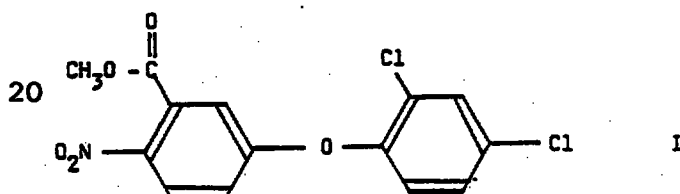


5 The invention relates to a method of controlling weeds in cereal crops and to herbicidal formulations useful *inter alia* in such method.

In order to control a broad range of weeds in crops, such as cereal crops, it is often necessary to employ more than one herbicide. Despite the use of such mixtures, weeds are still resistant to herbicide treatment, causing damage to both winter and spring cereal crops such as, for
10 example, wheat, barley, oats and rye.

It has now been found that specific combinations of herbicides not only give a broad spectrum of control but are also unexpectedly effective against weeds, especially broadleaf weeds, in cereal crops.

Accordingly the invention provides a method of controlling weeds, especially broadleaf weeds, in a cereal crop locus, which method comprises applying to said locus, post emergence the crop, bifenoxy, being a compound of formula I,
15



25 and one or more further active ingredients selected from (1) a benzoic acid herbicide which is dicamba or 2,3,6-TBA or a salt or ester thereof, (2) a phenoxy acid herbicide which is dichlorprop or 2,4-DB or a salt or ester thereof, (3) a dinitrophenol herbicide which is DNOC, dinoterb or dinoseb or a salt or ester thereof, (4) a benzonitrile herbicide which is ioxynil or bromoxynil or a salt or ester thereof, (5) benazolin or a salt or ester thereof, (6) bentazone, and
30 (7) 3,6-DCP or a salt or ester thereof.

It will be appreciated that more than one of the active ingredients (1) to (7) may be employed in the method of the invention and, indeed, that further or additional herbicidally active compounds may be employed alongside such ingredients (1) to (7). Where the active ingredient is acidic or phenolic, derivatives such as salts and esters may be employed, provided, of course, that they are non-phytotoxic to the crop, that is to say not substantially more phytotoxic than the free acid or phenol. The nature of such salts and esters is well-known to those skilled in the art
35

The preparation of bifenoxy, methyl 5-(2,4-dichlorophenoxy)-2-nitrobenzoate, is described in United Kingdom Patent 1,232,368 and its use as a herbicide in *Proc. N.E. Weed Sci. Conf.* 1973, 27, 31. Similarly, the benzoic acid herbicide dicamba, which is 3,6-dichloro-2-methoxybenzoic acid, is disclosed in U.S. Patent 3,013,054, and 2,3,6-TBA, which is 2,3,6-trichlorobenzoic acid, in U.S. Patents 2,848,470 and 3,081,162. The phenoxy acid herbicides are a well-known group of compounds and have been widely available for some considerable time. Dichlorprop is a common name for 2-(2,3-dichlorophenoxy) propionic acid, otherwise known as 2,4-DP; 2,4-DB is the common name for 4-(2,3-dichlorophenoxy) butyric acid. The dinitrophenol herbicide, DNOC (chemical name 2-methyl-4,6-dinitrophenol) was introduced under the protection of British Patent 425,295; dinoseb is the common name for 2-sec-butyl-4,6-dinitrophenol, disclosed in U.S. Patent 2,192,197; and dinoterb, 2-tert-butyl-4,6-dinitrophenol is disclosed in, for example, British Patent 1,126,658. The benzonitrile herbicides ioxynil (4-hydroxy-3,5-di-oxidobenzonitrile) and bromoxynil (3,5-dibromo-4-hydroxybenzonitrile) are
40 both disclosed in, for example, British Patent 977,755. Benazolin, having the chemical structure 4-chloro-2-oxo-3-benzothiazolineacetic acid, is disclosed in British Patent 862,226 and bentazone, which is the common name for 3-isopropyl-(1H)-benzo-2,1,3-thiadiazin-4-one 2,2-dioxide, is described in U.S. Patent 3,708,277. 3,6-DCP, which is 3,6-dichloropicolinic acid is disclosed in U.S. Patent 3,317,549.

