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(54) Titre : COMBINAISON DE PRODUITS HERBICIDES COMPRENANT DE LA 2-CHLORO-6-NITRO-3-PHENOXYANILINE ET AU MOINS UN HERBICIDE CHOISI PARMI LE BROMOXYNIL OU L'IOXYNIL OU UN DE LEURS DERIVES

(54) Title: HERBICIDAL COMBINATION COMPRISING 2-CHLORO-6-NITRO-3-PHENOXYANILINE AND AT LEAST ONE HERBICIDE SELECTED FROM AMONGST BROMOXYNIL OR IOXYNIL OR ONE OF THEIR DERIVATIVES

(57) Abrégé/Abstract:
The invention relates to a novel herbicidal combination resulting from a combination of a) 2-chloro-6-nitro-3-phenoxyaniline and b) one or more herbicides of hydroxybenzonitrile type, of which bromoxynil octanoate or heptanoate may be mentioned in particular. The ratio by weight of a/b is preferably between 0.1 and 10. 2-Chloro-6-nitro-3-phenoxyaniline is preferably applied at a weakly herbicidal, or non-herbicidal, dosage rate. This combination is particularly useful in the method of controlling weeds at the post-emergence stage of cereal and maize crops.

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ABSTRACT

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The invention relates to a novel herbicidal combination resulting from a combination of a) 2-chloro-6-nitro-3-phenoxyaniline and b) one or more herbicides of hydroxybenzonitrile type, of which bromoxynil octanoate or heptanoate may be mentioned in particular.

The ratio by weight of a/b is preferably between 0.1 and 10.

2-Chloro-6-nitro-3-phenoxyaniline is preferably applied at a weakly herbicidal, or non-herbicidal, dosage rate.

This combination is particularly useful in the method of controlling weeds at the post-emergence stage of cereal and maize crops.

HERBICIDAL COMBINATION COMPRISING 2-CHLORO-6-NITRO-3-PHENOXYANILINE AND AT LEAST ONE HERBICIDE SELECTED FROM AMONGST BROMOXYNIL OR IOXYNIL OR ONE OF THEIR DERIVATIVES

The present invention relates to a herbicidal product resulting from a combination of a herbicide of the benzonitrile type, selected from amongst bromoxynil or ioxynil or one of their derivatives, with 2-chloro-6-nitro-3-phenoxyaniline, which is outstandingly suitable for the selective control of weeds in crops.

The invention also relates to the use of the novel product by way of herbicide, especially in the form of a composition, and to a method of controlling weeds in crops with the aid of the product or the composition.

Prior art:

The herbicides of the benzonitrile type, selected from amongst bromoxynil or ioxynil or their derivatives, singly or as a mixture, are used very widely for post emergence control of weeds of the dicotyledon type in cereal fields. In general, these herbicides are called by the abbreviation "HBN", or hydroxybenzonitrile. From amongst the HBNs, the following may be mentioned especially:

bromoxynil or 3,5-dibromo-4-hydroxybenzonitrile, bromoxynil octanoate or bromoxynil heptanoate, which is the corresponding ester,

ioxynil or 4-hydroxy-3,5-diiodobenzonitrile,

ioxynil octanoate, which is the corresponding ester, or the potassium or sodium salt of ioxynil.

When the HBNs are used early after emergence, they are highly effective against a large number of weeds, even though thei activity against certain weeds which are particularly harmful, such as Galium aparine, Lamium purpurea or Veronica persica, could be substantially improved.

Moreover, there is known aclonifen, or 2-chloro-6-nitro-3-phenoxyaniline, which is a selective herbicide in crops of sunflower and peas, and which is normally used at doses of more than 2 kg/ha.

Object of the invention, or problem to be solved:

It is always desirable to improve the action of herbicidal substances as well as their speed of action.

As far as the present invention is concerned, it proposes a novel combination which results from a limited choice from amongst a virtually infinite number of possibilities and which provides great advantages which will be understood better in the light of what will be described hereinafter.

