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(54) Title: SYNERGISTIC HERBICIDAL COMPOSITION

(57) Abstract: The present invention relates to a novel synergistic herbicidal composition comprising Clodinafop Propargyl, Fomesafen and Chlorimuron ethyl as the active ingredients, useful in control of sedges, narrow-leaved weeds and broad-leaved weeds in agricultural crops, particularly in Soybean (*Glycine max*).



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SYNERGISTIC HERBICIDAL COMPOSITION**FIELD OF INVENTION:**

The present invention relates to herbicidal combination for controlling harmful undesirable plants. In particular, the invention relates to a novel, synergistic, and broad-spectrum herbicidal composition for the control of narrow leaved weeds, broad-leaved weeds and sedges in agricultural crops, particularly Soybean.

BACKGROUND OF THE INVENTION:

Weed control is an important practice for crops growth. The losses caused by weeds in agricultural production environments include reduced crop quality, increased irrigation costs, increased harvesting costs, reduced land value, injury to livestock and crop damage from insects and pests harbored by the weeds. There are several mechanisms by which weeds cause damage to crops. Weeds may compete with crop plants for the nutrients essential for growth and development. Weeds may produce toxic or irritant chemicals that cause human or animal health problems. Some of the weed varieties also produce immense quantities of seed or vegetative reproductive parts or both that contaminate agricultural products and perpetuate the species in agricultural land.

The present combination provides superior control of weeds with no crop injury and no carryover problems and additionally it minimizes the total amount of herbicide being applied to cropland.

Clodinafop-propargyl, chemical name: (prop-2-ynyl (2R)-2-[4-(5-chloro-3-fluoropyridin-2-yl)oxyphenoxy] propanoate) is a member of the aryloxyphenoxy propionate chemical family. It acts as a systemic herbicide that acts on post-emergent weeds such as selected grasses. It does not act on broad leaved weeds. It is applied to the foliar parts of the weeds and is absorbed through the leaves. This foliar acting grass weed killer is translocated to the meristematic growing points of the plant where it interferes with the production of fatty acids required for plant growth. Grass weeds controlled include wild oats, rough meadow-grass, green foxtail, barnyard grass, Persian dandel, and volunteer canary seed.

Fomesafen, chemical name: 5-[2-chloro-4-(trifluoromethyl)phenoxy]-N-methylsulfonyl-2-nitrobenzamide. It is a selective herbicide that is absorbed by both leaves and roots with very

limited translocation in the phloem. It is used as an early post-emergence control of broad-leaved weeds in soybeans. It is non-phytotoxic to soya beans and other crops such as beans. It works as a Protoporphyrinogen oxidase inhibitor.

Chlorimuron ethyl, chemical name (Ethyl 2-(4-chloro-6-methoxy-2-pyrimidinylcarbamoysulfamoyl) benzoate} is a member of Sulfonylureas class of herbicides. It is a potent and rapid inhibitor of plant cell division and growth. Inhibition of growth is rapid in growing tips of both the roots and shoots of sensitive plants. It is useful for post emergence control of broad-leaved weeds eg. Cocklebur, pigweed, sunflower and annual morning glory in soybeans and Peanuts. It basically acts by inhibiting biosynthesis of the essential amino acids valine and Isoleucine, hence stopping cell division and plant growth. Crop selectivity derives from plant metabolism both by homoglutathione conjugation and by de-esterification.

OBJECTS OF THE INVENTION:

It is an object of the present invention to provide a novel, synergistic herbicidal combination of Clodinafop-propargyl, Fomesafen and Chlorimuron ethyl for effective control of broad-leaved weeds, narrow leaved weeds and sedges in agricultural crops, particularly Soybean crop.

SUMMARY OF THE INVENTION:

In an aspect of the present invention, there is provided a herbicidal composition comprising a) Clodinafop Propargyl b) Fomesafen and c) Chlorimuron ethyl, wherein Clodinafop propargyl is present in an amount ranging from 1-25% w/w, Fomesafen is present in an amount ranging from 5-45% w/w and Chlorimuron ethyl is present in an amount ranging from 1-30%w/w of the herbicidal composition.

In another aspect of the present invention, there is provided a method for controlling undesired weeds in soybean, said method comprising treating soybean crop with a herbicidal composition comprising a) Clodinafop Propargyl b) Fomesafen and c) Chlorimuron ethyl, wherein clodinafop propargyl is present in an amount ranging from 1-25% w/w, Fomesafen is present in an amount ranging from 5-45% w/w and Chlorimuron ethyl is present in an amount ranging from 1-30% w/w of the herbicidal composition.

In another aspect of the present invention, there is provided a method for controlling undesired weeds in soybean, said method comprising treating the soil where soybean crop is intended to be grown with a herbicidal composition comprising a) Clodinafop Propargyl b) Fomesafen and c) Chlorimuron ethyl, wherein Clodinafop propargyl is present in an amount ranging from 1-25% w/w, Fomesafen is present in an amount ranging from 5-45% w/w and Chlorimuron ethyl is present in an amount ranging from 1-30% w/w of the herbicidal composition.

In yet another aspect of the present invention, there is provided a herbicidal composition comprising a) Clodinafop Propargyl b) Fomesafen and c) Chlorimuron ethyl, wherein Clodinafop propargyl is present in an amount ranging from 1-25% w/w, Fomesafen is present in an amount ranging from 5-45% w/w and Chlorimuron ethyl is present in an amount ranging from 1-30% w/w of the herbicidal composition for use in controlling undesired weeds in soybean crop cultivation.

In still another aspect of the present invention, there is provided a process of preparing a herbicidal composition comprising a) Clodinafop Propargyl b) Fomesafen and c) Chlorimuron ethyl, wherein Clodinafop propargyl is present in an amount ranging from 1-25% w/w, Fomesafen is present in an amount ranging from 5-45% w/w and Chlorimuron ethyl is present in an amount ranging from 1-30% w/w of the herbicidal composition; as a water-dispersible formulation, said process comprising: (1) preparing a blend of clodinafop, fomesafen, chlorimuron, and suitable agriculturally acceptable excipients to obtain a first pre-mix; (2) grinding the first pre-mix by jet-milling to obtain a second pre-mix having mean particle size of less than 10 microns; (3) preparing a dough from the second pre-mix; (4) subjecting the second pre-mix to an extruder to obtain granules; and (5) drying the granules to obtain the water-dispersible formulation.

DESCRIPTION OF ACCOMPANYING DRAWINGS:

Fig. 1 depicts the effect of WG formulation (CH-1221) of the herbicidal trimix of the present invention at various dosages on control of various unwanted plant species, in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION:

Those skilled in the art will be aware that the invention described herein is subject to variations and modifications other than those specifically described. It is to be understood that the invention described herein includes all such variations and modifications. The invention also

includes all such steps, features, compositions, and compounds referred to or indicated in this specification, individually or collectively, and all combinations of any two or more of said steps or features.

