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(54) Herbicidal composition

(57) A herbicidal composition comprising a herbicidal diester formally derived from one mole of a diol esterified with one mole of a first phenoxy alkanoic acid and with one mole of a second phenoxy alkanoic acid, and at least one additional herbicidal compound which is not based on a phenoxy alkanoic acid. A preferred composition comprises a diester formed from ethylene glycol and MCPA and 2,4-DB together with Linuron.

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SPECIFICATION

Herbicidal compositions

5 The present invention relates to herbicidal compositions.

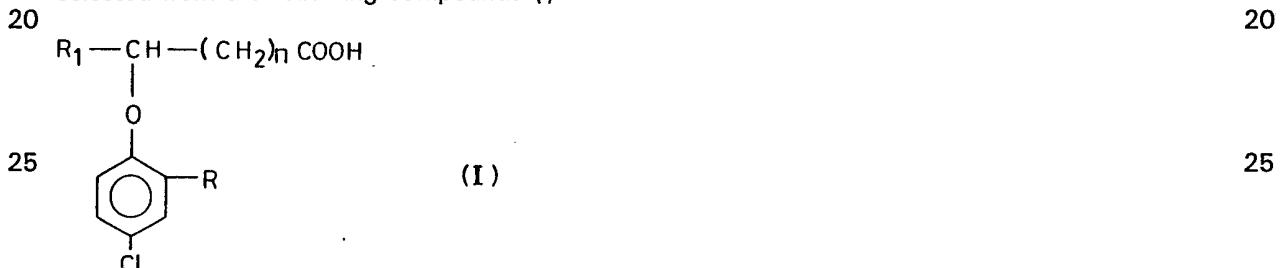
Our co-pending U.K. Patent Application No. 86 23939 (GB-A-2185015) proposes herbicidal diesters formally derived from one mole of a diol esterified one mole of a first phenoxy alkanoic acid and with one mole of a second phenoxy alkanoic acid (different from the first said acid).

10 The diester of GB-A-2185015 may be prepared by esterifying a mixture of the phenoxy alkanoic acids with the diol such that the product obtained comprises the "mixed" diester as well as the bisesters of the two phenoxy alkanoic acids. Such an admixture of esters may be used in the herbicidal formulations proposed in GB-A-2185015.

15 According to the present invention there is now provided a herbicidal composition which comprises a herbicidal diester as proposed in the above Patent Application and at least one additional herbicidal compound which is not based on a phenoxy alkanoic acid.

20 Preferably the additional herbicidal compound is selected from Dicamba, Dinoseb, Linuron, Bentazone and Benzolin, most preferably Linuron.

Preferably the phenoxy alkanoic acids from which the herbicidal diesters are derived are selected from the following compounds (I)



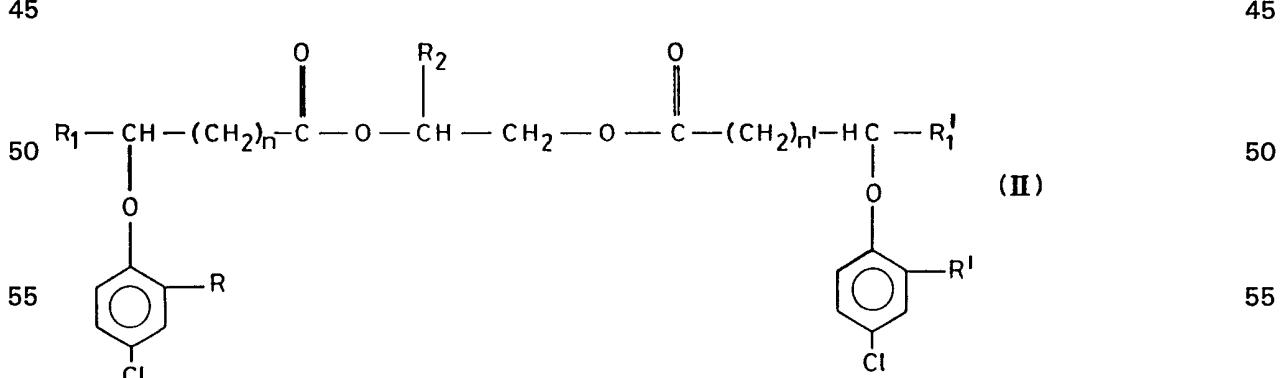
30 in which R is lower alkyl (particularly ^c1-4, e.g. methyl) or Cl, R₁ is H or lower alkyl (particularly ^c1-4, e.g. methyl) and n is 0-3.

Specific examples of such acids are listed below.

35	2,4-D	(R=Cl; R ₁ =H; n=0)	35
	2,4DP	(R=Cl; R ₁ =Me; n=0)	
	CMPP	(R=Me; R ₁ =Me; n=0)	
	MCPA	(R=Me; R ₁ =H; n=0)	
40	2,4-DB	(R=Cl; R ₁ =H; n=2)	
	MCPB	(R=Me; R ₁ =H; n=2)	40

The diols used to produce the diesters are preferably selected from ethylene glycol, and propylene glycol.

45 Thus the preferred diesters of the invention are of the general formula (II)



60 in which R₂ is H or methyl R, R₁ and n are as defined above, R', R'₁ and n' are selected from the same group as R, R₁ and n respectively with the proviso that the two acid residues in the molecule are not the same.

65 The most preferred formulations in accordance with the invention comprise (a) a mixed diester derived from ethylene glycol, 2,4-DB, and MCPA, (possibly in admixture with the bisesters

derived from each of the two phenoxy alkanoic acids) and (b) Linuron.

Preferably the weight ratio of the additional herbicide (e.g. Linuron) to the total amount of phenoxy alkanoic ester(s) is 1:250 to 250:1, preferably 1:100 to 100:1, more preferably 1:10 to 10:1.