In this way, it has been found in a completely unexpected manner that the combination improves, in a noticeable and surprising fashion, the respective and isolated action of the two active substances for a certain number of weeds which are

particularly harmful in crops, while preserving the selectivity towards the crops. From this follows an improvement of the activity spectrum and the possibility of reducing the respective dose of each active substance used, this latter quality being particularly important for ecological reasons which can be easily understood.

The combination therefore presents a remarkable degree of synergism as defined by PML Tammes, Netherlands Journal of Plant Pathology, 70 (1964), p. 7380 in an article with the title "Isoboles, une représentation graphique de synergie dans les pesticides" [Isoboles, a graphic representation of synergism in pesticides], or as defined by Limpel, L.E., P.H. Schuldt and D. Lamont, 1962, Proc. NEWCC 16:48-53, according to the formula (used by Colby):

$$E = X + Y - \frac{XY}{100}$$

where E is the expected percentage of growth inhibition of a mixture of the two herbicides at defined doses, X is the observed percentage of growth inhibition of herbicide A at a defined dose, Y is the observed percentage of growth inhibition of herbicide B at a defined dose. If the observed percentage of inhibition of the combination is greater than E, synergism is present.

Moreover, it has been found in a completely

unexpected fashion that aclonifen, when used at a dose which in itself is not herbicidal from the industrial point of view (that is to say, with an effectiveness which is zero or insufficient), potentiates or increases considerably the herbicidal effect of the HBNs. This is therefore in this case a remarkable innovation as regards its consequences for the application methods of said HBNs.

The invention:

Herbicidal product resulting from a combination of:

a) 2-chloro-6-nitro-3-phenoxyaniline, and

b) one or more herbicides of the 3,5-dihalo-4-hydroxybenzonitrile type, or an agriculturally acceptable ester or salt of these compounds.

The herbicides of the 3,5-dihalo-4-hydroxybenzonitrile type according to the invention can exist in phenolic form, as salts of amines, potassium or sodium, or in ester form, especially with an alkanoic acid (preferably an alkanoic acid having 4 to 8 carbon atoms).

Herbicides which are especially mentioned from amongst these are bromoxynil, which is 3,5-dibromo-4-hydroxybenzonitrile, or ioxynil, which is 4-hydroxy-3,5-diiodobenzonitrile.

As regards bromoxynil, the forms which are mainly used are the ester forms in the case of cereals and maize, and the phenol form in the case of maize.

The phenol form is generally used at dosage rates which are substantially higher than the ester form (in general 1.8 times to twice as high), but shows a lower phytotoxicity, which justifies its use under certain conditions.

As regards ioxynil, this substance is currently used in ester form or in the form of potassium or sodium salts, especially in cereal crops, occasionally in sugar cane, rice or onions. The difference in action between the ioxynil ester and the ioxynil salt is smaller than between the bromoxynil ester and bromoxynil in phenolic form (factor 1 and two thirds, approximately).

The form used is preferably the ester of bromoxynil or of ioxynil with an alkanoic acid having 4 to 8 carbon atoms.

Bromoxynil butyrate, heptanoate or octanoate, or a mixture of two or three of these compounds, will advantageously be used.

The most preferred form is bromoxynil heptanoate or octanoate, and still more advantageously: bromoxynil octanoate.

These products can be used by way of herbicides in a very wide range of ratio by weight of 2-chloro-6-nitro-3-phenoxyaniline to HBN, which will partly depend on the crops treated, the climatic conditions, the nature of the soil, the treatment stage of the main weeds at the site in question, and, if

desired, even on the wish of the user, depending on whether he wants an area that is perfectly clean or whether he is happy with a satisfactory, but not total, destruction of weeds.

These products according to the invention are intended for simultaneous, separate or sequential use, for the herbicidal treatment of undesirable plants, especially against weeds which are present in crops. The nature of the crops in question can vary depending on the HBN in question. We shall return to this aspect in the part dealing with the treatment method, below.