55 The cereal crop can be, for example, wheat, barley oats or rye, and the method of the invention finds its greatest potential in the treatment of wheat and barley, particularly winter wheat and spring and winter barley. Crop sensitivity and also the severity of the weed problem determine the amount of active ingredients applied. In general, however, the bifenoxy is applied at a rate of 0.25 to 3.0 kilogram per hectare, preferably from 0.5 to 1.5 kilogram per hectare
60 and particularly from 0.5 to 0.75 kilogram per hectare.

Set out below are the preferred application rates for the further active ingredients (1) to (7). Where a component is derived from an acid or phenol, the quantities are based on the free acid or phenol equivalent.

Thus, where a benzoic acid herbicide, which is dicamba or 2,3,6-TBA, is employed, such is
65 preferably applied at a rate of from 0.05 to 0.2 kilogram per hectare, the weight ratio of the

- bifenox to the benzoic acid herbicide suitably being in the ratio of 60:1 to 1:1, preferably 30:1 to 4:1. The benzoic acid herbicide may be employed in the form of a salt thereof, especially an alkali metal salt such as a sodium or potassium salt, or in the form of an ester thereof, e.g. a C₁-C₈ alkyl ester.
- 5 Where a phenoxy acid herbicide, which is dichloroprop or 2,4-DB, is employed, such is preferably applied at a rate of 0.1 to 3.5 kilogram per hectare, the weight ratio of the bifenox to the phenoxy acid herbicide suitably being in the ratio of 30:1 to 1:15, especially from 8:1 to 1:6. In a particularly preferred embodiment, the bifenox is applied at a rate of 0.5 to 0.75 kilogram per hectare, the phenoxy acid herbicide at a rate of 1.5 to 3.0 kilogram per hectare. 5
- 10 The phenoxy acid herbicide is suitably employed in the form of a salt thereof, from example as an alkali metal salt, especially the sodium or potassium salt, or as an amine or ammonium salt. As examples of ester forms of the phenoxy acid herbicide may be given those containing from 1 to 8 carbon atoms in the ester grouping, for example the ethyl, isopropyl and butyl esters. 10
- Where a dinitrophenol herbicide, which is DNOC, dinoterb or dinoseb is employed, such is preferably applied at a rate of from 0.5 to 5.0 kilogram per hectare, more preferably, particularly in the case of dinoterb or dinoseb, at a rate of 0.5 to 2.0 kilogram per hectare. The weight ratio of bifenox to dinitrophenol herbicide is preferably from 6:1 to 1:20, more preferably from 3:1 to 1:6. As examples of suitable salt forms of the dinitrophenol herbicide may be given those formed with both inorganic and organic bases, especially the amine and ammonium salts. As examples of esters may be given those formed with organic acids, e.g. 15
- 20 carboxylic acids, for example dinoseb acetate. 20
- Where a benzonitrile herbicide, which is ioxynil or bromoxynil, is employed, such is preferably applied at a rate of from 0.05 to 0.5 kilogram per hectare, more preferably at a rate of from 0.1 to 0.35 kilogram per hectare. The weight ratio of bifenox to the benzonitrile herbicide is preferably from 60:1 to 1:2, more preferably from 15:1 to 2:1. In a particular embodiment, both ioxynil and bromoxynil are employed together with the bifenox, in which case the preferred reates of application and weight ratios given above are based on the total weight of both the ioxynil and bromoxynil. Preferred salt forms of the ioxynil and bromoxynil are the alkali metal, such as sodium and potassium, salt forms. Preferred esters include ioxynil octanoate and bromoxynil octanoate. 25
