

PATENT SPECIFICATION

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NO DRAWINGS

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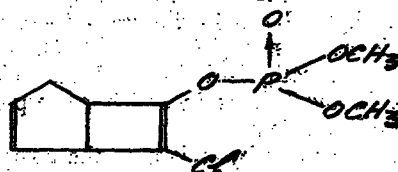
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(54) PESTICIDES

(71) We, FARBERWERKE HOECHST AKTIENGESELLSCHAFT formerly Meister, Lucius & Brüning, a body corporate, recognised under German Law, of 6230 Frankfurt-Main 80, P.O. Box 800320, 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:—

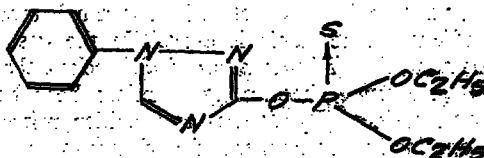
The present invention provides a pesticidal composition which comprises 4-(O,O-dimethylphosphoryl)-5-chloro-bicyclo-[3,2,0]-heptadiene-1,4, of formula I.



(I)

in admixture with

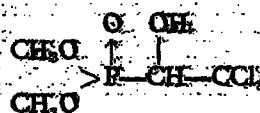
- a) 1-phenyl-3-(O,O-diethyl-thionophosphoryl)-1,2,4-triazole of formula II



(II)

or with

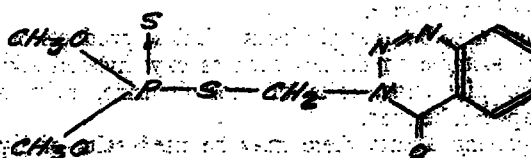
- b) O,O-dimethyl-(1-hydroxy-2,2,2-trichloroethyl)-phosphonic acid ester of formula III



(III)

or with

- c) O,O-dimethyl-S-(3,4-dihydro-4-oxo-1,2,3-benzotriazine-3-yl-methyl)-dithiophosphoric acid ester of formula IV



(IV)

or with

COP(=S)(OC)SSC1=NC(=O)SC(=O)N1

The aforesaid compounds I—V can be used individually as pesticides. It has been found, however, that when they are used in low concentrations their effect is often not sufficient for a quantitative destruction of the pests.

Mixtures comprising 1 to 2 parts by weight of the compound of formula I with 1 to 12 parts by weight of a compound of formulae II to V give a good effect, mixtures of 1 part by weight of the compound of formula I with 1 to 8 parts by weight of a compound of formulae II to V being preferred.

The compositions of active ingredients according to the invention may be used together with a carrier, for example, a solid or liquid inert carrier material, an adhesive, a wetting agent, a dispersing agent and/or grinding auxiliary, in the form of wettable powders, emulsions, suspensions, dusts, granules, fly bands, spreading agents and washing agents. They can also be mixed with other insecticides, fungicides, nematocides and herbicides.

As adhesives there may be used glutinous cellulose products or polyvinyl alcohols. As wetting agents all suitable emulsifiers such as oxyethylated alkyl phenols, salts of aryl or alkylarylsulphonic acids, salts of methyltaurine, salts of phenyl kogosin sulphonic acids or soaps can be used.

As suitable dispersing agents salts of naphthalene-sulphonic acid and possibly hydrated silic acids or kiesegum.

As grinding auxiliaries there may be used suitable inorganic or organic salts such as sodium sulphate, ammonium sulphate, sodium carbonate, sodium bicarbonate, sodium thiosulphate, sodium stearate and sodium acetate.

Other compositions according to the present invention are advantageously

The pesticidal compositions according to the present invention are advantageously used in the form of an emulsifiable concentrate containing 10% to 60% by weight of

the mixture of active ingredients and 5 to 20% by weight of a wetting agent, the balance up to 100% by weight being one or several organic solvents.

For the so-called ultra-low volume method, according to which highly concentrated mixtures are sprayed through nozzles from aeroplanes, pesticidal compositions can be used which comprise 70 to 95% by weight of a mixture of active ingredients according to the invention and 30 to 5% by weight of aliphatic and/or aromatic mineral oils and/or ketones, each having a boiling point above 120°C., or vegetable oils such as cotton seed oil or castor oil, or liquid emulsifiers such as ethoxylated alkyl phenols, for example nonyl phenol with 5 to 15 ethylene oxide units per molecule.

