every plot, determining the length of 50 plants and the yield after harvesting.

The results obtained are summarized in Table XI.

Table XI.

No. of treatments	No. of plants	Length cm	Yield to/ha
1.	55.2	5.5	4.02
2.	58.9	5.8	4.17
3.	60.3	5.8	4.20
4.	58.6	5.6	4.11
5.	62.9	5.9	4.49
6.	66.3	5.9	4.30
7.	61.8	5.7	4.35
8.	68.8	5.9	4.58

The data of Table XI clearly show that all treatments improve the emergenc of rice, promote the initial growth of the young plants and enhance the yield.

Example 29

Fungicidal activity against diseases of sunflower at germ stage

The sunflower plants emerging from the treated seeds were examined in plots of 20 m^2. The seed dressings were carried out with 2-(O-2'-chloroethyl)-2-thio-1,3,2--oxathiaphospholane (compound I/1, in form of composition of Example 17), Kelokarb 80 WP, Ju-Knol (gibberelinic acid + boric acid) and with the combination of these materials. The treatments were as follows:

1.) Untreated control

2.) Compound I/1 1.0 kg/to

3.) Kelokarb 80 WP 2.0 kg/to

4.) Ju-Knol 5.11 g/to

5.) Compound I/1 0.5 kg/to + Kelokarb 80 WP 1.0 kg/to + + Ju-Knol 5.11 g/to

6.) Compound I/1 0.25 kg/to + Kelokarb 80 WP 1.5 kg/to + + Ju-Knol 5.11 g/to

7.) Compound I/1 0.75 kg/to + Kelokarb 80 WP 0.5 kg/to + + Ju-Knol 5.11 g/to

8.) Compound I/1 0.25 kg/to + Ju-Knol 5.11 g/to

9.) Compound I/1 0.50 kg/to + Ju-Knol 5.11 g/to

10.) Compound I/1 0.75 kg/to + Ju-Knol 5.11 g/to

11.) Compound I/1 1.00 kg/to + Ju-Knol 5.11 g/to

The germination % was determined on 200 seeds in wet chamber. In the field best 200 seeds were sown. At the first leaf stage the number of the emerging

plants and at the 6-8 leaves stage the length thereof was determined. the results obtained are summarized in Table XII.

Table XII.

No. of treatments	Germination %	No. of plants/plot	Average length of plants, cm
1.	89	136	38.2
2.	94	142	41.7
3.	95	143	40.3
4.	97	142	44.2
5.	97	150	52.8
6.	96	146	48.7
7.	97	145	51.2
8.	96	141	46.1
9.	97	143	48.2
10.	96	143	49.7
11.	97	144	48.6

The data of Table XII clearly show that when the fungicidal compositions according to the invention (containing two or three active ingredients) are used in combination with Ju-Knol (germinating promoter) the number of the sunflower plants increases significantly and the initial growth thereof is also improved.

Example 30

Fungicidal activity on seed potato

Seed dressings of seed-potato were carried out by 2-(O-1'-methyl-n-butyl)-2-thio-1,3,2-oxathiaphospholane (compound I/62 in form of Example 17), Kelokarb 80 WP, Sayfos 80 (dimethyl-diamino-triazinyl--methyl-dithiophosphate), Rhizolex 25 FL (2,6-dichloro--p-tolyl-O,O-dimethyl-phosphorothioate) and with the combination of these materials. The treatments were as follows:

1.) Untreated control

2.) Compound I/62 1.0 kg/to

3.) Kelokarb 80 WP 2.0 kg/to

4.) Sayfos 80 1.0 kg/to

5.) Rhizolex 25 FL 1.0 l/to

6.) Compound I/62 0.5 kg/to + Kelokarb 80 WP 1.0 kg/to

7.) Compound I/62 0.5 kg/to + Rhizolex 25 FL 0.5 l/to

8.) Compound I/62 0.25 kg/to + Sayfos 80 0.25 kg/to

9.) Compound I/62 0.50 kg/to + Sayfos 80 0.50 kg/to

10.) Compound I/62 1.0 kg/to + Sayfos 80 1.0 kg/to

11.) Compound I/62 0.5 kg/to + Kelokarb 80 WP 1.0 kg/to + + Sayfos 80 1.0 kg/to

12.) Compound I/62 0.75 kg/to + Kelokarb 80 WP 1.0 kg/to + + Sayfos 80 0.75 kg/to

13.) Compound I/62 1.0 kg/to + Kelokarb 80 WP 1.0 kg/to + + Sayfos 80 0.5 kg/to

The compositions were sprayed onto the seed--potatoes and when the length of the shoots was 5 - 8 cm the ratio (in %) of the stocks infected by aphids (plant louses) thereafter the rate of rhizoctonic mouldering were determined on 100 underground shoots using the scale of 0 - 6 and infection index described in Example 25. After the harvesting the yield was also determined. The results obtained are summarized in Table XIII.

Table XIII.