In the case of simultaneous use (which is preferred), ready-to-use products can be used which contain the combination of the above-described active substances. Equally, products which have been prepared immediately before application can be used, by mixing the active substances, as they are described hereinafter, as the occasion arises.

Equally, the use can consist in using the product by treating the crops to be protected in succession with one and then the other of the active substances, 2-chloro-6-nitro-3-phenoxyaniline and HBN, in such a way as to form the product according to the invention in situ on the plant.

In a preferred variant, the ratio by weight of 2-chloro-6-nitro-3-phenoxyaniline/3,5-dihalo-4-hydroxybenzonitrile is between 0.1 and 20, naturally

taking into account variations which can exist in this margin, due to the fact that the ester is used rather than the phenol in the case of bromoxynil, or the ester rather than the salt in the case of ioxynil.

Thus, in the case of bromoxynil phenol, the ratios will be shifted towards the lower zone of the margin since more of the substance is needed.

The ratio by weight is preferably between 0.2 and 5 in the case of bromoxynil esters or ioxynil esters.

The combinations are most frequently of a binary type, but, occasionally, ternary or quaternary combinations with one or more other compatible pesticides (including fungicide or insecticide) can be considered.

As has been indicated above, one of the problems which the filing company proposes to resolve, is increasing the action of the HBNs. In this case, 2-chloro-6-nitro-3-phenoxyaniline plays the role of potentiator, or, in the technical jargon of crop protection, of "synergist".

In this case, the preferred ratios indicated above are equally suitable, but the fact that the dose of 2-chloro-6-nitro-3-phenoxyaniline is weakly or not herbicidal, must be taken into account (see section on method of use hereinafter).

The product is thus defined as a herbicidal product based on HBN and comprising, as amplifier,

2-chloro-6-nitro-3-phenoxyaniline which in itself is not, or weakly, herbicidal at the dose in question (g/ha).

Of course the preferred variants as regards the HBNs according to the invention are equally good in the present use. It will therefore be understood that, still with 2-chloro-6-nitro-3-phenoxyaniline as the amplifier, the HBNs in ester form will be used advantageously.

The products according to the invention are mostly used in the form of a herbicidal composition comprising one or more agriculturally acceptable carriers and one or more surfactants besides the herbicidal product.

In the case where the preparations are made up as the occasion arises, each active substance can be in the form of a composition. In contrast, in the case of a ready mix, it is the combination itself which is in the form of a composition.

Sometimes, taking into account the formulations which are available on the market, it is possible that a ready-for-use composition which contains the composition is readily available.

Sometimes, an appropriate formulation which is within the reach of those skilled in the art will sometimes be necessary.

Besides the active substance or the combination according to the invention as described

above, the compositions contain solid or liquid agriculturally acceptable carriers and those surfactants which are equally agriculturally acceptable. The customary inert carriers and the customary surfactants can be used in particular.

These compositions usually contain between 0.5 and 95% of active substance or of the combination according to the invention.

In this specification unless otherwise specified, percentages are by weight.

The term "carrier" in the present disclosure refers to an organic or inorganic substance, natural or synthetic, with which the active substance or combination is combined so as to facilitate its application to the plant, to the seeds or to the soil. This carrier is therefore generally inert and it must be agriculturally acceptable especially on the treated plant. The carrier can be solid (clays, natural or synthetic silicates, silica, resins, waxes, solid fertilisers, etc. ...) or liquid (water, alcohols, ketones, petroleum fractions, aromatic or paraffinic hydrocarbons, chlorinated hydrocarbons, liquefied gases, etc. ...).