Unless otherwise specified, all terms used in disclosing the invention, including technical and scientific terms, have the meaning as commonly understood by one of the ordinary skill in the art to which the invention belongs. For further guidance, term definitions may be included to better appreciate the teaching of the present invention.

As used herein, the term “plant” refers to any plant or part thereof including serial and subterranean parts of the plant. It is contemplated that the parts of the plant may be, for example, flowers, fruits or vegetables, shoots, leaves, needles, stalks, stems, fruiting bodies, seeds, also roots and that parts of the plants may or may not be attached to the remainder of the plant.

As used herein, the term “weed” refers to the unwanted plant which competes for resources with the crop or plant of interest.

As used herein, the term “herbicide” refers to a substance which adversely affects the existence and growth of the target weed.

As used herein the term “effective amount” is that quantity of active agent, applied in an amount which will provide the required control of weed on commercial crops. The amount is dependent upon many factors including, for example, type of formulations, the crop, weed sought to be controlled and environmental conditions.

As used herein, the term “agriculturally acceptable excipient” refers to an ingredient, additive, component or supplement, liquid or solid, suitable for incorporation in agricultural compositions.

As used herein, the terms “comprise”, “comprises”, “comprising”, “include”, “includes”, and “including” are meant to be non-limiting ie. other steps and other ingredients which do not affect the end of result can be added. The above terms encompass the terms “consisting of” and “consisting essentially of”.

The terms “weight percent”, “wt-%”, “percent by weight”, “% by weight” and variations thereof, as used herein, refer to the concentration of a substance as the weight of that substance divided

by the total weight of the composition and multiplied by 100. It is understood that, as used here, "percent", "%", and the like are intended to be synonymous with "weight percent", "wt. %", etc.

The present invention provides a herbicidal composition comprising a) Clodinafop Propargyl b) Fomesafen and c) Chlorimuron ethyl, wherein Clodinafop propargyl is present in an amount ranging from 1-25% w/w, Fomesafen is present in an amount ranging from 5-45% w/w and Chlorimuron ethyl is present in an amount ranging from 1-30%w/w of the herbicidal composition. In a preferred embodiment, Clodinafop propargyl is present in an amount of 12% w/w, Fomesafen is present in an amount of 22% w/w and Chlorimuron ethyl is present in an amount of 1.4% w/w of the herbicidal composition.

In an embodiment, the herbicidal composition comprising the said actives exhibit synergistic effect in control of narrow leaved weeds, broad leaved weeds and sedges in agricultural crops, particularly in soybean crop.

In an embodiment, the herbicidal composition further comprises at least one agriculturally acceptable excipient. In an embodiment, the at least one excipient is selected from the group consisting of at least a wetting agent, at least a dispersing agent, at least a defoaming agent, at least a binder, at least a suitable carrier, and combinations thereof. In a preferred embodiment, the herbicidal composition is in the form of a wettable granule formulation further comprising at least a wetting agent, at least a dispersing agent, at least a defoaming agent, at least a binder, and at least a suitable carrier.

In an embodiment, the at least a dispersing agent is selected from the group comprising sodium lignosulphonates, sodium naphthalene sulphonate- formaldehyde condensates, aliphatic alcohol ethoxylates, tristyrylphenol ethoxylates and esters, ethylene oxide/propylene oxide block copolymers. In a preferred embodiment, the at least a dispersing agent is sodium salt of naphthalene sulfonate condensate. The at least a dispersing agent weight concentration in said herbicidal composition is in the range of 6-10%w/w.

In an embodiment, the at least a wetting agent is selected from the group consisting of blend of alkyl naphthalene sulfonate, sodium salt, sodium laurel sulphate, and combinations thereof. In a preferred embodiment, the at least a wetting agent is sodium laurel sulphate. The at least a wetting agent weight concentration in said herbicidal composition is in the range of 2-6% w/w.

In an embodiment, the at least an anti-foaming is selected from the group consisting of silicone emulsions, long-chain alcohols, fatty acids, organic fluorine compounds, and combinations thereof. The at least an anti-foaming agent weight concentration in said herbicidal composition is in the range of 0.1-0.5%w/w.

5 In an embodiment, the at least a binder is selected from the group consisting of Starch paste, Hydroxypropyl methyl cellulose (HPMC), Polyvinyl Pyrrolidone (PVP), Lactose monohydrate, and combinations thereof. The at least a binder weight concentration in said herbicidal composition is in the range of 8-12% w/w.

10 In an embodiment, the at least a carrier is selected from the group consisting of dextrose, lactose, soluble starch, galactose, amyloextrin, ammonium sulfate, maltose, mannitol, sucrose, sorbitol, china clay, and combinations thereof.

In an embodiment, the herbicidal composition is formulated in a form selected from the group comprising water-soluble concentrates (SL), emulsifiable concentrates (EC), emulsions (EW), micro-emulsions (ME), Suspension concentrates (SC), oil-based suspension concentrates (OD),
15 flowable suspensions (FS), water-dispersible granules (WG), water-soluble granules (SG), wettable powders (WP), water soluble powders (SP), granules (GR), encapsulated granules (CG), fine granules (FG), macrogranules (GG), dry flowables (DF), aqueous Suspo-emulsions (SE), capsule suspensions (CS) and microgranules (MG). In a preferred embodiment, the herbicidal composition is in the form of suspension concentrates (SC), water-dispersible granule (WDG) and
20 wettable powder (WP).

In a more preferred embodiment, the herbicidal composition of the present invention is formulated in the form of water dispersible granule (WDG) comprising a wetting agent, a dispersing agent, a defoaming agent, a binder, and a suitable carrier.

25 The present invention also provides a method for controlling undesired weeds in soybean, said method comprising treating soybean crop with a herbicidal composition comprising a) Clodinafop Propargyl b) Fomesafen and c) Chlorimuron ethyl, wherein clodinafop propargyl is present in an amount ranging from 1-25% w/w, Fomesafen is present in an amount ranging from 5-45% w/w and Chlorimuron ethyl is present in an amount ranging from 1-30%w/w of the herbicidal composition. In a preferred embodiment, clodinafop propargyl is present in an amount

of 12% w/w, Fomesafen is present in an amount of 22% w/w and Chlorimuron ethyl is present in an amount of 1.4%vw/w of the herbicidal composition. The herbicidal composition is as described substantially in the present disclosure. In an embodiment, the herbicidal composition is applied at a dosage of 72-84 grams a.i./ha of clodinafop; 132-154 grams a.i./ha of fomesafen; and 8.4-9.8 grams a.i./ha of chlorimuron.