No. of treatments	Infection by aphids in %	Infection index of rhizoctonic shoots	Yield to/ha
1.	23	0.14	50.7
2.	24	0.06	52.3
3.	25	0.11	50.9
4.	5	0.16	50.1
5.	26	0.04	54.9
6.	26	0.05	53.4
7.	25	0.02	56.1
8.	9	0.13	50.9
9.	6	0.09	51.3
10.	0	0.07	53.2
11.	0	0.06	52.3
12.	0	0.06	54.0
13.	3	0.04	53.9

The data of Table XIII clearly show that the compositions containing compound I/62 together with one or two other active ingredients protect the potato against the early aphid infection and inhibit the rhizoctonic stem mouldering.

Example 31

Fungicidal activity against diseases of oil flax at germ stage

The oil flax plants sprang from treated seeds were examined in plots of 20 m^2. The seed dressings were carried out with 2-(O-1'-methyl-2'-chloroethyl)--2-thio-1,3,2-oxathiaphospholane (compound I/10, in form of composition of Example 17), Kelokarb 80 WP, Agrocit 50 WP, Chinufur 40 FW (40 % of 2,3-dihydro--2,2-dimethyl-7-benzofuranyl-methylcarbamate) and with the combinations of these materials. The treatments were as follows:

1.) Untreated control
2.) Compound I/10 1.0 kg/to
3.) Kelokarb 80 WP 2.0 kg/to
4.) Agrocit 50 WP 2.0 kg/to
5.) Chinufur 40 FW 5.0 l/to
6.) Compound I/10 1.0 kg/to + Chinufur 40 FW 5.0 l/to
7.) Compound I/10 0.5 kg/to + Kelokarb 80 WP 1.0 kg/to + + Chinufur 40 FW 5.0 l/to
8.) Compound I/10 0.5 kg/to + Agrocit 50 WP 1.0 kg/to + + Chinufur 40 FW 5.0 l/to

The treated seeds were sown, and the emerged plants were evaluated at the cotyledonous stage by determining the amount in % of the emerged plants and of the plants attacked by flax-flea compared to the untreated control. The results obtained are summarized in Table XIV.

Table XIV.

No. of treatment	Emergence %	Amount of plants attacked by flax-flea
1.	100	100
2.	132	104
3.	124	109
4.	139	109
5.	97	5
6.	147	0
7.	161	0
8.	173	2

The data of Table XIV. clearly show that the compositions containing compound I/10 together with one or two other active ingredient show a significantly higher activity in comparison with the compositions containing only one active ingredient and with the untreated control.

Example 32

Fungicidal activity on autumn wheat

The fungicidal activity of the compositions according to the invention against powdery mildew of cereals and fusarium rot of ear was examined on winter wheat in plots of 20 m^2. The treatments were carried out at flowering with Kelokarb 80 WP, Chinoin Fundazol 50 WP (50 % of 1-butyl-carbamoyl-benzimidazol-2-methyl--carbamate), compound I/1 (in form of composition of Example 17) and with the combinations of these materials. The treatments were as follows:

1.) Untreated control

2.) Chinoin Fundazol 50 WP 1.0 kg/ha

3.) Kelokarb 80 WP 2.0 kg/ha

4.) Compound I/1 2.0 kg/ha

5.) Compound I/1 1.0 kg/ha + Kelokarb 80 WP 1.0 kg/ha

6.) Compound I/1 0.5 kg/ha + Kelokarb 80 WP 1.0 kg/ha

7.) Compound I/1 1.75 kg/ha + Chinoin Fundazol 50 WP 0.5 kg/ha

8.) Compound I/1 1.50 kg/ha + Chinoin Fundazol 50 WP 0.75 kg/ha

9.) Compound I/1 0.25 kg/ha + Chinoin Fundazol 50 WP 0.5 kg/ha

10.) Compound I/1 0.5 kg/ha + Chinoin Fundazol 50 WP 0.5 kg/ha + Kelokarb 80 WP 2.0 kg/ha

11.) Compound I/1 0.75 kg/ha + Chinoin Fundazol 50 WP 0.5 kg/ha + Kelokarb 80 WP 1.5 kg/ha

12.) Compound I/1 1.0 kg/ha + Chinoin Fundazol 50 WP 0.5 kg/ha + Kelokarb 80 WP 1.0 kg/ha

The rate of infection caused by powdery mildew was evaluated prior to and two weeks after the treatments using the scale and infection index described in Example 25.

The activity against fusarium rot of ear was determined at milky ripening stage on a section of 5 x 1 m^2 by determining the amount of the infected ears after harvesting. the intrinsic infection of 200 - 200 grains was also determined. The results obtained are summarized in Table XV.

Table XV.

No. of treatments	Infection index for Powdery mildew	Fusarium infection % on ears	Fusarium infection % on grains
1.	2.60	7.60	39.0
2.	1.03	3.20	11.0
3.	2.72	3.50	16.0
4.	1.11	2.40	12.0
5.	1.28	1.20	7.0
6.	1.33	1.40	8.0
7.	0.54	0.74	5.0

Table XV.