- 30 Where benazolin is employed, such is preferably applied at a rate of from 0.05 to 0.25 kilogram per hectare. The weight ratio of bifenox to benazolin is preferably from 60:1 to 1:1, more preferably from 15:1 to 5:2. Suitable salt forms of the benazolin include the alkali metal, especially the sodium and potassium, salt forms. The preferred esters are those containing from 1 to 4 carbon atoms in the ester grouping, especially the ethyl ester. 30
- 35 Where bentazone is employed, such is preferably applied at a rate of from 0.1 to 1.5, more preferably 0.2 to 1.5 and most preferably 0.5 to 1.5 kilogram per hectare. A preferred weight ratio of bifenox to bentazone is from 6:1 to 1:6, more preferably 3:1 to 1:2. 35
- Where 3,6 DCP is employed, such is preferably applied at a rate of from 0.025 to 0.15 kilogram per hectare, more preferably at a rate of from 0.05 to 0.1 kilogram per hectare. A preferred weight ratio of bifenox to 3,6 DCP is from 30:1 to 3:1, more preferably from 15:1 to 5:1. As examples of salt forms of the 3,6 DCP may be given the alkali metal, e.g. sodium and potassium, salt forms and the amine and ammonium salt forms, e.g. the monoethanolamine salt form. As examples of esters may be given those containing from 1 to 8 carbon atoms in the ester grouping. 40
- 45 The method of the present invention is preferably carried out when the cereal crop is between the one leaf stage and the appearance of the second node. 45
- Where the bifenox is employed together with the benzoic acid herbicide, particularly good control of the weed species *Stellaria media*, *Polygonum spp*, *Spergula arvensis*, *Tripleurospermum maritimum*, *Viola spp* and *Veronica spp* is observed. 50
- Where the bifenox is employed together with the phenoxy acid herbicide, particularly good control of the weed species *Galium aparine*, *Stellaria media* and *Veronica spp* is observed.
- Where the bifenox is employed together with the dinitrophenol herbicide, particularly good control of the weed species *Galeopsis tetrahit*, *Fumaria officinalis*, *Polygonum convolvulus* and *Galium aparine* is observed. 55
- Where the bifenox is employed together with the benzonitrile herbicide, particularly good control of the weed species *Matricaria spp*, *Polygonum spp* and *Galium aparine* is observed.
- Where the bifenox is employed together with benazolin, particularly good control of the weed species *Stellaria media*, *Glaium aparine* and *Viola spp* is observed.
- 60 Where the bifenox is employed together with bentazone, particularly good control of the weed species *Viola spp*, *Veronica spp* and *Matricaria spp* is observed. 60
- Where the bifenox is employed together with 3,6 DCP, particularly good control of the weed species *Veronica spp* and *Matricaria spp* is observed.
- As examples of further or additional herbicidally active compounds which may be employed together with the bifenox and component (1) to (7), above, may be given MCPA, MCPB and 65

The bifenox and the active ingredient(s) (1) to (7), above, optionally along with any further or additional herbicidally active compound may be applied to the crop locus either simultaneously or separately. If the latter, the time period between applications is preferably short, say one day or less. It is by far preferred, however, for the compounds to be applied simultaneously as a single formulation. In order to simplify manufacture, storage and transport, herbicidal formulations will normally be produced in concentrate form intended for dilution with water to the degree necessary to enable the above application rates to be achieved, which dilution is generally such that the formulation to be applied to the crop locus contains from 0.05 to 3.0 per cent by weight of the active herbicide ingredients. The concentrate formulations generally contain from 1 to 90%, preferably 15 to 85% of active ingredients associated with one or more non-phytotoxic carriers or diluents.