The present invention also provides a method for controlling undesired weeds in soybean, said method comprising treating the soil where soybean crop is intended to be grown with a herbicidal composition comprising a) Clodinafop Propargyl b) Fomesafen and c) Chlorimuron ethyl, wherein clodinafop propargyl is present in an amount ranging from 1-25% w/w, Fomesafen is present in an amount ranging from 5-45% w/w and Chlorimuron ethyl is present in an amount ranging from 1-30% w/w of the herbicidal composition. In a preferred embodiment, Clodinafop propargyl is present in an amount of 12% w/w, Fomesafen is present in an amount of 22% w/w and Chlorimuron ethyl is present in an amount of 1.4% w/w of the herbicidal composition. The herbicidal composition is as described substantially in the present disclosure. In an embodiment, the herbicidal composition is applied at a dosage of 72-84 grams a.i./ha of clodinafop; 132-154 grams a.i./ha of fomesafen; and 8.4-9.8 grams a.i./ha of chlorimuron.

The present invention further provides a herbicidal composition comprising a) Clodinafop Propargyl b) Fomesafen and c) Chlorimuron ethyl, wherein clodinafop propargyl is present in an amount ranging from 1-25% w/w, Fomesafen is present in an amount ranging from 5-45% w/w and Chlorimuron ethyl is present in an amount ranging from 1-30% w/w of the herbicidal composition for use in controlling undesired weeds in soybean crop cultivation. In a preferred embodiment, clodinafop propargyl is present in an amount of 12% w/w, Fomesafen is present in an amount of 22% w/w and Chlorimuron ethyl is present in an amount of 1.4% w/w of the herbicidal composition. The herbicidal composition is as described substantially in the present disclosure.

The present invention also provides a process of preparing a herbicidal composition comprising a) Clodinafop Propargyl b) Fomesafen and c) Chlorimuron ethyl, wherein Clodinafop propargyl is present in an amount ranging from 1-25% w/w, Fomesafen is present in an amount ranging from 5-45% w/w and Chlorimuron ethyl is present in an amount ranging from 1-30% w/w of the herbicidal composition; as a a water-dispersible formulation, said process comprising: (1)

preparing a blend of clodinafop, fomesafen, chlorimuron, and suitable agriculturally acceptable excipients to obtain a first pre-mix; (2) grinding the first pre-mix by jet-milling to obtain a second pre-mix having mean particle size of less than 10 microns; (3) preparing a dough from the second pre-mix; (4) subjecting the second pre-mix to an extruder to obtain granules; and (5) drying the granules to obtain the water-dispersible formulation.

EXAMPLES:

The examples below are given solely for the purpose of illustration and are not to be construed as limitations of the present invention, as many variations thereof are possible without departing from the spirit and scope of the invention.

Example 1 (a): Preparation of herbicidal composition as wettable granule (WG)

Table 1 below provides a herbicidal composition as described in the present specification, formulated as a wettable granule (WG)

Table 1: Composition of the herbicidal composition (CH1221WG)

Ingredient	percentage w/w
Clodinafop technical (Basis of 100%)	12% w/w
Fomesafen technical (Basis of 100%)	22% w/w
Chlorimuron Ethyl technical (Basis of 100%)	1.40% w/w
Ammonium Sulphate	10% w/w
Dispersing agent (Sodium salt of naphthalene sulfonate condensate)	8% w/w
Wetting agent (sodium laurel sulphate)	4% w/w
Antifoam	0.02% w/w
Binder	10% w/w
China clay	q.s. to make w/w

Preparation method of WG:

The desired quantity of the active ingredients and excipients were weighed and mixed in a blender. The mixture was then subjected to grinding through a jet mill and grinding was carried out until a mean particle size of below 10 micron was obtained. After grinding, the homogenous mix was again put in a blender and a dough was prepared by dough mixer. After this step, granules were prepared by carrying the dough through an extruder. The granules thus prepared were then dried by using hot air or and oven. The dried granules were then checked for quality parameters.

The WG formulation as described above in Table 1 was tested for the below mentioned quality parameters as listed in Table 2.

Table 2: Quality parameters of WG formulation

Parameter	Desired quality
Description/ physical appearance	The material should consist of dry, free flowing granules, which should wet on mixing with water, thereby resulting into a solution suitable for spray. The material shall be free from visible extraneous matter
A.I. Content-	Clodinafop -12 % w/w Fomesafen -22% w/w Chlorimuron ethyl -1.4% w/w
Persistence of foaming	Not more than 60 ml after 1 min
Wettability	Max. for 120 secs
Suspensibility	Min 60%
Acidity as H ₂ SO ₄	0.5% max

Example 1 (b): Preparation of herbicidal composition as suspension concentrate (SC) (CH 1221 SC)

Table 3 below provides a herbicidal composition as described in the present specification, formulated as a suspension concentrate (SC)

Table 3: Composition of the herbicidal composition (CH 1221SC)

Ingredient	percentage w/w
Fomesafen Technical (basis of 100%)	22% w/w
Clodinafop technical (basis of 100%)	12%w/w
Chlorimuron technical (100% basis)	01.40% w/w
Anti- freeze agent (propylene glycol)	06.00% w/w
Dispersing/ Wetting agent	05.00% w/w
Deformer (silicon based)	00.50% w/w
Anti-bacterial or Biocide	00.20% w/w
Thickener (xanthan gum)	00.32% w/w
D. M. Water	Q. S.

Preparation method of SC

Step -1:- The mixture of surfactant(s) and anti-freeze agent were first diluted in demineralised water and solubilised by high speed mixer followed by addition of defoamer and further addition of Fomesafen technical mix to make a homogenous mass and then the other two technical were added -Clodinafop and Chlorimuron. This was followed by mixing of the rest of adjuvants to obtain a homogenous mass.

Step -2:- The above mixed mass was subjected to grinding in sand mill. Grinding was carried out until a mean particle size of <5 micron was obtained.

Step -3:- Preparation of 2% gum solution – 10 gm of demineralised water was taken and to it 0.5 gm of formaldehyde sol. was added under slow stirring.

Step -4:- After the grinding was complete, 2% water solution of xanthan gum was added under slow stirring. After homogenous mixing, quality parameters were checked.

The SC formulation as described above in Table 3 was tested for the below mentioned quality parameters as listed in Table 4.

Table 4: Quality parameters of SC formulation

Quality parameters for SC formulation:

Parameter	Desired quality
Description	Material shall be in the form of free-flowing suspension.
Pourability	Residue shall not be more than 5% w/w.
Spontaneity of dispersion	Shall not be less than 95% w/w.
Wet sieve test	98% min (passes through 45 micron sieve).
Foam persistence	Persistence of foam shall not be more than 60 ml in 12 min.
A.I. content	Fomesafen 22% , Clodinafop 12% and Chlorimuron 1.4%
Suspensibility	Not less than 95% w/w.
pH of 1% aq. Solution	6.0-8.0
HST (Heat Stability Test)	Take 100ml sample & keep it in 54°C±2 for 14 days. After 14 days, the physical appearance is observed and all listed parameters are re-checked for any major deviation If the formulation is heat stable, the parameters remain in the original range.
Cold test	Take 100ml sample & keep it at 0°C±2 for 7 days. After 7 days, the physical appearance is observed and all listed parameters are re-checked for any major deviation If the formulation is cold stable, the parameters remain in the original range.