(contd.)

No. of treatments	Infection index for Powdery mildew	Fusarium infection % on ears	Fusarium infection % on grains
8.	0.22	0.53	2.0
9.	0.81	1.10	3.0
10.	0.46	0.51	2.0
11.	0.33	0.39	3.0
12.	0.25	0.31	2.0

The data of Table XV clearly show that the synergistic fungicidal compositions according to the invention containing compound I/1 and zinc, manganese complex of 8-quinolinolato-(dimethyl-dithiocarbamate) in a ratio of 1:1 and 1:2 and containing compound I/1 and benomyl in a ratio of (3.5:1) - (1:2) and containing compound I/1, benomyl and said complex in a ratio of (1:1:4)-(2:1:2) significantly decrease the rate of infection caused by powdery mildew and Fusarium spp.

Example 33

Fungicidal activity against apple trees

The fungicidal activity was examined in plots containing 5 apple trees against powdery mildew of

apple and apple scab. The first spraying was carried out at red-bud stage and repeated every 10-14 days, using Karathane LC (350 g/l, of 6-(1-methyl-heptyl)--2,4-dinitrophenyl-crotonate) Chinoin Fundazol 50 WP, 2-(O-2'-chloroethyl)-2-thio-5-methyl-oxathiaphospholane (compound I/4, in form of composition of Example 17) and the combinations of these materials. The treatments were as follows:

1.) Untreated control
2.) Karathane LC 0.5 l/ha
3.) Chinoin Fundazol 50 WP 1.0 kg/ha
4.) Kelokarb 80 WP 2.0 kg/ha
5.) Compound I/4 1.0 kg/ha
6.) Compound I/4 0.5 kg/ha + Karathane LC 0.25 l/ha
7.) Compound I/4 0.5 kg/ha + Chinoin Fundazol 0.5 kg/ha + + Kelokarb 80 WP 1.5 kg/ha
8.) Compound I/4 0.75 kg/ha + Chinoin Fundazol 0.5 kg/ha + + Kelokarb 80 WP 1.5 kg/ha

The rate of infection was evaluated at the stage when the fruits were as big as a green nut and after the last spraying sing the scale and infection index described in Example 25. The calculated and found results are summarized in Table XVI.

Table XVI.

No. of treatments	Infection by apply scab leaf	fruit	Powdery mildew Infection %	Infection index
1.	28.5	68.7	97.2	1.16
2.	27.2	67.9	29.7	0.32
3.	7.9	12.5	33.5	0.56
4.	4.7	11.9	96.9	1.25
5.	7.6	13.1	38.9	0.60
6.	7.4	14.0	13.5	0.19
7.	4.2	10.3	18.2	0.27
8.	2.9	8.2	15.9	0.23

The data of Table XVI show that while Karathene LC is effective only against powdery mildew and Kelokarb 80 WP only against apple scab, the compositions according to the invention containing compound of Formula (I), benomyl and zinc, manganese complex of 8-quinolinolato-dimethyl-dithiocarbamate in a ratio of (1:1:3)--(1,5:1:3) exhibit activity against both fungi. The combination of Formula (I) and Karathane LC show also good activity.

Example 34

Fungicidal activity on vine

The activity of compositions according to the invention was examined on vine culture consisting 25 double vine stocks grown as wall-fruit against peronospora, powdery mildew and grey mould.

The treatments against peronospora were repeated in the period between the 6-8 leaves stage and emergence in every 14 days. The time of protection against the grey mould is defined plant phenologically: the treatment should be carried out after flowering at the time of closing of clusters and emergence. The seed dressings were carried out using 2-(O-1'-methyl--2'-chloroethyl)-2-thio-1,3,2-oxathiaphospholane (compound I/10, in form of composition of Example 17), Chinoin Fundazol 50 WP, Thiovit S (80 % of sulfur), Kelokarb 80 WP and the combinations of these materials. The treatments were as follows:

1.) Untreated control
2.) Thiovit S 3.0 kg/ha
3.) Kelokarb 80 WP 2.0 kg/ha
4.) Chinoin Fundazol 50 WP 1.5 kg/ha
5.) Compound I/10 1.0 kg/ha
6.) Compound I/10 1.0 kg/ha + Thiovit S 2.0 kg/ha
7.) Compound I/10 1.0 kg/ha + Chinoin Fundazol 50 WP 1.0 kg/ha
8.) Compound I/10 1.0 kg/ha + Chinoin Fundazol 50 WP 0.5 kg/ha

9.) Compound I/10 0.5 kg/ha + Chinoin Fundazol 50 WP 1.0 kg/ha

10.) Compound I/10 0.5 kg/ha + Chinoin Fundazol 50 WP 0.5 kg/ha + Kelokarb 80 WP 1.0 kg/ha

11.) Compound I/10 0.75 kg/ha + Chinoin Fundazol 50 WP 0.75 kg/ha + Kelokarb 80 WP 1.5 kg/ha

Whern evaluating the activity the foliage was investigated in case of peronospora and the clusters of vine in case of grey mould using the scale and infection index described in Example 25. The results obtained are summarized in Table XVII.