The surfactant can be an ionic emulsifier, dispersant or wetting agent. Examples which may be mentioned are salts of polyacrylic acids, salts of lignosulphonic acids, salts of phenolsulphonic acids, or naphthalenesulphonic acids, or polycondensates of ethylene oxide with fatty alcohols or with fatty acids or with fatty amines, substituted phenols (especially

alkylphenols or arylphenols), salts of esters of sulphosuccinic acids, taurine derivatives (especially alkyltaurates), phosphoric esters of alcohols or polycondensates of ethylene oxide with phenols. The presence of at least one surfactant is indispensable since the active substances in the combination (2-chloro-6-nitro-3-phenoxyaniline + HBN) are not water-soluble, and the vector agent for the application is water.

The following may be mentioned as agricultural forms of compositions: powders for dusting or dispersion (with a content of active ingredient which can be up to 100%), and granules, especially those obtained by extrusion, by compacting or by impregnation of a granulated carrier, or by granulation of a powder, (the content of active ingredient in these granules being between 1 and 80% in these last mentioned cases).

The following may be mentioned as liquid forms of commpositions, or forms which are intended to make up liquid compositions at the time of application: emulsifiable concentrates, emulsions, flowables, wettable powders (or powder for spraying) and pastes.

More detailed information on this type of formulation are given hereinafter to illustrate these observations:

- the emulsifiable concentrates mostly comprise 10 to 80% of active substance or of

combination, 0.5 to 15% of surfactants, 0.1 to 10% of thickeners, and 0 to 10% of suitable additives;

- the wettable powders (or powder for spraying) are usually prepared in such a way that they contain 20 to 95% of active substance, and they usually contain, besides the solid carrier, 0 to 5% of a wetting agent, 3 to 10% of a dispersant and, if necessary, 0 to 10% of one or more suitable additives.

Suspoemulsions (ie formulations containing both solid and liquid (or low melting point solid and a solvent) active ingredients dispersed in an aqueous phase) mostly comprise 10 to 50% by weight of active substances or combinations, 0.5 to 15% of surfactants, 0.1 to 10% of thickeners, and 0 to 10% of suitable additives.

The flowables generally contain 10 to 75% of active substances or combinations, 0.5 to 15% of surfactants, 0.1 to 10% of thickeners, and 0 to 10% of suitable additives.

From amongst these suitable additives, the following may be mentioned: thixotropic colloids, penetrants, stabilisers, sequestering agents, etc. ...

Moreover, the said compositions can contain other active substances which have pesticidal properties (especially insecticides or fungicides), or properties which favour plant growth (especially fertilisers), or growth-regulating properties with the proviso that there is no major incompatibility between all these active substances.

In the case of the HBNs in ester form, it is preferred to produce a suspoemulsion from an

emulsifiable HBN concentrate in ester form and the 2-chloro-6-nitro-3-phenoxyaniline in the form of a flowable, with the proviso that this is subject to optimisation within the reach of those skilled in the art of the formulation of plant-protection products.

It is known that, in this type of formulation, the 2-chloro-6-nitro-3-phenoxyaniline will be in the form of fine, suspended particles, and the HBN ester in solubilised form, the entire mixture being in the form of a stable emulsion.

In the case where the HBNs are in phenolic form, it is preferable to produce a flowable, naturally still with the same provisos as regards the industrial feasibility which may make adjustments necessary. Special care must be taken to avoid the formation of a eutectic between the two active substances.

In the case where the HBNs are in salt form, it is possible to produce a flowable in which the HBN salt will be dissolved and the 2-chloro-6-nitro-3-phenoxyaniline will be suspended.

<u>Treatment method according to the invention</u>

The invention equally relates to a method of controlling weeds, in particular in an environment in which crops are growing, or where it is intended to grow crops, which consists of applying an effective dosage of the composition, as has just been described above, containing the product according to the invention.

Amongst the crops, the combination of 2-chloro-6-nitro-3-phenoxyaniline/bromoxynil ester (especially heptanoate and/or octanoate) will preferably be used on cereals (wheat, barley, etc.) and maize, the combination 2-chloro-6-nitro-3-phenoxyaniline/bromoxynil in phenol form on maize, and the combination 2-chloro-6-nitro-3-phenoxyaniline/ioxynil ester (especially heptanoate and/or octanoate) or phenol on cereals, sugar cane, rice and onions.