Concentrate formulations form part of the present invention. Thus, there is provided a concentrated herbicidal formulation which can particularly, though by no means exclusively, be employed in the method of the present invention, which formulation comprises bifenox, one or more further active ingredients selected from (1) a benzoic acid herbicide which is dicamba or 2,3,6-TBA or a salt or ester thereof, (2) a phenoxy acid herbicide which is dichlorprop or 2,4-DB or a salt or ester thereof, (3) a dinitrophenol herbicide which is DNOC, dinoterb or dinoseb or a salt or ester thereof, (4) a benzonitrile herbicide which is ioxynil or bromoxynil or a salt or ester thereof, (5) benazolin or a salt or ester thereof, (6) bentazone and (7) 3,6-DCP or a salt or ester thereof, in association with one or more non-phytotoxic carriers or diluents.

In such formulation, the weight ratios of bifenox to each of the ingredients (1) to (7) are preferably as set out above in connection with the method of the invention.

The concentrate formulations according to the invention will usually be in the form of a wettable powder, an emulsifiable concentrate or an aqueous suspension. Aqueous suspension and wettable powder formulations are preferred for use in the method of the invention, giving significantly lower phytotoxicity to the cereal crop than the emulsifiable concentrate.

Wettable powders comprise an intimate mixture of the active ingredients, one or more inert carriers and appropriate surfactants. The inert carrier may, for example, be chosen from the attapulgite clays, the montmorillonite clays, the diatomaceous earths, kaolins, micas, talcs and purified silicates. Effective surfactants may be found among the sulfonated lignins, the naphthalene sulfonates and condensed naphthalene sulfonates, the alkyl succinates, the alkylbenzene sulfonates, the alkyl sulfates and nonionic surfactants such as ethylene oxide adducts of phenol.

Emulsifiable concentrates comprise the active ingredients dissolved in a suitable solvent or suitable solvents, together with a surfactant. Suitable surfactants may, for example, be chosen from those mentioned above in connection with wettable powders. Suitable solvents include alkyl substituted benzenes, o-chlorotoluene, heavy aromatic naphthalenes, glycol ethers and cyclic ketones.

Aqueous suspensions and solutions comprise the active ingredients suspended or dissolved in water or suitable solvents respectively together with any desired surfactants, thickening agents, antifreezing agents or preservatives. Suitable surfactants may be chosen from those mentioned above in connection with wettable powders. Thickening agents, if used, are normally chosen from appropriate cellulose materials and natural gums whilst glycols will generally be used when an antifreezing agent is required. Preservatives may be chosen from a wide range of materials such as the various paraben antibacterials, phenol, o-chlorocresol, phenyl mercuric nitrate and formaldehyde.

Alternatively, herbicidal formulations may be formed by mixing the two or more active ingredients with water in a spray tank just prior to use, the water thus acting as a non-phytotoxic carrier. Such formulations are called "tank mixes" and form a further aspect of the invention. In such tank mixes, the weight ratios of bifenox to the other ingredient (1) to (7) are again preferably those given for the method of the invention.

The following Examples illustrate concentrated herbicidal formulations according to the invention. Where a herbicidal ingredient is a derivative of an acid or phenol the amount is based on the acid or phenol equivalent.

EXAMPLES 1 to 10

The following wettable powders were prepared in each case with the ingredients shown.