Table XVII

No. of treatments	Infection index		
	Peronospora on leaves	Powdery mildew on leaves	Grey mould on clusters
1.	1.82	3.93	0.50
2.	1.89	0.33	0.52
3	0.41	3.41	0.48
4.	1.35	0.22	0.28
5.	0.48	0.26	0.37
6.	0.42	0.11	0.35
7.	0.29	0	0.11
8.	0.30	0.04	0.18
9.	0.46	0.02	0.14

Table XVII

(contd.)

No. of treatments	Infection index		
	Peronospora on leaves	Powdery mildew on leaves	Grey mould on clusters
10.	0.18	0.09	0.20
11.	0.11	0,08	0.18

The data of Table XVII clearly show that the compositions according to the invention containing compounds of formula (I) and benomyl in a ratio of (2:1) - (1:2) and compound of formula (I), benomyl and 8-quinolinolato-dimethyl-dithiocarbamate Zn, Mn complex in a ratio of (1:1:2) show good activity against the fungal diseases of vine. The most harmful infections could not develop on vine after the treatments carried out with said compositions.

When determining the fungicidal effect also the acaricidal activity against vine mites was examined on 100-100 leaves. It has been found that the compositions according to the invention possess a valuable acaricidal activity, too, especially the combination No. 6 (compound of formula I+Thiovit S) provides good activity.

Example 35

Fungicidal activity against diseases of winter wheat at germ stage

The tests were carried out on seeds having 92 % of germinating ability (variety of Jubilejnaja 50) and an intrinsic infection caused by Fusarium spp. of 10.5 %. The seed dressings were carried out with composition of Example 7 and for comparison Quinolate V-4X (15 % of cooper-oxyquinolate + 50 % of 2,3-dihydro--6-methyl-5-carboxanilido-1,4-oxathiino (5,6)) was used.

After emergence, at the 2-4 leaves stage of wheat, the number of emerged plants was determined on a section of 5x1 m and the length of 100 plants - located beside each other - was also determined in every plot. Under laboratory conditions the rate of infection of 200-200 seeds was also examined after a 10-day incubation carried out in wet chamber at 20 ^{o}C. The results obtained are summarized in Table XVIII.

Table XVIII

Treatments	Dose (kg/to)	Laboratory conditions		Field conditions	
		Fusarium spp. infection %	Alternaria infection %	No. of plants per m	Length of plants cm
Untreated control	-	10.5	20.5	51.4	7.9
55 WP of Example 7	1.0	6.5	8.5	53.5	8.1
55 WP of Example 7	2.0	1.0	0	58.5	8.3
55 WP of Example 7	3.0	0	0	57.2	7.8
Quinolate V-4X	2.0	1.0	0.5	57.8	8.1

The data of Table XVIII clearly show that the composition according to the invention is as active seed dressing agent in a dose of 2.0 kg/to as the widely used known Quinolate V-4X.

Example 36

Fungicidal activity against Fusarium rot of winter wheat

On plots of 40 m^2 winter wheat (variety of MV-8) was sprayed at flowering using compositions of Example 12 (diluted with 500 l/ha of water) and for comparison Kolfugo 25 FW (25 % of 2-(methoxy-carbonyl-amino)-benzimidazole). After harvesting the rate of Fusarium infection was determined using the infection index described in Example 25. The intrinsic infection was also determined. The results obtained are summarized in Table XIX.

Table XIX.

Treatments	Dose l/ha	Fusarium spp. Infection index F_i	Intrinsic infection %
Untreated control	-	1.12	19.75
60 FW of Example 12.	0.5	0.85	10.2

Table XIX.

(contd.)

Treatments	Dose l/ha	Fusarium spp. Infection index F_i	Intrinsic infection %
60 FW of Example 12.	1.0	0.41	3.5
60 FW of Example 12.	1.5	0.10	2.0
Kolfugo 25 FW	1.5	0.58	7.5

The data of Table XIX clearly show that the composition according to the invention provide a better protection even in a dose 1.0 l/ha against both Fusarium rot of ear and intrinsic infection caused by Fusarium spp. than the widely usedKolfungo 25 FW in a dose of 1.5 l/ha.

Example 37

Fungicidal activity against late blight of potato

On plots of 75 m^2 potato (variety of Gracia) was sown and when starting the budding, the plants were sprayed with composition according to Example 10, using 500 l/ha of spray, and for comparison with Dithane M 45 (80 % of manganese, zinc-ethylene-bis-

(dithiocarbamate) against late blight of potato (Phytophtora infestans). The treatments were repeated four times, in every 14 days. The evaluation was carried out 2 weeks after the last treatment using the scale and infection index described in Example 25. The results obtained were summarized in Table XX.