Example 2: Field evaluation of the bioefficacy of the present herbicidal composition

The presently disclosed herbicidal trimix (coded as CH-1221 WG) was tested for its bioefficacy against narrow leaved weeds, broad leaved weeds and sedges on soybean crop. The plants were aligned in a plot size of 25 sq. meter, with the spacing of 15 cm between individual crop plants and a spacing of 30 cm between the rows. The trial was laid out in a random block design consisting of a total of 9 treatments in three replications. The trial was conducted at a temp. of 32°C under 60% relative humidity, no winds and under optimum soil moisture conditions. The application of the herbicidal trimix was carried out at the early post emergence stage 15-20 days after sowing of the crop.

Measured quantity of the chemical was added to required volume of water @ 375 lit. /ha for spray. The spray tank was filled with ½ the quantity of clean required volume of water and then the measured chemical (according to the dose) was added followed by the rest half quantity of water. The solution was stirred well before application. Knapsack sprayer fitted with boom along with flood jet nozzle was used to apply the herbicidal solution.

Table 5 below provides the treatment details of the soybean crop in the trial experiment conducted. For purposes of convenience, the present composition has been represented by the code “CH-1221 WG”.

Table 5: Treatment details

Treat	Treatment details	Dose a.i./hectare	Dose/hectare
T-1	Untreated	-	-
T-2	Clodinafop 15% WP	81	540 gm
T-3	Fomesafen 25% SL	312.5	1250 ml
T-4	Chlorimuron ethyl 25% WP	9	36 gm
T-5	CH-1221 WG	72 + 132 + 8.4	600 gm
T-6	CH-1221 WG	78 + 143 + 9.1	650 gm
T-7	CH-1221 WG	84 + 154 + 9.8	700 gm
T-8	Shaked (S)	50 + 70	2000
T-9	Fusiflex (S)	111 + 111	1000

Note

CH-1221 WG (clodinafop propargyl 12% + Fomesafen 22% + Chlorimuron ethyl 1.4% WG)

Shaked – Propaquizafop 2.5% + Imazethapyr 3.75% w/w ME

Fusiflex – Fluazifop-p- butyl 11.1% + Fomesafen 11.1% SL

S- Market standard.

EVALUATION OF BIO-EFFICACY IN SOYABEAN CROP

Weed count: A quadrat of the dimensions (0.5m × 0.5m) was placed at 3 randomly selected places in all the plots of the experimental field and the number of weed flora were counted uniformly at 21 days after application

Weed control: The percent weed control was determined based on no. of live weed flora at 7, 14, 21, 28 and 42 days after application as per following:

Percent weed control = WC – WT

$$\dots \times 100$$

WC

Where WC = No. of weed in control plot

WT = No. of weed in treated plot

5 **Table 6 (a): Effect of herbicidal treatment on weed density of Narrow, Broad leaved weeds & Sedges at 21 DAA (days after application)**

Treatment	Dose (a.i/ha)	Percent control of Narrow, Broad leaves weeds & Sedges(Mean 0.25 sqm) over UTC					
		<i>Echinochloa colonum</i>		<i>Commelina bengalensis</i>		<i>Cyperus spp.</i>	
		Live pop.	%cont rol	Live pop.	%cont rol	Live pop.	%cont rol
Untreated (T1)	-	45.7	-	28.5	-	12	-
Clodinafop 15% WP (T2)	81	12.5	72.65	25.5	10.53	9.5	20.83
Fomesafen 25% SL (T3)	312 .5	40.7	10.94	11	61.40	10	16.67
Chlorimuron ethyl 25% WP (T4)	9	32.3	29.32	16.5	42.11	2.5	79.17
CH-1221 WG (T5)	72 + 132 + 8.4 (212.4)	8.5	81.40	6.5	77.19	4.0	66.67
CH-1221 WG (T6)	78 + 143 + 9.1 (230.1)	1.5	96.72	2.0	92.98	1.0	91.67
CH-1221 WG (T7)	84 + 154 + 9.8 (247.8)	1.3	96.16	1.5	94.74	0.9	92.50
Shaked (s) (T8)	50 + 70	9.5	79.21	11.5	59.65	8.5	29.17
Fusiflex (s) (T9)	111 + 111	6.5	85.78	9.5	66.67	9.2	23.33

Fig. 1 shows the graphical representation of the percent control achieved at 21 days after various treatments T1-T-9 for the three major weeds: *Echinochloa colonum*, *Commelina bengalensis* and *Cyperus spp.* T2, T3, and T4 represent the recommended dosages of each of Clodinafop, Fomesafen, and Chlorimuron ethyl respectively. It is to be understood that under regulatory

conditions, the dosage amount of each of Clodinafop, Fomesafen, and Chlorimuron ethyl is not to be exceeded in real-world application.

In the case of *Echinochloa colonum*, it can be unexpectedly and surprisingly seen that treatment T6 (230/1g a.i./ha) and T7 (247.8g a.i./ha) shows >96% control as compared to the effect of the combination of Clodinafop, Fomesafen, and Chlorimuron ethyl (T2+T3+T4), wherein the total weight of actives is 402.5g a.i./ha. Not only the individual concentrations of the actives in the trimix is reduced compared to their application separately, the total concentration of the actives in the trimix is about 38% less compared to separate application.

In the case of *Commelina begalensis*, it can be unexpectedly and surprisingly seen that treatment T6 (230/1g a.i./ha) and T7 (247.8g a.i./ha) shows >92% and 94% control respectively as compared to the effect of the combination of Clodinafop, Fomesafen, and Chlorimuron ethyl (T2+T3+T4), wherein the total weight of actives is 402.5g a.i./ha. Not only the individual concentrations of the actives in the trimix is reduced compared to their application separately, the total concentration of the actives in the trimix is about 38% less compared to separate application.

In the case of *Cyperus spp.*, it can be unexpectedly and surprisingly seen that treatment T6 (230/1g a.i./ha) and T7 (247.8g a.i./ha) shows >91% control respectively as compared to the effect of the combination of Clodinafop, Fomesafen, and Chlorimuron ethyl (T2+T3+T4), wherein the total weight of actives is 402.5g a.i./ha. Not only the individual concentrations of the actives in the trimix is reduced compared to their application separately, the total concentration of the actives in the trimix is about 38% less compared to separate application.

Example 3: Evaluation of phytotoxicity of the present herbicidal composition

Visual observations were recorded at 3, 7 and 10 days after application (DAA) of testing products. The parameters observed were leaf injury on tip/surface, necrosis, vein clearing, epinasty, hyponasty and wilting. The score scale (1-10) followed for leaf injury on tips/surface is given below in Table 7.