When applied, the dosage should be sufficiently high for controlling the growth of the weeds without causing substantial permanent damage to said crops. Effective dosage is understood as meaning, in this context, the dosage which does in fact allow this result to be obtained.

The application is carried out at the post-emergence stage of the crops. Post-emergence is understood as meaning application of the product after the cultivated plant has emerged from the soil. The mixture acts on the leaves of the weeds, but also by application to the soil and subsequent uptake by the roots.

Above all, the product according to the invention acts against the weeds after the latter have emerged, even though a pre-emergence action, that is say when the plant has not yet emerged from the soil, would equally be possible.

The product is leaf-acting and root-acting in proportions which can vary according to the active substances in question and the treated plants.

The product (which can be applied for simultaneous, separate or sequential use) will usually be applied at a dosage rate from 150 g/ha to 1,100 g/ha, depending on the nature of the 3,5-dihalo-4-hydroxybenzonitrile.

The following weeds which can be controlled by said product (or said composition) may be mentioned:

* From amongst the dicotyledons which are present mainly in cereal fields:

Anthemis arvensis, Anthemis cotula, Brassica nigra, Capsella bursa-pastoris, Chrysanthemum segetum, Galium aparine, Lamium amplexicaule, Lamium purpureum, Lapsana communis, Matricaria inodora, Papaver rhoeas, Raphanus raphanistrum, Sinapis alba, Sinapis arvensis, Stellaria media, Veronica hederifolia, Veronica persica, Viola arvensis, Viola tricolor;

* From amongst the dicotyledons which are present mainly in maize fields:

Abutilon theophrasti, Amaranthus retroflexus, Atriplex patula, Bidens pilosa, Chenopodium album, Datura stramonium, Ipomea purpurea, Polygonum spp. (e.g. Polygonum aviculare, Polygonum convolvulus and Polygonum persicaria), Portulaca oleracea, Solanum nigrum, Xanthium strumarium;

* From amongst the grasses present mainly in cereal fields:

Alopecurus myosuroides, Apera spica-venti;

* From amongst the grasses present mainly in maize fields:

Digitaria sanguinalis, Echinochloa crus-galli, Setaria viridis.

Depending on the variants which follow:

- the combination bromoxynil octanoate or heptanoate/2-chloro-6-nitro-3-phenoxyaniline will be applied to cereals such as, especially, wheat or barley, or to maize. The dosage rate per hectare will advantageously be

50 to 500 g/ha of 2-chloro-6-nitro-3-phenoxyaniline, and

100 to 400 g/ha of bromoxynil ester,

very advantageously:

100 to 400 g/ha of 2-chloro-6-nitro-3-phenoxyaniline, and

120 to 300 g/ha of bromoxynil ester;

- the combination bromoxynil-phenol/2-chloro-6-nitro-3-phenoxyaniline will be applied to maize, at a dosage per hectare of:

50 to 500 g of 2-chloro-6-nitro-3-phenoxyaniline, and

200 to 800 g of bromoxynil-phenol,

preferably:

100 to 400 g of 2-chloro-6-nitro-3-phenoxyaniline, and

240 to 600 g of bromoxynil-phenol.

The invention will now be described on the basis of concrete use examples which, it will be clearly understood, are given purely by way of indication and can in no way restrict the scope of the said invention.

To simplify the method, and to arrive at a better base for comparison,

- Galium aparine,
- Viola tricolor,
- Sinapis alba,
- Lamium purpureum,
- Veronica persica,

were selected to demonstrate the activity of the product against wheat weeds and to demonstrate the selectivity of the product in this crop.

General experimental set-up

The application is effected after the plant species have emerged.

A number of seeds (the number being determined on the basis of the plant species and the size of the seed) are sown in 9 x 9 x 9 cm pots filled with light agricultural soil.