The following Examples illustrate the invention, the percentages being by weight unless otherwise stated.

EXAMPLE 1

A solution in xylene containing 50% of 4-(O,O-dimethylphosphoryl)-5-chlorobicyclo-[3,2,0]-heptadiene-1,4 (I) and 25% of an emulsifier mixture was emulsified in water together with another solution in xylene containing 40% of 1-phenyl-3-(O,O-diethyl-thionophospheryl)-1,2,4-triazole (II) and 12% of an emulsifier mixture in such a manner that the resulting compositions had the concentrations of active ingredients indicated in Table I below.

Horse beans (*Vicia faba*) infested with black bean aphids (*Doralis fabae*) were sprayed with the emulsion compositions thus obtained until the emulsion dripped from the leaves. The treated horse beans were placed in a greenhouse at 20°C. in an atmosphere of relative humidity 45%. 24 hours after spraying the living and dead aphids were counted. The result is indicated in Table I below.

For comparison, horse beans infested with black bean aphids were treated under identical conditions with the bicycloheptadiene derivative (I) in the xylene solution used above, which had been emulsified in water to such an extent that the concentrations of active ingredient indicated in Table I were obtained. In Table I the said comparative emulsions are designated as comp. I.

For further comparison horse beans infested with black bean aphids were treated under identical conditions with the triazole derivative (II) in the xylene solution used above, which had been emulsified in water to such an extent that the concentrations of active ingredient indicated in Table I were obtained. In Table I the said comparative emulsions are designated as comp. II.

The results listed in Table I, columns 1 to 3, indicate that the compositions of active ingredients according to the invention in the specified concentrations killed the bean aphids completely or substantially, whereas the comparative emulsions I and II had a much weaker effect.

EXAMPLE 2

Mallows (*Malva spec.*) infested with green peach aphids (*Myzodes persicae*) were sprayed with the emulsions specified in Example 1 and the infested plants were placed in the greenhouse. After 24 hours, the living and dead green peach aphids were counted. The results are listed in column 4 of Table I. In this case too, it can be seen that the composition of active ingredients according to the invention is much more effective against the pests than the individual components.

EXAMPLE 3

The covers and insides of Petri dishes were uniformly sprayed with 1 cc. each of a solution of the compositions of active ingredients according to the invention (cf. Example 1) in acetone in the concentrations indicated in Table II. After evaporation of the solvent, common flies (*Musca domestica*) and American cockroaches (*Periplaneta americana*, third stage) were placed in the Petri dishes. The effect was evaluated after 5 and 8 hours, respectively. The results are listed in Table II.

For comparison the individual active ingredients comp. I and comp. II mentioned in Example 1 were tested in analogous manner in acetonic solution. Table II shows the superior effect of the composition of active ingredients according to the invention as compared with the effect of the individual components.

EXAMPLE 4

In the manner described in Example 3 the covers and insides of Petri dishes were sprayed with acetonic solutions of the following compositions of active ingredients according to the invention in the concentrations indicated in Table III:

4-(O,O-dimethylphosphoryl)-5-chloro-bicyclo-[3,2,0]-heptadiene-1,4 (I) with
 O,O-dimethyl-(1-hydroxy-2,2-trichloroethyl)-phosphonic acid ester (III), or with
 O,O-dimethyl-S-(3,4-dihydro-4-oxo-1,2,3-benzotriazine-3-yl-
 methyl)-dithiophosphoric acid ester (IV) or with
 O,O-dimethyl-S-(5-methoxy-1,3,4-triazole-2-(3H)-one-3-yl-
 methyl)-dithiophosphoric acid ester (V), respectively.

The concentrations in which the pesticidal compositions according to the invention
 and the individual components, respectively, were applied are indicated in Table III.
 As test animals there were used common flies (*Musca domestica*) and German cock-
 roaches (*Phyllodromia germanica*, *imagine*). The pesticidal effect was evaluated 3
 and 24 hours, respectively, after the insects had been placed in the Petri dishes.

Table III shows the great superiority of the compositions of active ingredients
 according to the invention as compared with the individual components.