		% by weight	
(1)	Bifenox	25	
	Bentazone	25	
	Sodium alkyl ether sulphate	3	
5	Sulphonated lignin	2	5
	Precipitated silica	6	
	Talc	to 100	
(2)	Bifenox	50	
	Ioxynil	5	
10	Sodium salt of condensed naphthalene		10
	Sulphonic acids	2	
	Ethoxylated alkyl phenol	4	
	Fumed silica	5	
	Montmorillonite	to 100	
15 (3)	Bifenox	42	15
	Bromoxynil	6	
	Sodium lauryl sulphate	5	
	Sodium lignin sulphonate	3	
	Precipitated silica	8	
20	Kaolin	to 100	20
(4)	Bifenox	48	
	Benazolin (ethyl ester)	4	
	Ethoxylated nonyl phenol	4	
	Sulphite lye powder	4	
25	Fumed silica	5	25
	Attapulgate	to 100	
(5)	Bifenox	40	
	3,6 DCP (monoethanolamine salt)	4	
	Sodium lauryl sulphate	4	
30	Sodium lignin sulphonate	3	30
	Precipitated silica	8	
	Kaolin	to 100	
(6)	Bifenox	20	
	2,4 DB (potassium salt)	30	
35	Ethoxylated alkyl phenol	2	35
	Sulphite lye powder	4	
	Fumed silica	5	
	Attapulgate	to....100	
(7)	Bifenox	20	
40	Dichlorprop (potassium salt)	40	40
	Sodium dialkylsulphosuccinate	3	
	Lignosulphonate	2	
	Micronised silica	7	
	Diatomaceous earth	to 100	
45 (8)	Bifenox	45	45
	Ioxynil	2.5	
	Bromoxynil	3	
	Sodium lauryl sulphite	2	
	Sodium lignin sulphonate	3	
50	Precipitated silica	5	50
	Montmorillonite	to 100	
(9)	Bifenox	40	
	2,3,6-TBA (sodium salt)	5	
	Sodium lauryl sulphate	3	
55	Sodium lignin sulphonate	3	55
	Precipitated silica	4	
	Kaolin	to 100	
(10)	Bifenox	40	
	Dicamba (sodium salt)	4	
60	Ethoxylated alkyl phenol	4	60
	Lignosulphonate	2	
	Fumed silica	3	
	Sodium alumino silicate	to 100	

65 In each Example, the active ingredients were carefully blended with the specified excipients in 65

size range of from 1 to 10 microns.

EXAMPLES 11 TO 22

5	The following emulsifiable concentrates were prepared having the constituents shown below:			5
	(11)	Bifenox	25	
		Ioxynil (octanoate)	3	
		Calcium dodecylbenzene sulphonate	4	
10		Alkylphenoxyethoxyethylene ethanols	2	10
		Cyclohexanone	35	
		Xylene	to 100	
	(12)	Bifenox	20	
		Bromoxynil (octanoate)	4	
15		Amine salt of dodecylbenzene sulphonic acid	3	15
		Polyoxyethylene triglyceride	3	
		Cyclohexanone	30	
		Orthochlorotoluene	to 100	
	(13)	Bifenox	20	
20		Benazolin (ethyl ester)	2	20
		Calcium dodecylbenzene sulphonate	2	
		Ethoxylated alkyl phenol	4	
		Isophorone	35	
		Heavy aromatic naphtha	to 100	
25	(14)	Bifenox	6	25
		DNOC	20	
		Calcium dodecylbenzene sulphonate	3	
		Ethoxylated alkyl phenol	3	
		Cyclohexanone	25	
30		Heavy aromatic naphtha	to 100	30
	(15)	Bifenox	20	
		Dinoterb	10	
		Alkyl aryl sulphonate	2	
		Alkylphenoxyethoxyethylene ethanols	4	
35		Isophorone	30	35
		Orthochlorotoluene	to 100	
	(16)	Bifenox	15	
		Dinoseb	15	
		Amine salt of dodecylbenzenesulphonic acid	4	
40		Polyoxyethylene triglyceride	3	40
		Isophorone	20	
		Heavy aromatic naphtha	to 100	
	(17)	Bifenox	20	
		3,6 DCP	4	
45		Calcium dodecylbenzene sulphonate	4	45
		Ethoxylated alkyl phenol	4	
		Isophorone	30	
		Heavy aromatic naphtha	to 100	
	(18)	Bifenox	15	
50		2,4-DB (isopropyl ester)	30	50
		Alkyl aryl sulphonate	4	
		Polyoxyethylene triglyceride	2	
		Cyclohexanone	25	
		Xylene	to 100	
55	(19)	Bifenox	15	55
		Dichlorop (butyl ester)	45	
		Amine salt of dodecylbenzene sulphonate	3	
		Alkylphenoxyethoxyethylene ethanols	3	
		Cyclohexanone	25	
60		Heavy aromatic naphtha	to 100	60
	(20)	Bifenox	20	
		Ioxynil (octanoate)	1.5	
		Bromoxynil (octanoate)	2	
		Calcium dodecylbenzene sulphonate	3	
65		Alkylphenoxyethoxyethylene ethanols	4	65