Table 7: Phytotoxicity symptoms scoring and rating for leaf injury on tip/surface

Leaf injury on tips/surface	Rating
0-10%	1

11-20%	2
21-30%	3
31-40%	4
41-50%	5
51-60%	6
61-70%	7
71-80%	8
81-90%	9
91-100%	10

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Phytotoxicity studies:**Table-8(a): Study conducted to assess the phytotoxic effect after various treatments on soyabean crop at 3 DAA**

Treatments	Treatment details	Dose a.i./hectare	3 DAA					
			L	N	V	E	H	W
T-1	Untreated	-	-	-	-	-	-	-
T-2	Clodinafop 15 % WP	81	0	0	0	0	0	0
T-3	Fomesafen 25% SL	312 .5	0	0	0	0	0	0
T-4	Chlorimuron 25% WP	9	0	0	0	0	0	0
T-5	CH – 1221 WG	72 + 132 + 8.4	0	0	0	0	0	0
T-6	CH – 1221 WG	78 + 143 + 9.1	0	0	0	0	0	0
T-7	CH – 1221 WG	84 + 154 + 9.8	0	0	0	0	0	0
T-8	Shaked	50 + 70	0	0	0	0	0	0
T-9	Fusiflex (MKT STD)	111 + 111	0	0	0	0	0	0

DAA – Days after application,

L- Leaf injury on tips/surface, N-Necrosis, V- Vein clearing, E- Epinasty, H- Hyponasty, W-wilting.

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Table 8 (b) Study conducted to assess the phytotoxic effect of various treatments on soybean crop at 7 DAA

Treatment	Treatment details	Dose a.i./hectare	7 DAA					
			L	N	V	E	H	W
T-1	Untreated	-	-	-	-	-	-	-
T-2	Clodinafop 15 % WP	81	0	0	0	0	0	0
T-3	Fomesafen 25% SL	312 .5	0	0	0	0	0	0

Treatment	Treatment details	Dose a.i./hectare	7 DAA					
			L	N	V	E	H	W
T-4	Chlorimuron 25% WP	9	0	0	0	0	0	0
T-5	CH – 1221 WG	72 + 132 + 8.4	0	0	0	0	0	0
T-6	CH – 1221 WG	78 + 143 + 9.1	0	0	0	0	0	0
T-7	CH – 1221 WG	84 + 154 + 9.8	0	0	0	0	0	0
T-8	Shaked	50 + 70	0	0	0	0	0	0
T-9	Fusiflex (MKT STD)	111 + 111	0	0	0	0	0	0

DAA – Days after application,

L- Leaf injury on tips/surface, N-Necrosis, V- Vein clearing, E- Epinasty, H- Hyponasty, W-wilting.

5 **Table 8 (c) Study conducted to assess the phytotoxic effect of various treatments on soyabean crop at 10 DAA**

Treatment	Treatment details	Dose a.i./hectare	10 DAA					
			L	N	V	E	H	W
T-1	Untreated	-	-	-	-	-	-	-
T-2	Clodinafop 15 % WP	81	0	0	0	0	0	0
T-3	Fomesafen 25% SL	312 .5	0	0	0	0	0	0
T-4	Chlorimuron 25% WP	9	0	0	0	0	0	0
T-5	CH – 1221 WG	72 + 132 + 8.4	0	0	0	0	0	0
T-6	CH – 1221 WG	78 + 143 + 9.1	0	0	0	0	0	0
T-7	CH – 1221 WG	84 + 154 + 9.8	0	0	0	0	0	0
T-8	Shaked	50 + 70	0	0	0	0	0	0
T-9	Fusiflex (MKT STD)	111 + 111	0	0	0	0	0	0

DAA – Days after application,

L- Leaf injury on tips/surface, N-Necrosis, V- Vein clearing, E- Epinasty, H- Hyponasty, W-wilting

10 **Example 4 (a):**

Bioefficacy studies with CH 8188 WG (Clodinafop Propargyl 08% + Fomesafen 18% + Chlorimuron ethyl 0.8 % WG)

In further trials, the herbicidal combination was tested at varied percent active ingredient (a.i.) content. Effect of herbicidal treatment on weed density of narrow and broad leaves weeds at 21 days after application was tested for CH 8188 WG comprising Clodinafop Propargyl 8% + Fomesafen 18% + Chlorimuron ethyl 0.8 %.

Table 9: Effect of herbicidal treatment on weed density of Narrow, Broad leaved weeds & Sedges at 21 days- CH 8188 WG

Treatments	Dose (a.i./ha)	Percent control of Narrow & Broad leaves weeds (Mean 0.25 sqm) over UTC					
		<i>Echinochloa colonum</i>		<i>Commelina bengalensis</i>		<i>Cyperus spp.</i>	
		Live pop.	%control	Live pop.	%control	Live pop.	%control
Untreated (T1)	-	45.7	-	28.5	-	12	-
Clodinafop 15 % WP (T2)	81	12.5	72.65	25.5	10.53	9.5	20.83
Fomesafen 25% SL (T3)	312.5	40.7	10.94	11	61.40	10	16.67
Chlorimuron 25 % WP (T4)	9	32.3	29.32	16.5	42.11	2.5	79.17
CH- 8188 WG (T5)	48 + 108 + 4.8 (160.8)	20.0	56.23	13.0	54.38	6.0	50.00
CH- 8188 WG (T6)	52 + 117 + 5.2 (174.2)	15.0	67.17	6.0	78.74	3.0	75.00
CH- 8188 WG (T7)	56 + 126 +	12.0	73.74	5.0	82.45	1.5	87.50

	5.6 (187.6)						
Shaked (S) (T8)	50 + 70	9.5	79.21	11.5	59.65	8.5	29.17
Fusiflex (S) (T9)	111 + 111	6.5	85.78	9.5	66.67	9.2	23.33

As seen in Table 9, application of the trimix (T5, T6, T7) does not provide any substantial protection over *Echinochloa colonum* compared to the effect of application of Clodinafop alone.

However, application of the trimix (T6, T7), wherein the total concentration of the actives in T6 is 174.5g a.i./ha and in T7 is 187.6g a.i./ha unexpectedly and surprisingly exhibits about 78% and 82% efficacy in control of *Commelina bengalensis* as compared to the effect of application of the actives concurrently as per the recommended dosages (402.5g a.i./ha) (T2, T3, T4). Application of the trimix (T7), wherein the total concentration of the actives is 187.6g a.i./ha unexpectedly and surprisingly exhibits about 87.5% efficacy in control of *Cyperus spp.* as compared to the effect of application of the actives separately as per the recommended dosages (T2, T3, T4).