The seeds are then covered by a layer of soil about 3 mm thick, and the seed is allowed to germinate until it gives rise to a plantlet at the right stage. In the case of the grasses, the treatment stage is the "second leaf being formed" stage. In the case of the dicotyledons, the treatment stage is the "cotyledons

unfolded, first true leaf being developed" stage.

The pots are then treated by spraying them with a mixture in an amount which corresponds to an application rate of 500 l/ha and which contains the active substances to be sprayed.

The mixtures are obtained by diluting the formulated products in water.

The following formulated products were used:

- 2-Chloro-6-nitro-3-phenoxyaniline flowable, 600 g/l "Challenge 600"®,
- Bromoxynil octanoate emulsifiable concentrate 225 g/l "Buctril"®.

These formulations are properly approved and well known in the art.

The pots are then placed in containers for receiving the irrigation water, by way of subirrigation, and maintained for 24 hours at ambient temperature and 60% relative humidity.

After 24 days, the number of live plants in the pots treated with the mixture containing the active substance under test and the number of live plants in a control pot which has been treated under the same conditions, but using a mixture without active substance, are counted. In this way, the destruction percentage of the treated plants is determined relative to the untreated control. A destruction percentage equal to 100% means that complete destruction of the plant species in question has taken place, and the

percentage 0% means that the number of live plants in the treated pot is identical to that of the control pot.

In the tables in Examples 1 to 6, the amounts of 2-chloro-6-nitro-3-phenoxyaniline are given in the first column and the amounts of bromoxynil octanoate in the first row. Both amounts are given in g.a.i./ha (grammes of active ingredient per hectare).

Example 1:

Test showing the nature of the synergistic biological effect of the combination of bromoxynil octanoate and 2-chloro-6-nitro-3-phenoxyaniline on Sinapis alba:

The experiment is carried out having sown Sinapis alba seeds.

The table which follows represents the mean of 1 greenhouse trial. In the case of each dosage rate, the higher value is the value obtained, and the lower value is the expected value calculated according to Colby.

	Bromoxynil octanoate				
		0	62	125	250
2-chloro-6-nitro-3-phenoxy-aniline	0	0	40	83	99
	62	0	55	80	100
			40	83	99
	125	5	90	100	100
			43	84	99
	250	10	65	100	100
			46	85	99

With reference to the formula given at the beginning of the description, the results given in the table above demonstrate clearly the excellent and unexpected degree of synergism obtained with the combination of the invention.

Example 2:

Test showing the nature of the synergistic biological effect of the combination of bromoxynil octanoate and 2-chloro-6-nitro-3-phenoxyaniline on Galium aparine:

The experiment is carried out having sown Galium aparine seeds.

The table which follows represents the mean of 1 greenhouse trial. In the case of each dosage rate, the higher value is the value obtained, and the lower value is the expected value calculated according to Colby.

	Bromoxynil octanoate				
		0	62	125	250
2-chloro-6-nitro-3-phenoxy-aniline	0	0	0	0	5
	62	0	10	15	25
			0	0	5
	125	0	60	55	65
			0	0	5
	250	10	60	50	55
			10	10	14

With reference to the formula given at the beginning of the description, the results given in the table above demonstrate clearly the excellent and unexpected degree of synergism obtained with the combination of the invention.

Example 3:

Test showing the nature of the synergistic biological effect of the combination of bromoxynil octanoate and 2-chloro-6-nitro-3-phenoxyaniline on Viola tricolor:

The experiment is carried out having sown Viola tricolor seeds.

The table which follows represents the mean of 1 greenhouse trial. In the case of each dosage rate, the higher value is the value obtained, and the lower value is the expected value calculated according to Colby.

		Bromoxynil octanoate			
	0	62	125	250
2-chloro-6-nitro-3-phenoxy-aniline	0	0	10	15	15
	62	0	10 10	30 15	45 15
	125	0	20 10	30 15	20 15
	250	5	40 14	60 19	55 19

With reference to the formula given at the beginning of the description, the results given in the table above demonstrate clearly the excellent and unexpected degree of synergism obtained with the combination of the invention.