	Orthochlorotoluene	to 100	
	(21) Bifenox	25	
	2,3,6-TBA (ester)	3	
5	Clacium dodecylbenzene sulphonate	3	5
	Ethoxylated alkyl phenol	3	
	Isophorone	30	
	Orthochlorotoluene	to 100	
	(22) Bifenox	20	
10	Dicamba	2	10
	Alkyl aryl sulphonate	4	
	Alkylphenoxypoloxethylene ethanols	2	
	Cyclohexanone	25	
	Xylene	to 100	
15			15

The active ingredients were added to the appropriate solvent(s) with stirring and optional heating to facilitate solubilisation of the active materials. The surfactants were then added. After solubilisation the solution was filtered to remove insoluble impurities.

20 EXAMPLES 23 TO 26

The following aqueous suspensions were prepared from the constituents shown below:

		% by weight/by volume	
	(23) Bifenox	20	
25	Bentazone	20	25
	Alkyl aryl sulphonate	2	
	Phosphate ester of an ethoxylated polyarylphenol neutralised with triethanolamine.	2	
30	Xanthan gum	0.2	30
	Silicone antifoam	0.1	
	Formaldehyde	0.2	
	Water	to 100	
	(24) Bifenox	40	
35	Ioxynil (sodium salt)	4	35
	Ethoxylated nonly phenol	3	
	Hydroxymethyl cellulose	2	
	Silicone antifoam	0.1	
	Water	to 100	
40	(25) Bifenox	35	40
	Bromoxynil (potassium salt)	3.5	
	Ethoxylated nonly phenol	2.5	
	Hydroxymethyl cellulose	1.7	
	Silicone antifoam	0.1	
45	Water	to 100	45
	(26) Bifenox	48	
	Benazolin (potassium salt)	8	
	Sodium lauryl sulphate	3	
	Attapulgate	1.5	
50	Silicone antifoam	0.15	50
	Water	to 100	

The herbicide ingredients were mixed with surfactants and antifoaming agent, then vigorously stirred in water to form a coarse aqueous suspension. This was then wet-milled to reduce the particle size of the active ingredients to 0.5 to 20 microns. To this wet milled preparation was then added an aqueous suspension of the thickening or suspending agent (hydrated).

The following Example 27 is of the test method employed to asses the efficacy of the method and formulation of the invention

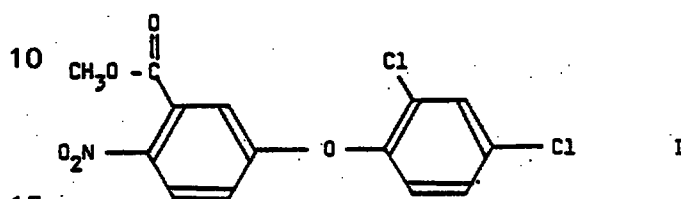
60 EXAMPLE 27 TEST METHOD

The appropriate quantity of formulated product (for example of one of the concentrate formulations of the foregoing Examples 1 to 26) is added to water in a micro-sprayer which is subsequently agitated to ensure dispersion. The sprayer is adjusted to deliver a volume equivalent to 200 litres per hectare at a pressure 40 p.s.i. (ca 2.72 atm). A standard nozzle (Allman No. 0) delivering a fan shaped jet is fitted to the sprayer.

applications varying from the 3 leaf stage to beginning of stem extension. Weed size at application can also be variable, ranging from the cotyledon stage to the small plant stage.