No plant phytotoxicity was observed in case of CH-8188 WG. Data is shown in tables 10-12 below:

Table 10: Phytotoxic effect of various treatments on Soybean crop after 3 DAA

Treatments	Treatment details	Dose/hectare	3 DAA					
			L	N	V	E	H	W
T-1	Untreated	-	-	-	-	-	-	-
T-2	Clodinafop 15 % WP	81	0	0	0	0	0	0
T-3	Fomesafen 25% SL	312.5	0	0	0	0	0	0
T-4	Chlorimuron 25 % WP	9	0	0	0	0	0	0
T-5	CH- 8188 WG	48 + 108 + 4.8	0	0	0	0	0	0
T-6	CH- 8188 WG	52 + 117 + 5.20	0	0	0	0	0	0
T-7	CH- 8188 WG	56 + 126 + 5.6	0	0	0	0	0	0
T-8	Shaked (S)	50 + 70	0	0	0	0	0	0
T-9	Fusiflex (S)	111 + 111	3	0	0	0	0	0

Table 11: Phytotoxic effect of various treatments on Soybean crop after 7 DAA

Treatments	Treatment details	Dose/hectare	7 DAA					
			L	N	V	E	H	W
T-1	Untreated	-	-	-	-	-	-	-
T-2	Clodinafop 15 % WP	81	0	0	0	0	0	0

T-3	Fomesafen 25% SL	312.5	0	0	0	0	0	0
T-4	Chlorimuron 25 % WP	9	0	0	0	0	0	0
T-5	CH- 8188 WG	48 + 108 + 4.8	0	0	0	0	0	0
T-6	CH- 8188 WG	52 + 117 + 5.20	0	0	0	0	0	0
T-7	CH- 8188 WG	56 + 126 + 5.6	0	0	0	0	0	0
T-8	Shaked (S)	50 + 70	0	0	0	0	0	0
T-9	Fusiflex (S)	111 + 111	3	0	0	0	0	0

Table 12: Phytotoxic effect of various treatments on Soybean crop after 10 DAA

Treatments	Treatment details	Dose/hectare	10 DAA					
			L	N	V	E	H	W
T-1	Untreated	-	-	-	-	-	-	-
T-2	Clodinafop 15 % WP	81	0	0	0	0	0	0
T-3	Fomesafen 25% SL	312.5	0	0	0	0	0	0
T-4	Chlorimuron 25 % WP	9	0	0	0	0	0	0
T-5	CH- 8188 WG	48 + 108 + 4.8	0	0	0	0	0	0
T-6	CH- 8188 WG	52 + 117 + 5.20	0	0	0	0	0	0
T-7	CH- 8188 WG	56 + 126 + 5.6	0	0	0	0	0	0
T-8	Shaked (S)	50 + 70	0	0	0	0	0	0
T-9	Fusiflex (S)	111 + 111	3	0	0	0	0	0

DAA – Days after application,

L- Leaf injury on tips/surface, N-Necrosis, V- Vein clearing, E- Epinasty, H- Hyponasty, W-wilting.

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Example 5

The present herbicidal trimix of the present invention was also tested at varied active ingredient (a.i.) content. Effect of herbicidal treatment on weed density of narrow & broad leaves weeds at 21 days after application was tested for CH 1431 WG comprising Clodinafop Propargyl 14% + Fomesafen 30% + Chlorimuron ethyl 1.8 % WG

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Table 13: Effect of herbicidal treatment on weed density of Narrow, Broad leaved weeds & Sedges at 21days- CH- 1431 WG

Treatments	Dose (a.i./ha)	Percent control of Narrow & Broad leaves weeds (Mean 0.25 sqm) over UTC		
		<i>Echinochloa colonum.</i>	<i>Commelina bengalensis</i>	<i>Cyperus spp.</i>

		Live pop.	%control	Live pop.	%control	Live pop.	%control
Untreated (T1)	-	45.7	-	28.5	-	12	-
Clodinafop 15 % WP (T2)	81	12.5	72.65	25.5	10.53	9.5	20.83
Fomesafen 25% SL (T3)	312.5	40.7	10.94	11	61.40	10	16.67
Chlorimuron 25 % WP (T4)	9	32.3	29.32	16.5	42.11	2.5	79.17
CH- 1431 WG (T5)	84 + 180 + 10.8 (274.8)	7.9	82.71	6.0	78.94	3.0	75.00
CH- 1431 WG (T6)	91 + 195 + 11.7 (297.7)	1.3	97.15	1.8	93.68	2.0	83.33
CH- 1431 WG (T7)	98 + 210 + 12.6 (320.6)	1.3	97.15	1.3	95.43	1.0	91.66
Shaked (S) (T8)	50 + 70	9.5	79.21	11.5	59.65	8.5	29.17
Fusiflex (S) (T9)	111 + 111	6.5	85.78	9.5	66.67	9.2	23.33

As seen in Table 13, application of the trimix (T5, T6, T7) unexpectedly and surprisingly exhibits synergistic enhancement in control of *Echinochloa colonum* compared to the effect of application of the three actives concurrently at their recommended dosages. For T5, the control is about 82%; for T6 and T7, the control is about 97%. In each of T5-T7, the total concentration of the actives in the trimix are in the range of about 20-31% less than the total concentration of actives when applied concurrently at recommended dosages.

A similar synergistic effect is also observed in the case of control of *Commelina bengalensis* in each of T5 (about 79%), T6 (about 94%, and T7 (about 95%). Synergy was also observed in the case of control of *Cyperus spp.* In T6 (about 83%) and T7 (about 92%). The enhancement observed

was also in light of the fact that the dosages of the actives in the trimix are lower than the recommended dosages when applied together.

Some amount of phytotoxicity was however observed on Soybean crop in case of CH 1431WG comprising Clodinafop Propargyl 14% + Fomesafen 30% + Chlorimuron ethyl 1.8 % WG. The data is shown in below tables.

Table 14: Phytotoxic effect of various treatments on Soybean crop after 3 DAA

Treatments	Treatment details	Dose/hectare	3 DAA					
			L	N	V	E	H	W
T-1	Untreated	-	-	-	-	-	-	-
T-2	Clodinafop 15 % WP	81	0	0	0	0	0	0
T-3	Fomesafen 25% SL	312.5	3	3	0	1	1	0
T-4	Chlorimuron 25 % WP	9	0	0	0	0	0	0
T-5	CH- 1431 WG	84 + 180 + 10.8	3	3	0	1	1	0
T-6	CH- 1431 WG	91 + 195 + 11.7	5	3	0	1	1	0
T-7	CH- 1431 WG	98 + 210 + 12.6	3	5	0	1	1	0
T-8	Shaked (S)	50 + 70	0	0	0	0	0	0
T-9	Fusiflex (S)	111 + 111	3	0	0	0	0	0

Table 15: Phytotoxic effect of various treatments on Soybean crop after 7 DAA

Treatments	Treatment details	Dose/hectare	7 DAA					
			L	N	V	E	H	W
T-1	Untreated	-	-	-	-	-	-	-
T-2	Clodinafop 15 % WP	81	0	0	0	0	0	0
T-3	Fomesafen 25% SL	312.5	3	3	0	1	1	0
T-4	Chlorimuron 25 % WP	9	0	0	0	0	0	0
T-5	CH- 1431 WG	84 + 180 + 10.8	3	3	0	1	1	0
T-6	CH- 1431 WG	91 + 195 + 11.7	7	7	0	1	1	0
T-7	CH- 1431 WG	98 + 210 + 12.6	3	7	0	7	1	0
T-8	Shaked (S)	50 + 70	0	0	0	0	0	0
T-9	Fusiflex (S)	111 + 111	3	0	0	0	0	0