Example 4:

Test showing the nature of the synergistic biological effect of the combination of bromoxynil octanoate and 2-chloro-6-nitro-3-phenoxyaniline on Lamium purpurea:

The experiment is carried out having sown Lamium purpurea seeds.

The table which follows represents the mean of 1 greenhouse trial. In the case of each dosage rate, the higher value is the value obtained, and the lower value is the expected value calculated according to Colby.

	Bromoxynil octanoate				
	0	62	125	250
2-chloro-6-nitro-3-phenoxy-aniline	0	0	0	5	35
	62	0 0	70 0	70 5	80 35
	125	20 0	75 55	95 24	100 48
	250	50 -	100 50	100 52	100 66

With reference to the formula given at the beginning of the description, the results given in the table above demonstrate clearly the excellent and unexpected degree of synergism obtained with the combination of the invention.

Example 5:

Test showing the nature of the synergistic biological effect of the combination of bromoxynil octanoate and 2-chloro-6-nitro-3-phenoxyaniline on Veronica persica:

The experiment is carried out having sown Veronica persica seeds.

The table which follows represents the mean of 1 greenhouse trial. In the case of each dosage rate, the higher value is the value obtained, and the lower value is the expected value calculated according to Colby.

	Bromoxynil octanoate				
	0	62	125	250
2-chloro-	0	0	0	0	5
6-nitro-	62	0	0	25	50
3-phenoxy-			0	0	5
aniline	125	0	30	45	65
			0	0	5
	250	50	40	65	75
			0	0	5

With reference to the formula given at the beginning of the description, the results given in the table above demonstrate clearly the excellent and unexpected degree of synergism obtained with the combination of the invention.

Example 6:

Test demonstrating the absence of phytotoxicity of the combination of bromoxynil octanoate and 2-chloro-6-nitro-3-phenoxyaniline to Triticum aestivum:

The experiment was carried out as above, but after having sown wheat seeds, and gives results shown in the table below.

Bromoxynil octanoate

		0	62	125	250
2-chloro-6-nitro-3-phenoxy-aniline	0	0	0	0	0
	62	0	0	0	0
	125	0	0	0	0
	250	0	0	0	0

It can thus be seen that the abovementioned combination shows no phytotoxicity to wheat, while increasing the respective activities of the two active substances against the weeds given by way of example.

CLAIMS

1) A herbicidal product resulting from a combination of:

a) 2-chloro-6-nitro-3-phenoxyaniline, and

b) one or more herbicides of the 3,5-dihalo-4-hydroxybenzonitrile type, selected from amongst bromoxynil, which is 3,5-dibromo-4-hydroxybenzonitrile or an agriculturally acceptable ester or salt thereof, or ioxynil, which is 4-hydroxy-3,5-diiodobenzonitrile, or an agriculturally acceptable ester or salt thereof.

2) The product according to claim 1, in which herbicide b) is the ester of bromoxynil or ioxynil with an alkanoic acid having 4 to 8 carbon atoms.

3) The product according to claim 2, in which herbicide b) is bromoxynil octanoate or heptanoate, or a mixture of the two.

4) The product according to claim 1, for simultaneous, separate or sequential use, for the treatment of undesirable plants or weeds in crops.

5) The product according to claim 1, in which the ratio by weight of 2-chloro-6-nitro-3-phenoxyaniline to HBN is between 0.1 and 10.

6) The product according to claim 2 or 3, in which the ratio by weight of 2-chloro-6-nitro-3-phenoxyaniline to bromoxynil or ioxynil ester is between 0.2 and 5.

7) The product according to one of claims 1 to 6, which comprises a non-herbicidal or weakly herbicidal dosage of 2-chloro-6-nitro-3-phenoxyaniline.

8) Use of 2-chloro-6-nitro-3-phenoxyaniline by way of amplifier of the HBN activity in a product according to claim 7.