Table XX.

Treatments	Dose l; kg/ha	Infection index F_i
Untreated control	-	2.37
50 FW according to Example 10	2.0	0.84
50 FW according to Example 10	3.0	0.59
50 FW according to Example 10	4.0	0.52
Dithane M-45	2.0	0.98

The data of Table XX clearly show that the composition of Example 10 posseses a higher activity against Phytophtora inf. even at a dose of 2 l/ha than the widely used Dithane M-45 at the same dose.

Example 38

Fungicidal activity against disease of corn at germ stage

In plots of 15 m^2 treated corn (variety of P_i 3732) were sown. the treatments were carried out with compositions of Examples 5 and 6 and for comparison the combination of Orthocid 50 WP (50 % of N-trichloro-methylthio-tetrahydrophtalimide) and Agrocit 50 WP (50 % of 1-butyl-carbamoyl-benzimidazole--2-methylcarbamate) were used. The evaluation was carried out at the 2 and 4 leaves stage by determining the number of the emerged plants from 100 seeds. At the 2-leaves stage the length of the plants and under laboratory conditions the germinating % as well as the intrinsic infection caused by Fusarium spp. (on 200 seeds) were also determined. The results obtained are summarized in Table XXI.

Table XXI.

Treatments	Dose kg/to	Laboratory conditions		Field conditions		
		Germination %	Fusarium spp. infection, %	Emerged plants %	Length of plants cm,	%
Untreated control	-	98.5	10.5	82.5	7.9	100
50 WP according to Example 5	1.0	99.0	5.5	90.0	8.3	101
50 WP according to Example 5	2.0	98.5	1.0	94.0	8.6	105
50 WP according to Example 5	4.0	97.5	1.0	94.0	7.9	109
50 WP according to Example 6	1.0	98.0	2.5	92.5	8.5	100

Table XXI.

(contd.)

Treatments	Dose kg/to	Laboratory conditions		Field conditions		
		Germination %	Fusarium spp. infection, %	Emerged plants %	Length of plants cm,	%
50 WP according to Example 6	2.0	99.0	0	95.0	8.9	108
50 WP according to Example 6.	4.0	98.0	0	95.0	8.3	109
Orthocid 50 WP + Agrocit 50 WP	1.0 + 1.0	99.0	4.5	90.5	8.0	105

The data of Table XXI clearly show that the compositions according to Example 5 and 6 possess the same or better activity than the known Orthocid 50 WP and Agrocit 50 WP compositions. these compositions effectively protext the plants against phatogenic fungi, increase the emergence % and promote the growth of seedlings.

Example 39

Fungicidal activity against powdery mildew of apple

In apple culture on 10-10 apple trees the fungicidal activity of composition of Example 6 was examined against powderey mildew of apple (Rhodosphaery leucotricha). For comparison treatments with composition Example 18, Sulfur 900 WP (900 g/l of sulfur) and Chinoin Fundazol 50 WP (50 % of benomyl) were carried out. For the spraying 100 litre/ha spray was used and 9-times in every 14 days between the period of the "mouse ear" stage and beginning of ripening. The evaluation was accomplished 10 days after the last treatment on 250 - 250 shoots using the scale and infection index described in Example 25.

Table XXII.

Treatments	Dose l; kg/ha	Rate of infection	
		Infection %	Infection index F_i
Untreated control	-	100	2.0
50 WP according to Example 6	2.0	28	0.61
50 WP according to Example 6	1.5	35	0.74
50 EC according to Example 18	2.0	71	1.15
50 EC according to Example 18	1.5	76	1.20
Sulfur 900 FW	4.0	85	1.40
Chinoin Fundazol 50 WP	2.0	57	1.02
Chinoin Fundazol 50 WP	1.5	61	1.04

The data of Table XXII clearly show that the composition of Example 6 possess the best activity against powdery mildew of apple and that this composi-

tion containing compound I/1 - having contact activity - and benomyl - having systemic activity - is a synergistic fungicide.

Example 40

Fungicidal activity against grey mould of vine

In plots of 30 m^2 the fungicidal activity of composition according to Example 11 was tested against grey mould of vine (Botrytis cinerea). For comparison Rovral 25 FW (25 % of 1-isopropyl carbamoyl--3-(3,5-dichlorophenyl)-hydantoine), Chinoin Fundazol 50 WP and composition of Example 18 were used. The treatments were carried out 7-times after the end of flowering in every 10-14 days, using 1000 litre/ha of spray. The evaluation was carried out in the middle of August and at the end of September on 4x50 clusters per plot, using the scale described in Example 25 to determine the rate of infection and from the values obtained the infection index was also determined. The results obtained are summarized in Table XXIII.

Table XXIII.