Table 16: Phytotoxic effect of various treatments on Soybean crop after 10 DAA

Treatments	Treatment details	Dose/hectare	10 DAA					
			L	N	V	E	H	W
T-1	Untreated	-	-	-	-	-	-	-
T-2	Clodinafop 15 % WP	81	0	0	0	0	0	0
T-3	Fomesafen 25% SL	312.5	3	3	0	1	1	0
T-4	Chlorimuron 25 % WP	9	0	0	0	0	0	0
T-5	CH- 1431 WG	84 + 180 + 10.8	3	3	0	1	1	0
T-6	CH- 1431 WG	91 + 195 + 11.7	5	3	0	1	1	0
T-7	CH- 1431 WG	98 + 210 + 12.6	3	5	0	1	1	0
T-8	Shaked (S)	50 + 70	0	0	0	0	0	0
T-9	Fusiflex (S)	111 + 111	3	0	0	0	0	0

DAA – Days after application,

L- Leaf injury on tips/surface, N-Necrosis, V- Vein clearing, E- Epinasty, H- Hyponasty, W-wilting.

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Example 6

Field evaluations for phytotoxicity of CH 1221 SC and CH 1221 WG were carried out on Soyabean crop after 3DAA.

The results are as shown below in Table 17.

Treatment	Treatment details	Dose/hectare	3 DAA					
			L	N	V	E	H	W
T-1	Untreated	-	-	-	-	-	-	-
T-2	CH-1221 SC	72 + 132 + 8.4	1	3	1	1	0	0
T-3	CH-1221 SC	78 + 143 + 9.1	3	3	1	1	0	0
T-4	CH-1221 SC	84 + 154 + 9.8	3	3	1	1	0	0
T-5	CH-1221 WG	72 + 132 + 8.4	0	0	0	0	0	0
T-6	CH-1221 WG	78 + 143 + 9.1	0	0	0	0	0	0
T-7	CH-1221 WG	84 + 154 + 9.8	0	0	0	0	0	0

DAA – Days after application,

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L- Leaf injury on tips/surface, N-Necrosis, V- Vein clearing, E- Epinasty, H- Hyponasty, W-wilting

As seen in Table 17, the trimix of the present invention in WG form preferably shows no phytotoxic effect compared to SC form, which shows moderate phytotoxicity in terms of necrosis, and measurable phytotoxicity to leaf tips, and veins, suggesting that the WG formulation is safer and suitable for application as compared to SC formulation.

Example 7

Phytotoxic effect of 2 different formulations of CH-1221 WG and CH-1221 SC on Soybean crop after 7 DAA.

The results are shown below in Table 18.

Treatment	Treatment details	Dose/hectare	7 DAA					
			L	N	V	E	H	W
T-1	Untreated	-	-	-	-	-	-	-
T-2	CH-1221 SC	72 + 132 + 8.4	1	3	1	1	0	0
T-3	CH-1221 SC	78 + 143 + 9.1	3	3	1	1	0	0
T-4	CH-1221 SC	84 + 154 + 9.8	3	3	1	1	0	0
T-5	CH-1221 WG	72 + 132 + 8.4	0	0	0	0	0	0
T-6	CH-1221 WG	78 + 143 + 9.1	0	0	0	0	0	0
T-7	CH-1221 WG	84 + 154 + 9.8	0	0	0	0	0	0

DAA – Days after application,

L- Leaf injury on tips/surface, N-Necrosis, V- Vein clearing, E- Epinasty, H- Hyponasty, W-wilting

As seen in Table 18, the trimix of the present invention in WG form preferably shows no phytotoxic effect compared to SC form, which across all dosages shows moderate phytotoxicity in terms of necrosis and leaf tip damage, while measurable damage to veins, suggesting that the WG formulation is safer and suitable for application compared to SC formulation.

Example 8

Phytotoxic effect of 2 different formulations of CH-1221 WG and CH-1221 SC on Soybean crop after 10 DAA.

The results are shown below in Table 19.

Treatment	Treatment details	Dose/hectare	10 DAA					
			L	N	V	E	H	W
T-1	Untreated	-	-	-	-	-	-	-
T-2	CH-1221 SC	72 + 132 + 8.4	1	1	1	0	0	0
T-3	CH-1221 SC	78 + 143 + 9.1	1	1	1	0	0	0
T-4	CH-1221 SC	84 + 154 + 9.8	1	1	1	0	0	0
T-5	CH-1221 WG	72 + 132 + 8.4	0	0	0	0	0	0
T-6	CH-1221 WG	78 + 143 + 9.1	0	0	0	0	0	0
T-7	CH-1221 WG	84 + 154 + 9.8	0	0	0	0	0	0

DAA – Days after application,

L- Leaf injury on tips/surface, N-Necrosis, V- Vein clearing, E- Epinasty, H- Hyponasty, W-wilting

As seen in Table 19, the trimix of the present invention in WG form preferably shows no phytotoxic effect compared to SC form, which across all dosages shows measurable phytotoxicity as evaluated by leaf injury to tips/surface, necrosis and vein clearing, suggesting that the WG formulation is safer and suitable for application compared to SC formulation.

Overall, the present invention provides a herbicidal trimix comprising the actives a) Clodinafop Propargyl b) Fomesafen and c) Chlorimuron ethyl, wherein clodinafop propargyl is present in an amount ranging from 1-25% w/w, Fomesafen is present in an amount ranging from 5-45% w/w and Chlorimuron ethyl is present in an amount ranging from 1-30% w/w, which exhibits surprising and unexpected synergism/functional interrelationship especially when applied to soybean crop for control of a wide variety of unwanted weeds. The net combined effect of the trimix is better than the effect of each of the actives if they were to be applied concurrently at the recommended dosages. The same is evidenced from the data presented herein, where the total concentration of the actives in the trimix is significantly less than that concentration of actives if they were to be applied as per recommended dosages. Furthermore, as per the trial data, a WG formulation of the claimed composition shows better safety profile than SC.