9) A herbicidal composition which comprises a) 2-chloro-6-nitro-3-phenoxyaniline, and b) a 3,5-dihalo-4-hydroxybenzonitrile herbicide which is bromoxynil, which is 3,5-dibromo-4-hydroxybenzonitrile or an agriculturally acceptable ester or salt thereof or ioxynil, which is 4-hydroxy-3,5-diodobenzonitrile or an agriculturally acceptable ester of salt thereof, in association with at least one inert carrier, and/or at least one surfactant.

10) The herbicidal composition according to claim 9, which contains between 0.5 and 95% of product according to one of claims 1 to 7.

11) A method of controlling the growth of weeds at a crop locus, which comprises applying to the locus, post emergence of the crop, a) 2-chloro-6-nitro-3-phenoxyaniline, and b) a 3,5-dihalo-4-hydroxybenzonitrile herbicide which is bromoxynil, which is 3,5-dibromo-4-hydroxybenzonitrile or an agriculturally acceptable ester or salt thereof or ioxynil, which is 4-hydroxy-3,5-diodobenzonitrile or an agriculturally acceptable ester of salt thereof.

12) The control method according to claim 11, in which the weeds controlled are:

* From amongst the dicotyledons which are present mainly in cereal fields:

Anthemis arvensis, Anthemis cotula, Brassica nigra, Capsella bursa-pastoris, Chrysanthemum segetum, Galium aparine, Lamium amplexicaule, Lamium purpureum, Lapsana communis, Matricaria inodora, Papaver rhoeas, Raphanus raphanistrum, Sinapis alba, Sinapis arvensis, Stellaria media, Veronica hederifolia, Veronica persica, Viola arvensis, Viola tricolor;

* From amongst the dicotyledons which are present mainly in maize fields:

Abutilon theophrasti, Amaranthus retroflexus, Atriplex patula, Bidens pilosa, Chenopodium album, Datura stramonium, Ipomea purpurea, Polygonum spp. (e.g. Polygonum aviculare, Polygonum convolvulus and Polygonum persicaria), Portulaca oleracea, Solanum nigrum, Xanthium strumarium;

* From amongst the grasses present mainly in cereal fields:

Alopecurus myosuroides, Apera spica-venti;

* From amongst the grasses present mainly in maize fields:

Digitaria sanguinalis, Echinochloa crus-galli, Setaria viridis.

13) The control method according to claim 11, in which the crops are the cereals (wheat, barley, etc.) and maize in the case of the combination of 2-chloro-6-nitro-3-phenoxyaniline/bromoxynil ester, maize in the case of the combination 2-chloro-6-nitro-3-phenoxyaniline/bromoxynil-phenol, and the cereals, sugar cane, rice and onions in the case of the combination 2-chloro-6-nitro-3-phenoxyaniline/ioxynil ester or phenol.

14) The control method according to claim 11, which comprises application of the product according to claim 2 to cereals or maize at a rate of:

50 to 500 g/ha of 2-chloro-6-nitro-3-phenoxyaniline, and 100 to 400 g/ha of bromoxynil ester.

15) A method according to claim 14, in which the product is applied at a rate of:

100 to 400 g/ha of 2-chloro-6-nitro-3-phenoxyaniline, and

120 to 300 g/ha of bromoxynil ester.

16) A control method according to claim 11, which comprises applying the combination bromoxynil-phenol/2-chloro-6-nitro-3-phenoxyaniline, according to claim 1, to maize in a dosage per hectare of:

50 to 500 g of 2-chloro-6-nitro-3-phenoxyaniline, and

200 to 800 g of bromoxynil phenol.

17) A method according to claim 16, in which the product is applied at a rate of:

100 to 400 g/ha of 2-chloro-6-nitro-3-phenoxyaniline, and

240 to 600 g/ha of bromoxynil phenol.

18) The control method of claim 14 wherein said cereals are selected from the group consisting of wheat and barley.