Treatments	Dose l; kg/ha	Infection index F_i	
		in the middle of August	at the end of September
Untreated control	-	0.31	0.51
50 WP according to Example 11	1.0	0.17	0.26
50 WP according to Example 11	2.0	0.06	0.09
Rovral 25 FW	2.0	0.08	0.13
Chinoin Fundazol 50 WP	2.0	0.13	0.20
50 EC according to Example 18	2.0	0.22	0.35

The data of Table XXIII clearly show that the activity of composition of Example 11 surpasses that of the compositions containing these active ingredients alone, so the composition containing benomyl and compound I/1 possess synergistic activity.

Example 41

Fungicidal activity against apple scab

On plots, consisting 5 apple trees, the fungicidal activity of composition of Example 5 against

apple scab (Venturia inaequalis) was examined. For comparison Polyram Combi (80 % of zinc-polyethylene--thiuram-disulfide complex), Kelokarb 80 WP and composition according to Example 18 were used. The spraying of apple trees (variety of Starking), having medium trunk, were sprayed with 1000 l/ha of spray in the period between the "mouse ear" state and start of ripening 10-times in every 14 days. When the first and second shoots appear on 100 leaves per plot the rate of infection in % and the infection index were determined according to Example 25. The rate of infection was similarly determined in the middle of August on 50 apples per plot. The results obtained are summarized in Table XXIV.

Table XXIV.

Treatments	Dose l; kg/ha	Rate of infection on leaves				on fruits	
		%	F_i	%	F_i	%	F_i
Untreated control	-	86.0	1.6	46.0	1.32	35.0	0.44
50 WP according to Example 4	3.2	3.0	0.05	16.0	0.19	2.0	0.02
50 WP according to Example 4	2.4	5.0	0.08	27.0	0.25	5.0	0.05
50 WP according to Example 4	1.6	17.0	0.31	30.0	0.38	15.0	0.16
Polyram Combi	2.0	23.5	0.35	32.0	0.39	15.0	0.16
Kelokarb 80 WP	2.0	21.0	0.37	33.0	0.34	13.0	0.18
50 EC according to Example 18	3.2	29.0	0.41	40.0	0.39	20.0	0.20

The data of Table XXIV clearly show that the composition of Example 4 possesses a higher activity against apple scab in a dose of 2.4-3.2 kg/ha than the widely used Polyram Combi or the active ingredients thereof used alone.

Example 42

Fungicidal activity against diseases of winter wheat at germ stage

The experiments were carried out on winter wheat (variety of MV-8) on plots of 20 m^2. The seeds - having germinating ability of 91 % and intrinsic infection caused by Fusarium spp. of 22 % - were treated with the composition according to Example 14, and for comparison Kolfugo 25 FW and Dithane M-45 were used. After seed dressing 270 kg seeds were sown per ha in a depth of 6 cm. When evaluating, under laboratory conditions the rate of infection was determined after an incubation carried out with a sterile culture medium of type Papavizas and in wet chamber, respectively. Evaluating the field experiments the number of the emerged plants on a section of 5x1 m and the length thereof were determined. The results obtained are summarized in Table XXV.

Table XXV.

Treatments	Dose l; kg/to	Laboratory exp.		Field exp.	
		Fusarium spp. infection %	Alternaria infextion %	No. of plants per m	Length of plant cm
Untreated control	-	22.0	30.5	51.2	7.9
45 WP according to Example 14	1.0	3.5	2.0	53.9	8.4
45 WP according to Example 14	2.0	0.5	0.0	60.4	8.9
45 WP according to Example 14	3.0	0.0	0.0	51.4	7.9
Kolfugo 25 FW + Dithane M-45	2.0 + 1.0	2.5	0.5	50.2	8.9

The data of Table XXV clearly show that the activity of composition in a dose of 1.0 kg/to according to Example 14 is quite the same as the combination of the widely used Kolfugo 25 FW and Dithane M-45. The most favourable result was obtained at a dose of 2.0 kg/to of composition according to Example 14.

Example 43

Fungicidal activity against diseases of corn at germ stage

Under glass house conditions the activity of composition of Example 15 on corn seeds (variety of Pioneer 3747SC) was examined in comparison with Kelokarb 80 WP, Chinoin Fundazol 50 WP and composition of Example 18.

After seed dressing the rate of infection was determined on 200-200 seeds after an incubation on a Papavizas culture medium. 10-10 treated seeds were thereafter sown into pots in 8 replicates and the emergence % and the length of the emerged plants were determined 14 days after the sowing.

The results obtained are summarized in Table XXVI.

Table XXVI.

Treatments	Dose l; kg/to	Fusarium spp. infection %	Emergence %	Length of plants cm	Length of plants %
Untreated control	-	44.0	72	19.5	100
55 WP according to Example 15	1.0	7.0	79	20.6	106
55 WP according to Example 15	1.5	0.0	85	21.5	110
55 WP according to Example 15	2.0	0	90	22.0	113
Kelokarb 80 WP	1.4	6.0	80	20.3	104
Chinoin Fundazol 50 WP	2.2	2.0	87	20.8	107
50 EC according to Example 18	2.2	7.0	63	18.1	93

The data of Table XXVI clearly show that the composition of Example 15 possesses a higher activity than the compositions containing the same active ingredients alone, i.e. the composition has synergistic activity.