5 CLAIMS

1. A method of controlling weeds in a cereal crop locus, which method comprises applying to said locus, post-emergence the crops, bifenoX being a compound of formula I,



and one or more further active ingredients selected from (1) a benzoic acid herbicide which is dicamba or 2,3,6-TBA or a salt or ester thereof, (2) a phenoxy acid herbicide which is dichlorprop or 2,4-DB or a salt or ester thereof, (3) a dinitrophenol herbicide which is DNOC, dinoterb or dinoseb or a salt or ester thereof, (4) a benzonitrile herbicide which is ioxynil or bromoxynil or a salt or ester thereof, (5) benazolin or a salt or ester thereof, (6) bentazone and (7) 3,6-DCP or a salt or ester thereof.

2. A method according to claim 1, wherein the bifenoX is applied at a rate of from 0.25 to 3.0 kilogram per hectare of locus.

3. A method according to claim 2, wherein said rate is from 0.5 to 1.5 kilogram per hectare.

4. A method according to claim 3, wherein said rate is from 0.5 to 0.75 kilogram per hectare.

5. A method according to any preceding claim, wherein the benzoic acid herbicide is applied at a rate of from 0.05 to 0.2 kilogram per hectare, the phenoxy acid herbicide is applied at a rate of 0.1 to 3.5 kilogram per hectare, the dinitrophenol herbicide is applied at a rate of 0.5 to 5.0 kilogram per hectare, the benzonitrile herbicide is applied at a rate of 0.05 to 0.5 kilogram per hectare, the benazolin is applied at a rate of from 0.05 to 0.25, the bentazone is applied at a rate of from 0.1 to 1.5 kilogram per hectare and the 3,6-DCP is applied at a rate of from 0.025 to 0.15 kilogram per hectare.

6. A method according to any preceding claim, wherein the bifenoX is applied at a rate of 0.5 to 0.75 kilogram per hectare and the phenoxy acid herbicide is applied at a rate of 1.5 to 3.0 kilogram per hectare.

7. A method according to any one of claims 1 to 5, wherein the bifenoX is applied together with both ioxynil and bromoxynil.

8. A method according to claim 1, substantially as hereinbefore described.

9. A herbicidal formulation which is a concentrate or a tank mix and comprising bifenoX and one or more of the active ingredients (1) to (7), given in claim 1, in association with one or more non-phytotoxic diluents or carriers.

10. A herbicidal formulation according to claim 9, wherein the weight ratio of bifenoX to the benzoic acid herbicide is from 60:1 to 1:1, the weight ratio of bifenoX to the phenoxy acid herbicide is from 30:1 to 1:15, the weight ratio of bifenoX to the dinitrophenol herbicide is from 6:1 to 1:20, the weight ratio of bifenoX to the benzonitrile herbicide is from 60:1 to 1:2, the weight ratio of bifenoX to benazolin is from 60:1 to 1:1, the weight ratio of bifenoX to bentazone is from 6:1 to 1:6 and the weight ratio of bifenoX to 3,6 DCP is from 30:1 to 3:1.

11. A herbicidal formulation according to claim 9 or 10 which is a concentrate formulation and which contains from 15 to 85% of active ingredients.

12. A herbicidal formulation according to claim 11, which is an emulsifiable concentrate, an aqueous suspension or a wettable powder formulation.

13. A herbicidal formulation according to claim 9 substantially as hereinbefore described with reference to any one of the foregoing Examples 1 to 25.

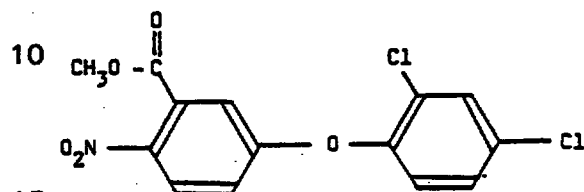
14. A herbicidal formulation according to any one of claims 9 to 13 for use in the method of any one of claims 1 to 8.