5 The compositions may be applied to the land such that the additional herbicide (e.g. Linuron) is applied in an amount of 5-300 (preferably 50-200) grammes per hectare and the phenoxy alkanoic ester(s) is applied in a total amount of 50-6000 (preferably 500-2500) grammes per hectare. 5

10 The herbicidal compositions of this invention may of course be formulated with conventional carriers, surfactants, solvents etc. 10

The compositions of this invention are particularly suitable for the control of broad leafed weeds (e.g. common chickweed) in undersown cereals.

The invention is illustrated by the following Example.

15 *Example* 15
A non-volatile ester as proposed in GB-A-2185015 was prepared from the following reactants:

220g	2,4 dichlorophenoxy butyric acid	
20 30g	2-methyl-4-chlorophenoxy acetic acid	20
34g	ethylene glycol	
200mls	xylene	

This mixture was heated to reflux and water azeotroped off until esterification was complete.

25 The xylene was then distilled off under a vacuum of 5mm to a boiler temperature of 190°C. 25
The product was a brown liquid which solidifies on standing over a few weeks to give a low melting solid of the following composition:

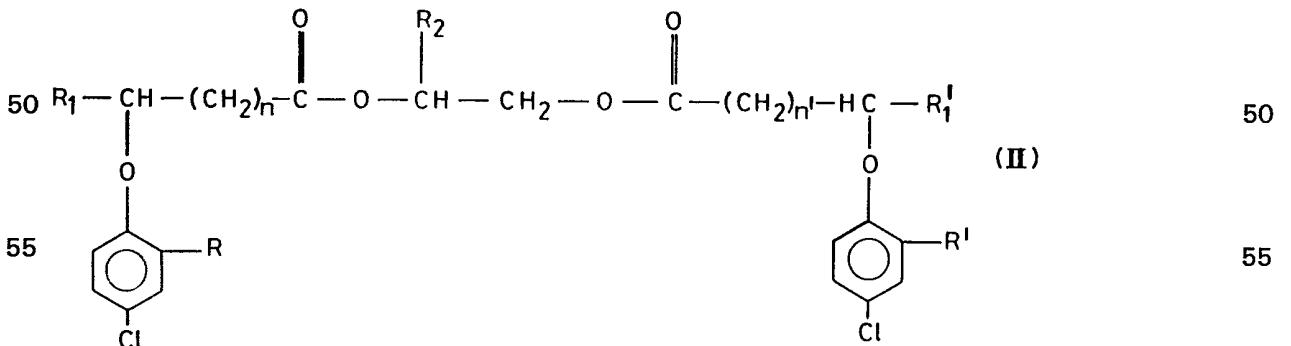
30 1- 2%	mono MCPA ethylene glycol ester	
4- 6%	mono 2,4-DB ethylene glycol ester	30
2- 3%	bis MCPA ethylene glycol ester	
19-20%	MCPA/DB ethylene glycol ester	
68-72%	bis 2,4-DB ethylene glycol ester	

35 An emulsifiable concentrate can be prepared from 280g of the above ester mixture, 31g of Linuron (97%), 35g of Calcium Dodecyl benzene sulphonate, 70g alkylphenol ethoxylates and 660ml of high boiling aromatic solvent. 35

CLAIMS

40 1. A herbicidal composition which comprises a herbicidal diester formally derived from one mole of a diol esterified with one mole of a first phenoxy alkanoic acid and with one mole of a second phenoxy alkanoic acid, and at least one additional herbicidal compound which is not based on a phenoxy alkanoic acid. 40

2. A herbicidal composition as claimed in claim 1 wherein the herbicidal diester is of the 45 general formula II 45



where R₂ is H or methyl R and R' are lower alkyl or Cl, R₁ and R'₁ are H or lower alkyl, and n and n' are 0-3 with the proviso that the two acid residues in the molecule are not the same.

3. Herbicidal composition as claimed in claim 2 wherein one phenoxy alkanoic residue is 65 derived from MCPA (R=Me, R'₁=H, n=0) and the other is derived from 2,4-DB (R'=Cl, R'₁=H, 65

$n^1=2$).

4. A herbicidal composition as claimed in any one of claims 1 to 3 wherein the additional herbicide is selected from Dicamba, Dinoseb, Linuron and Benazolin.

5. A herbicidal composition as claimed in claim 4 wherein the additional herbicide is Linuron.

5 6. A herbicidal composition as claimed in any one of claims 1 to 5 wherein the weight ratio of the additional herbicide to the total amount of phenoxy alkanoic esters is 1:250 to 250:1. 5

7. A herbicidal composition as claimed in claim 6 wherein the weight ratio is 1:100 to 100:1.

8. A herbicidal composition as claimed in claim 7 wherein the weight ratio is 1:10 to 10:1.

10 9. A herbicidal composition as claimed in any one of claims 1 to 8 which is formulated with a solvent and/or carrier and/or surfactant. 10

10 10. A herbicidal composition substantially as hereinbefore described with reference to the foregoing Example.

11. A method of combatting weeds comprising applying to an area of land to be treated a 15 herbicidally effective amount of a composition as claimed in any one of claims 1 to 10. 15

12. A method as claimed in claim 11 wherein the application rate of the composition to the land is 5-300 grammes per hectare of the additional herbicide and 50-6000 grammes per hectare of the phenoxy alkanoic esters.

13. A method as claimed in claim 12 wherein the additional herbicide is applied at a rate of 20 50-200 grammes per hectare and the phenoxy alkanoic ester is applied at a rate of 500-2000 grammes per hectare. 20

14. A method of combatting weeds substantially as hereinbefore described.

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