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PATENT SPECIFICATION

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NO DRAWINGS

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COMPLETE SPECIFICATION

Mercury-Free Seed Treating Agent

We, **FARBWERKE HOECHST A.G.** vormal Meister Lucius & Brüning, a Company recognised by German Law, of 6230 Frankfurt (M)-Hoechst, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 The present invention relates to mercury-free seed treating agents.

For protecting against various fungus diseases, for example, *Tilletia caries*, *Fusarium* disease or *Rhizoctonia solani*, seeds are nowadays generally treated with mercury-containing preparations. Because of the objectionable toxicological properties of such preparations, especially of organic mercury compounds also used for seed treatment, attempts have been made to develop mercury-free seed treating agents. The compounds and combinations hitherto proposed have the disadvantage, however, that they are effective only against part of the fungi concerned. Moreover, many of these compounds cause damage to the germs which lead to considerable crop losses. In British Specification No. 856,446 for example, 3,3,4,4-tetrachlorotetrahydrothiophene-1,1-dioxide has been described as an effective compound for soil and seed treatment in pea cultivation. When this compound was used for treating cereals, for example, wheat and barley, it has been found, however, that its phytotoxicity is too high in the ranges of concentration in which it is fully effective, so that it cannot be used in practice as a so-called universal seed protectant.

40 The present invention provides a preparation for treating seeds, which comprises, as active substance, a mixture of (a) 3,3,4,4-tetrachlorotetrahydrothiophene-1,1-dioxide with (b) tributyltinphthalimide and/or tributyltin-para-toluene-sulphonamide and/or tributyltin chloride in conjunction with an inert carrier. The effectiveness of this combina-

tion is superior to that of the individual components.

In the above preparation, the ratio of component (a) to component (b) in the mixture is preferably within the range of 1:1 to 6:1.

The present invention also provides a process for the manufacture of a seed protectant wherein 3,3,4,4-tetrachlorotetrahydrothiophene-1,1-dioxide is mixed with tributyltinphthalimide and/or tributyltin-p-toluenesulphonamide and/or tributyltin chloride in a ratio of 1 to 6 parts by weight of the thiophene compound to 1 part by weight of the tin compound or compounds and the whole is admixed with an inert material.

The following Examples illustrate the invention the parts being by weight.

EXAMPLE 1

Winter rye seed naturally infested with *Fusarium mycel* was treated with combination (A) consisting of

10 parts 3,3,4,4-tetrachlorotetrahydrothiophene-1,1-dioxide and
5 parts tributyltinphthalimide and
85 parts talcum as inert material.

As comparison preparations the individual active substance components were used, comparison preparation (B) containing

15 parts 3,3,4,4-tetrachlorotetrahydrothiophene-1,1-dioxide and
85 parts talcum as inert material

and comparison preparation (C) containing
15 parts tributyltinphthalimide and
85 parts talcum as inert material.

A commercial seed protectant (D) containing 2% of mercury was also used as comparison preparation. Each preparation was used in concentrations of 100 g, 50 g and 25 g, respectively, for 100 kg of seed grains.

One day after the treatment, the treated seed grains were sown in wooden boxes with sterile garden mould with 5 replications and caused to germinate under optimum infesta-

tion conditions in an air-conditioned room at a temperature of 5 to 8°C and a relative atmospheric moisture of 90—100%.

The evaluation of the comparison is set forth in the following Table 1. It shows that

combination (A) of the invention has a considerably higher effectiveness than the individual components (B) and (C) and exhibits the same favourable properties as mercury seed protectant (D).

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TABLE 1

Preparation	% of infestation with <i>Fusarium</i> with concentrations of g of preparation for 100 kg of seed			Damage to plants with +) 100 g/100 kg
	100 g/100 kg	50 g/100 kg	25 g/100 kg	
A	0%	0.1%	0.9%	0
B	2.3%	6.5%	12.0%	1 — 2
C	11.7%	19.6%	24.3%	1
D	0.05%	0.2%	1.3%	0
Untreated	60.9%	59.8%	61.5%	

+) evaluation scheme of damage to plants:

0 = no damage

5 = plants died down

EXAMPLE 2

Winter wheat strongly infested artificially with *Tilletia tritici* was treated with a preparation (A) consisting of a combination of
 15 3 parts tributyltin-p-toluenesulphonamide and
 10 parts 3,3,4,4-tetrachlorotetrahydrothiophene-1,1-dioxide and
 20 87 parts talcum as inert material.
 For comparison, there were used a preparation (B) containing
 13 parts 3,3,4,4-tetrachlorotetrahydrothiophene-1,1-dioxide alone and
 25 87 parts talcum as inert material
 and a preparation (C) containing
 13 parts tributyltin-p-toluenesulphonamide and
 87 parts talcum as inert material.