I/We claim:

1. A herbicidal composition comprising a) Clodinafop Propargyl b) Fomesafen and c) Chlorimuron ethyl, wherein Clodinafop propargyl is present in an amount ranging from 1-25% w/w, Fomesafen is present in an amount ranging from 5-45% w/w and Chlorimuron ethyl is present in an amount ranging from 1-30%w/w of the herbicidal composition.
2. The herbicidal composition as claimed in claim 1, further comprising at least one agriculturally acceptable excipient.
3. The herbicidal composition as claimed in claim 1, wherein said herbicidal composition is formulated in a form selected from the group comprising water-soluble concentrates (SL), emulsifiable concentrates (EC), emulsions (EW), micro-emulsions (ME), Suspension concentrates (SC), oil-based suspension concentrates (OD), flowable suspensions (FS), water-dispersible granules (WG), water-soluble granules (SG), wettable powders (WP), water soluble powders (SP), dry flowables (DF), granules (GR), encapsulated granules (CG), fine granules (FG), macrogranules (GG), aqueous Suspo-emulsions (SE), capsule suspensions (CS) and microgranules (MG).
4. The herbicidal composition as claimed in claim 3, wherein said herbicidal composition is preferably in the form of wettable granule (WG) formulation.
5. The herbicidal composition as claimed in claim 4, wherein said herbicidal composition further comprises at least a wetting agent, at least a dispersing agent, at least a defoaming agent, at least a binder and at least a suitable carrier.
6. The herbicidal composition as claimed in claim 5, wherein said at least a dispersing agent is selected from the group consisting of sodium lignosulphonates, sodium naphthalene sulphonate- formaldehyde condensates, aliphatic alcohol ethoxylates, tristyrylphenol ethoxylates and esters, ethylene oxide/propylene oxide block copolymers, and combinations thereof.
7. The herbicidal composition as claimed in claim 6, wherein said at least a dispersing agent is present in an amount ranging from 6-10% w/w of the herbicidal composition.

8. The herbicidal composition as claimed in claim 5, wherein said at least a wetting agent is selected from the group consisting of blend of alkyl naphthalene sulfonate, sodium salt, sodium laurel sulphate, and combinations thereof.
9. The herbicidal composition as claimed in claim 8, wherein said wetting agent is present in an amount ranging from 2-6% w/w of the herbicidal composition.
10. The herbicidal composition as claimed in claim 5, wherein said at least an anti-foaming is selected from the group consisting of silicone emulsions, long-chain alcohols, fatty acids, organic fluorine compounds, and combinations thereof.
11. The herbicidal composition as claimed in claim 10, wherein said anti-foaming agent is present in an amount ranging from 0.1-0.5% w/w of the composition.
12. The herbicidal composition as claimed in claim 5, wherein said at least a binding agent is selected from the group consisting of Starch paste, Hydroxypropyl methyl cellulose (HPMC), Polyvinyl Pyrrolidone (PVP), Lactose monohydrate, and combinations thereof.
13. The herbicidal composition as claimed in claim 12, wherein said binding agent is present in an amount ranging from 8-12% w/w of the composition.
14. The herbicidal composition as claimed in claim 1, wherein clodinafop propargyl is present in an amount of 12% w/w, Fomesafen is present in an amount of 22% w/w and Chlorimuron ethyl is present in an amount of 1.4% w/w of the herbicidal composition.
15. A method for controlling undesired weeds in soybean, said method comprising treating soybean crop with a herbicidal composition as claimed in claim 1.
16. A method for controlling undesired weeds in soybean, said method comprising treating the soil where soybean crop is intended to be grown with a herbicidal composition as claimed in claim 1.
17. The method as claimed in claim 15 or 16, wherein said herbicidal composition is applied at a dosage of 72-84 grams a.i./ha of clodinafop; 132-154 grams a.i./ha of fomesafen; and 8.4-9.8 grams a.i./ha of chlorimuron.

18. A herbicidal composition as claimed in claim 1 for use in controlling undesired weeds in soybean crop cultivation.

19. A process for preparing a herbicidal composition as claimed in claim 1 as a water-dispersible formulation, said process comprising:

- 5 a. preparing a blend of clodinafop, fomesafen, chlorimuron, and suitable agriculturally acceptable excipients to obtain a first pre-mix;
- b. grinding the first pre-mix by jet-milling to obtain a second pre-mix having mean particle size of less than 10 microns;
- c. preparing a dough from the second pre-mix;
- 10 d. subjecting the second pre-mix to an extruder to obtain granules; and
- e. drying the granules to obtain the water-dispersible formulation.

1/1

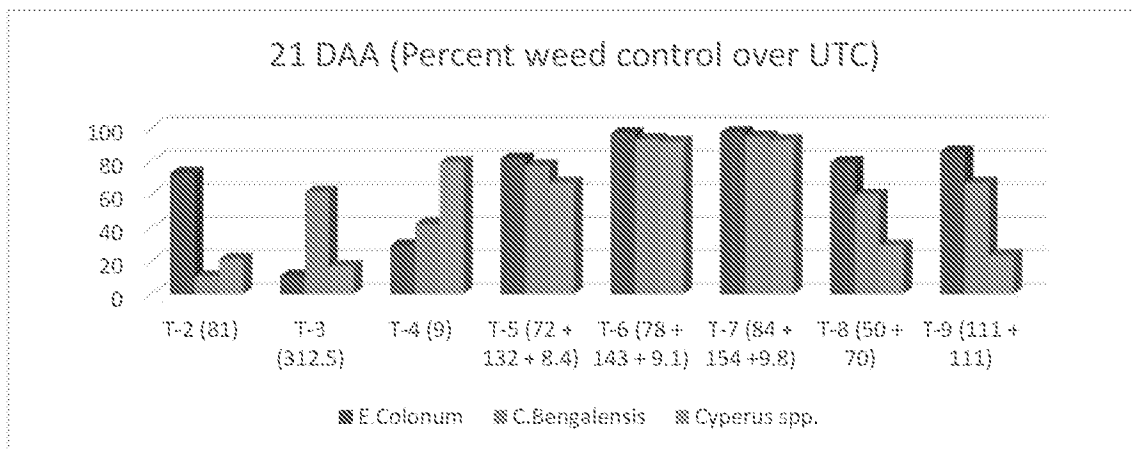


FIG.1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN2021/050709

A. CLASSIFICATION OF SUBJECT MATTER

A01N43/00, A01N43/08, A01N43/16, A01N43/34, A01N43/36 Version=2021.01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PatSeer, IPO Internal Database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	IN201621017889 (GSP CROP SCIENCE PVT. LTD.) 24 November 2017 (24-11-2017); see abstract, pages 16-62, claims 1-13	1-19
X	WO2013026811 A1 (BASF SE) 28 February 2013 (28-02-2013); see pages 15-29	1-19
X	WO2010143205 A2 (UNITED PHOSPHORUS LTD) 16 December 2010 (16-12-2010); see abstract and examples	1-19

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"D" document cited by the applicant in the international application

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

08-11-2021

Date of mailing of the international search report

08-11-2021

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IN2021/050709

Citation	Pub.Date	Family	Pub.Date
WO 2013026811 A1	28-02-2013	AU 2012298515 A1	13-03-2014
		CA 2843377 A1	28-02-2013
		CN 103747675 A	23-04-2014
		EP 2747564 A1	02-07-2014
WO 2010143205 A2	16-12-2010	CN 102458131 A	16-05-2012
		TW 201101999 A	16-01-2011