Example 44

Fungicidal activity against fusarium rot of pink

Under glass house conditions on plots of 5 m^2 the fungicidal activity of composition of Example 13 was examined against fusarium foot rot of pink. For comparison Kelokarb 80 WP, Chinoin Fundazol 50 WP and composition of Example 18 were used.

The number of Fusarium spp germs of the soil (9500 /g) thereafter on 50 pink cuttings the rate of infection of the propagating material (4 %) was determined. Thereafter the compositions were admixed with the soil and the planting was carried out. The evaluation was carried out 5, 7, 9 and 11 weeks after the planting by determining the rate of infection. The results obtained are summarized in Table XXVII.

Table XXVII.

Treatments	Dose g, ml/m^2	Rate of infection, %			
		5 weeks	7 weeks	9 weeks	11 weeks
Untreated control	-	0	6.95	8.57	9.86
20 WP according to Example 13	5.0	0	3.92	4.66	5.75
20 WP according to Example 13	10.0	0	1.90	2.73	3.04
20 WP according to Example 13	20.0	0	1.32	2.20	2.82
Kelokarb 80 WP	5.0	0	6.23	7.30	9.46
Chinoin Fundazol 50 WP	8.0	0	5.26	5.66	6.43
50 EC according to Example 18	8.0	0	4.05	5.55	6.60

The data of Table XXVII clearly show that the activity of composition of Example 13 is significantly higher at the same dose (i.e. 4 g/m^2 which corresponds to 20 g/m^2 of 20 WP, to 5 g/m^2 of 80 WP and to 8 ml/m^2 of 50 EC) than that of the compositions containing the same active ingredients alone.

The same results were obtained when using the composition of Example 13 in less doses.

Example 45

Fungicidal activity against diseases of peas at germ stage

The experiments were carried out in plots of 40 m^2 on peas (variety of Frila) using for seed dressing composition of Example 15, Chinoin Findazul 50 WP, and Dithane M-45. The germinating activity of seeds to be treated was 95% . When evaluating the treatments under laboratory conditions the rate of infection was determined on 200-200 seeds per treatment after a 10-day incubation in sterile wet chamber. Under field condition the number of the emerged plants at the 2-leaves stage of peas and the number of the infected plants were determined. The yield data after the harvesting was also determined. The results obtained are summarized in Table XXVIII.

Table XXVIII.

Treatments	Dose kg/to	Infection of seeds %					No. of plants		Crop to/ha
		Fusarium spp.	Ascolupta spp.	Aspergil-lus spp.	Penicil-lium spp.	Clodos-porium spp.	Emerged	Infected	
Untreated control	-	10.7	2.5	5.5	18.0	9.5	33.7	0.4	4.63
55 WP according to Example 15	1.0	1.0	0	1.5	0	0	39.0	0	4.79
55 WP according to Example 15	1.5	0.5	0	1.0	0	0	43.6	0	5.10
55 WP according to Example 15	2.0	0	0	0	0	0	44.2	0	5.09
Chinoin Fundazol 50 WP +	1.0 +								
Dithane M-45	1.5	1.0	0	1.0	0	0	39.8	0	4.88

The data of Table XXVIII clearly show that the activity of composition of Example 15 is the same in a dose of 1.0 kg/to as the activity of the combination of Chinoin Fundazol 50 WP and Dithane in a 2.5-fold higher dose. The composition of Example 15 protects the seeds against fungal attack, increases the number of emerged plants as well as the crop.

Example 16

Fungicidal activity on cotton

Under glass house conditions the fungicidal activity of composition of Example 16 was examined on cotton in comparison of Chinoin Fundazol 50 WP and Dithane M-45. After seed dressing 10-10 treated seeds were sown in plot and 14 days after sowing the emergence % and length of the plants were determined.

The results are summarized in Table XXIX.

Table XXIX.

Treatments	Dose kg/to	Emergence %	Length of the plants cm	%
Untreated control	-	62.0	13.2	100.0
80 WP according to Example 16	1.0	83.0	15.1	114.4
80 WP according to Example 16	2.0	92.0	15.8	119.7

Table XXIX.

(contd.)

Treatments	Dose kg/to	Emergence %	Length of the plants cm	%
80 WP according to Example 16	3.0	85.0	14.3	108.3
Chinoin Fundazol 50 WP + Dithane M-45	1.0 + 1.5	81.0	14.9	112.9

The data of Table XXIX clearly show that the composition according to Example 16 even at a dose of 1.0 kg/to possesses higher activity than the widely used compositions in 1.5-fold higher dose. Due to the fungicidal effect against the diseases of cotton at germ stage the initial growth of the plant improves.