Application is made post emergence to both crop and weeds, the crop size for different applications varying from the 3 leaf stage to beginning of stem extension. Weed size at application can also be variable, ranging from the cotyledon stage to the small plant stage.

5 CLAIMS

1. A method of controlling weeds in a cereal crop locus, which method comprises applying to said locus, post-emergence the crops, bifenox being a compound of formula I,



and one or more further active ingredients selected from (1) a benzoic acid herbicide which is dicamba or 2,3,6-TBA or a salt or ester thereof, (2) a phenoxy acid herbicide which is dichlorprop or 2,4-DB or a salt or ester thereof, (3) a dinitrophenol herbicide which is DNOC, dinoterb or dinoseb or a salt or ester thereof, (4) a benzonitrile herbicide which is ioxynil or bromoxynil or a salt or ester thereof, (5) benazolin or a salt or ester thereof, (6) bentazone and (7) 3,6-DCP or a salt or ester thereof.

2. A method according to claim 1, wherein the bifenox is applied at a rate of from 0.25 to 3.0 kilogram per hectare of locus.

3. A method according to claim 2, wherein said rate is from 0.5 to 1.5 kilogram per hectare.

4. A method according to claim 3, wherein said rate is from 0.5 to 0.75 kilogram per hectare.

5. A method according to any preceding claim, wherein the benzoic acid herbicide is applied at a rate of from 0.05 to 0.2 kilogram per hectare, the phenoxy acid herbicide is applied at a rate of 0.1 to 3.5 kilogram per hectare, the dinitrophenol herbicide is applied at a rate of 0.5 to 5.0 kilogram per hectare, the benzonitrile herbicide is applied at a rate of 0.05 to 0.5 kilogram per hectare, the benazolin is applied at a rate of from 0.05 to 0.25, the bentazone is applied at a rate of from 0.1 to 1.5 kilogram per hectare and the 3,6-DCP is applied at a rate of from 0.025 to 0.15 kilogram per hectare.

6. A method according to any preceding claim, wherein the bifenox is applied at a rate of 0.5 to 0.75 kilogram per hectare and the phenoxy acid herbicide is applied at a rate of 1.5 to 3.0 kilogram per hectare.

7. A method according to any one of claims 1 to 5, wherein the bifenox is applied together with both ioxynil and bromoxynil.

8. A method according to claim 1, substantially as hereinbefore described.

9. A herbicidal formulation which is a concentrate or a tank mix and comprising bifenox and one or more of the active ingredients (1) to (7), given in claim 1, in association with one or more non-phytotoxic diluents or carriers.

10. A herbicidal formulation according to claim 9, wherein the weight ratio of bifenox to the benzoic acid herbicide is from 60:1 to 1:1, the weight ratio of bifenox to the phenoxy acid herbicide is from 30:1 to 1:15, the weight ratio of bifenox to the dinitrophenol herbicide is from 6:1 to 1:20, the weight ratio of bifenox to the benzonitrile herbicide is from 60:1 to 1:2, the weight ratio of bifenox to benazolin is from 60:1 to 1:1, the weight ratio of bifenox to bentazone is from 6:1 to 1:6 and the weight ratio of bifenox to 3,6 DCP is from 30:1 to 3:1.

11. A herbicidal formulation according to claim 9 or 10 which is a concentrate formulation and which contains from 15 to 85% of active ingredients.

12. A herbicidal formulation according to claim 11, which is an emulsifiable concentrate, an aqueous suspension or a wettable powder formulation.

13. A herbicidal formulation according to claim 9 substantially as hereinbefore described with reference to any one of the foregoing Examples 1 to 25.

14. A herbicidal formulation according to any one of claims 9 to 13 for use in the method of any one of claims 1 to 8.