A commercial seed protectant (D) containing 2% of mercury was also used as comparison preparation.

The preparations were used in concentrations of 100 g, 50 g and 25 g, respectively, for 100 kg of seed grains.

One day after the treatment, the treated wheat was sown in lots of 2 m² each with 5 replications. On harvesting, the number of sound and of infested ears was determined and compared with the figures obtained with untreated control plants.

As is evident from the following Table 2, combination (A) of the invention is considerably more effective than the individual components (B) and (C) and is, in the low concentrations, more effective than mercury seed protectant (D).

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TABLE 2

Preparation	% of infestation with <i>Tilletia tritici</i> with concentrations of g of preparation for 100 kg of seed		
	100 g/100 kg	50 g/100 kg	25 g/100 kg
A	0%	0.1%	0.8%
B	9.8%	13.7%	18.4%
C	6.7%	11.2%	23.1%
D	0.1%	0.8%	3.3%
Untreated	63%	66.3%	68.4%

EXAMPLE 3

5 Bean seeds strongly infested with *Colletotrichum* were treated with a preparation (A) containing as active substance a combination of

15 parts 3,3,4,4-tetrachlorotetrahydrothiophene-1,1-dioxide and
 10 3 parts tributyltin chloride in addition to 82 parts talcum as inert material.

For comparison there were used a preparation (B) containing as active substance
 15 18 parts 3,3,4,4-tetrachlorotetrahydrothiophene-1,1-dioxide alone in addition to 82 parts talcum as inert material
 and a preparation (C) containing as active substance

20 18 parts tributyltin chloride alone in addition to 82 parts talcum as inert material.

A commercial seed protectant (D) containing 2% of mercury was also used as comparison preparation.

The preparations were used in concentrations of 200 g, 100 g and 50 g, respectively, for 100 kg of seed grains. 25

One day after the treatment, the treated seed grains were sown in dishes with sterile garden mould and after germination the extent of infestation was determined. 30

As results from the following Table 3, active substance combination (A) of the invention is distinctly more effective than individual components (B) and (C). The effectiveness of the combination of 3,3,4,4-tetrachlorotetrahydrothiophene-1,1-dioxide with the organic tin compound is about equal to that of the commercial mercury seed protectant (D). 35

TABLE 3

Preparation	% of infestation with <i>Colletotrichum</i> with concentrations of g of preparation for 100 kg of seed		
	200 g/100 kg	100 g/100 kg	50 g/100kg
A	0%	1.8%	4.5%
B	7.4%	12.3%	18.5%
C	4.7%	9.5%	15.9%
D	0.2%	2.3%	7.9%
Untreated	30.6%	32.8%	38.4%

WHAT WE CLAIM IS:—

1. A preparation for treating seeds, which comprises, as active substance, a mixture of (A) 3,3,4,4 - tetrachlorotetrahydrothiophene-1,1-dioxide with (B) tributyltinphthalimide and / or tributyltin-p-toluenesulphonamide and/or tributyltin chloride in conjunction with an inert carrier material.
2. A preparation as claimed in claim 1, wherein the weight ratio of (A) to (B) in the mixture is within the range of from 1:1 to 6:1.
3. A process for the manufacture of a seed protectant wherein 3,3,4,4-tetrachlorotetrahydrothiophene-1,1-dioxide is mixed with tributyltinphthalimide and/or tributyltin-p-toluenesulphonamide and / or tributyltin

chloride in a ratio of 1 to 6 parts by weight of the thiophene compound to 1 part by weight of the tin compound or compounds and the whole is admixed with an inert material.

4. A method of treating seeds to protect them from fungi, which comprises applying to the seeds a preparation as claimed in claim 1.

5. Seed protectant according to claim 1 and substantially as described in any one of the Examples herein.

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