Example 47

Fungicidal activity against the diseases of soya at germ stage

The fungicidal activity on soya (variety of Pi 1677) was examined in plots of 20 m^2. The seeds were treated with compositions of Example 15 and for comparison with Chinoin Fundazol 50 WP and Dithane M-45. The germination % under laboratory conditions and under field conditions on a section of 10x1 m and

the number of the emerged plants were determined at the cotyledonous stage and when the first tergeminal appeared. After the harvesting the yield data were also determined. The results obtained are summarized in Table XXX.

Table XXX.

Treatments	Dose kg/to	Germination %	No. of emerged plants first evaluation	No. of emerged plants second evaluation	Length of plants cm	Yield to/ha
Untreated control	-	82.0	15.1	15.3	9.10	3.22
55 WP according to Example 15	1.0	86.0	16.9	17.0	9.05	3.30
55 WP according to Example 15	2.0	92.0	17.4	17.3	9.00	3.45
55 WP according to Example 15	3.0	81.0	17.0	17.1	9.00	3.35
Chinoin Fundazol 50 WP + + Dithane M-45	1.0 + 1.5	86.0	16.6	16.9	9.00	3.38

The data of Table XXX clearly show that the composition of Example 15 improve the germination % and emergence % and yield without influencing the length of soya plants.

Example 48

Fungicidal activity on sunflower

The fungicidal activity of compositions according to Examples 6, 11 and 16 was examined on sunflower in a plot of 2 ha. For comparison the composition of Chinoin Fundazol 50 WP and Dithane M-45 was used. The compositions were applied by areal spraying (using helicopter, type KA-26) at the time of formation of plates and flowering, the amount of spray was 70 l/ha. The evaluation was carried out prior to desiccation on 10x50 plants and the rate of infection in % was determined on the basis of scale described in Example 25. The results obtained are summarized in Table XXXI.

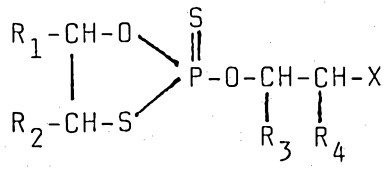
The data of Table XXXI clearly show that the composition of Example 6 possesses a higher activity than the known compositions and compositions of Examples 11 and 16 are as effective as the known compositions.

Table XXXI.

Treatments	Dose l; kg/ha	Infection %		
		Sclerotinia sclerotiorum on plates	Botrytis cinerea on plates	Total infection on plates
Untreated control	-	3.5	22.5	26.0
50 WP according to Example 6	3.0	1.0	3.5	4.5
50 WP according to Example 11	3.0	2.5	8.7	11.2
80 WP according to Example 16	2.0	2.0	9.2	11.2
Chinoin Fundazol 50 WP + Dithane M-45	1.5 +2.0	2.3	9.5	11.8

What we claim is:
THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Synergistic fungicidal compositions containing two or three active ingredients which comprises in an effective amount and in a ratio of (10:1) - (1:10) and (10:1:1) - (1:10:10) respectively 2-/O-(substituted alkyl)-2-thio-1,3,2-oxathiaphospholane of formula (I)



(I)

- wherein

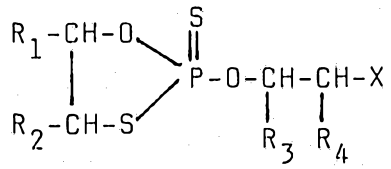
R_1, R_2, R_3 and R_4 stand independently from eacn other for hydrogen, alkyl having 1 to 6 carbon atoms, alkenyl having 2 to 6 carbon atoms, alkynyl having 2 to 6 carbon atoms,

X is halogen or hydrogen, alkyl having 1 to 6 carbon atoms or mercapto -

and a zinc and manganese (1:1) complex of 8-quinolinolato-dimethyl-dithiocarbamate and/or benomyl as active ingredients in admixture with known carriers and/or additives.

2. Synergistic fungicidal composition as claimed in Claim 1 which comprises in an effective amount and in a ratio of (10:1) - (1:10) compound

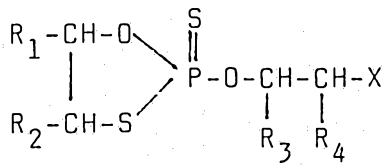
of formula (I)



(I)

- wherein R_1, R_2, R_3, R_4 and X are the same as mentioned in Claim 1 - and a zinc and manganese (1:1) complex of 8-quinolinolato-dimethyl-dithiocarbamate as active ingredients.

3. Synergistic fungicidal composition as claimed in Claim 1, which comprises in an effective amount and in a ratio of (10:1:1) - (1:10:10) a compound of formula (I)



(I)

- wherein R_1, R_2, R_3, R_4 and X are the same as mentioned in claim 1 - and a zinc and manganese (1:1) complex of 8-quinolinolato-dimethyl-dithiocarbamate and benomyl.

DATED this 29th day of May 1989.
ESZAKMAGYARORSZAGI VEGYIMUVEK

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