TABLE I

active ingredient	concentration of active ingredient in % by weight	destruction of bean aphids in % after 24 hrs.	destruction of peach aphids in % after 24 hrs
composition of active ingredients according to invention	0.0001 (I) + 0.0004 (II)	100	98
	0.0001 (I) + 0.0003 (II)	96	85
	0.0001 (I) + 0.0002 (II)	83	72
	0.0002 (I) + 0.0002 (II)	100	97
comp. I	0.0002 (I)	56	30
	0.0001 (I)	0	12
comp. II	0.0004 (II)	58	41
	0.0003 (II)	36	28
	0.0002 (II)	20	20

TABLE II

active ingredient	concentration of active ingredient in % by weight	destruction in %	
		common flies after 5 hrs.	cockroaches after 8 hrs.
composition of active ingredients according to invention	0.0002 (I) + 0.0004 (II)	100	100
	0.0001 (I) + 0.0004 (II)	100	100
	0.00005 (I) + 0.0004 (II)	100	100
comp. I	0.0002 (I)	0	0
comp. II	0.0004 (II)	50	0

TABLE III

active ingredient	concentration of active ingredient in % by weight	destruction in %	
		common flies after 3 hrs.	cockroaches after 24 hrs.
composition of active ingredients according to invention	0.0005 (I) + 0.001 (III)	100	100
	0.0005 (I) + 0.0005 (III)	100	100
comp. I	0.0005 (I)	0	0
comp. III	0.001 (III)	50	0
	0.0005 (III)	0	0
composition according to invention	0.0005 (I) + 0.001 (IV)	100	100
	0.0005 (I) + 0.0005 (IV)	100	100
comp. I	0.0005 (I)	0	0
comp. IV	0.001 (IV)	30	0
	0.0005 (IV)	0	0
composition according to invention	0.0005 (I) + 0.0005 (V)	100	100
comp. I	0.0005 (I)	0	0
comp. V	0.0005 (V)	30	0



WHAT WE CLAIM IS:—

1. A pesticidal composition which comprises 4-(O,O-dimethyl-phosphoryl)-5-chloro-bicyclo-[3,2,0]-heptadiene-1,4 in admixture with
 - a) 1-phenyl-3-(O,O-diethyl-thionophosphoryl)-1,2,4-triazole or with
 - b) O,O-dimethyl-(1-hydroxy-2,2,2-trichloroethyl)-phosphonic acid ester or with
 - c) O,O - dimethyl - S - (3,4 - dihydro - 4 - oxo - 1,2,3 - benzotriazine - 3 - yl-methyl)-dithiophosphoric acid ester or with
 - d) O,O - dimethyl - S - (5 - methoxy - 1,3,4 - thiadiazole - 2 - (3H) - one - 3-yl - methyl) - dithiophosphoric acid ester.
2. A pesticidal composition as claimed in claim 1, together with a carrier.
3. A pesticidal composition as claimed in claim 1 or 2, wherein the carrier is a solid or liquid inert carrier material, an adhesive, a wetting agent, a dispersing agent, a grinding auxiliary, and/or other pesticide.
4. A pesticidal composition as claimed in any one of claims 1 to 3, which comprises 1 to 2 parts by weight of 4-(O,O-dimethyl-phosphoryl)-5-chloro-bicyclo-[3,2,0]-heptadiene-1,4 in admixture with 1 to 12 parts by weight of component a), b), c) or d).
5. A pesticidal composition as claimed in claim 4, which comprises 1 part by weight of 4-(O,O-dimethyl-phosphoryl)-5-chloro-bicyclo[3,2,0]-heptadiene-1,4 in admixture with 1 to 8 parts by weight of component a), b), c) or d).
6. A pesticidal composition as claimed in any one of claims 2 to 5, in the form of an emulsifiable concentrate containing 10 to 60% by weight of the mixture of active ingredients and 5 to 20% by weight of a wetting agent, the balance being one or more organic solvents.
7. A pesticidal composition as claimed in any one of claims 2 to 5 which comprises 70 to 95% by weight of the mixture of active ingredients and 30 to 5% by weight of aliphatic and/or aromatic mineral oils and/or ketones, the oils and ketones having a boiling point above 120°C.
8. A pesticidal composition as claimed in any one of claims 2 to 5, which comprises 70 to 95% by weight of the mixture of active ingredients and 30 to 5% by weight of vegetable oils or liquid emulsifiers.
9. A pesticidal composition as claimed in claim 1, substantially as described in any one of the Examples herein.
10. A method of combating pests, wherein a composition as claimed in any one of claims 1—9 is applied to a crop area.
11. A method of combating pests as claimed in claim 10, substantially as described in Example 1 or 2 herein.

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