(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
06 April 2023 (06.04.2023)

WIPO | PCT

(10) International Publication Number
WO 2023/053139 A1

(51) International Patent Classification:
A01N 25/08 (2006.01) *A01N 43/80* (2006.01)
A01N 25/14 (2006.01) *A01N 43/84* (2006.01)
A01N 25/30 (2006.01) *A01N 47/38* (2006.01)
A01N 43/707 (2006.01) *A01P 13/00* (2006.01)

(21) International Application Number:
PCT/IN2022/050869

(22) International Filing Date:
29 September 2022 (29.09.2022)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
202121044726 01 October 2021 (01.10.2021) IN

(71) Applicant: **UPL LIMITED** [IN/IN]; UPL House, 610 B/2, Bandra Village, Off Western Express Highway, Bandra (East), Mumbai 400 051 (IN).

(72) Inventors: **SAINI, Anil**; UPL House, 610 B/2, Bandra Village, Off Western Express Highway, Bandra (East), Mumbai 400 051 (IN). **CAMPOS, Luiz**; UPL House, 610 B/2, Bandra Village, Off Western Express Highway, Bandra (East), Mumbai 400 051 (IN). **SHIRSAT, Rajan Ramakant**; UPL House, 610 B/2, Bandra Village, Off Western Express Highway, Bandra (East), Mumbai 400 051 (IN). **PAGARE, Ritesh**; UPL House, 610 B/2, Bandra Village, Off Western Express Highway, Bandra (East), Mumbai 400 051 (IN).

(74) Agent: **ARORA, Manika**; C/o Lall & Sethi, D-17, South Extension – II, New Delhi 110 049 (IN).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:
— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
— *of inventorship (Rule 4.17(iv))*

Published:
— *with international search report (Art. 21(3))*

(54) Title: A STABLE AGROCHEMICAL COMPOSITION

(57) Abstract: The present invention discloses a stable agrochemical composition comprises at least one triazolone herbicide or a derivative thereof; and a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert. The present invention also discloses process of preparing stable agrochemical composition, method of controlling weeds using stable agrochemical composition developed according to the present invention.

WO 2023/053139 A1

Title: A STABLE AGROCHEMICAL COMPOSITION

FIELD OF THE INVENTION

The present disclosure relates to an agrochemical composition of triazolone herbicide. The present disclosure more particularly relates to an agrochemical composition of triazolone herbicide in the form of water dispersible granules.

BACKGROUND

Agrochemical formulations are generally formulated as liquid formulations and applied by spraying. With respect to meeting the demand for a reduction in the risk to the end user, solid formulations are attractive because the active agrochemical in a solid formulation is immobilised, and solid formulations are of higher density than liquid formulations.

Granules being the solid formulation, are produced to enhance the uniformity of the active ingredient in the final product, to increase the density of the blend so that it occupies less volume per unit weight for better storage and shipment, to facilitate metering or volumetric dispensing, to reduce dust during granulation process to reduce toxic exposure and process-related hazards, and to improve the appearance of the product. Consequently, the ideal characteristics of granules include narrow particle size distribution for content uniformity and volumetric dispensing, sufficient fines to fill void spaces between granules for better compaction and compression characteristics, and adequate moisture and hardness to prevent breaking.

Widely acceptable granular formulations, water dispersible granules (WDGs) are wettable powders that have been aggregated into uniform granules size for easier handling and to eliminate respirable particles. They are dispersed in the spray tank and applied as dilute suspensions in the same way as wettable powders. WDGs incorporate the same ingredients as wettable powders, including dispersants and clay, although generally with a higher level of active and less diluent. The granules must be strong enough to resist crumbling into powder, yet readily and completely disintegrate and disperse in the spray tank. This avoids nozzle clogging and ensures the finest particle size of the active ingredient for optimum efficacy.

Typically, the granules are made by mixing the formulation components including sufficient water to form a paste having suitable rheology for granulation, forming granules from the mixture, and then drying the granules.

Several methods are used to form WDGs from the starting powder blend. These include pan granulation, fluid bed granulation, spray drying, high speed mixer agglomeration and extrusion granulation. Powder granular formulations can be converted into granules of larger particle size by such processing methods or by adding moderate amount of water to the powder and mixing the powder to agglomerate to form larger granules.

In extrusion granulation, the formulation will usually be made up as a pasty material that can be readily extruded typically to give spaghetti like strands which are usually subsequently broken up into granules e.g., during drying.

In fluidized bed granulation, a mixture of the powdered components is fluidized in a fluidized bed and the mixture is sprayed with an aqueous mixture or solution of the liquid components. The particles agglomerate in the bed to form granules which are dried in the bed.

In pan granulation, the solids are tumbled in a rotating inclined vessel and the liquid components are sprayed on the particles which agglomerate to form granules which are dried either in the vessel or subsequently, for example in a fluidized bed drier. In spray drying, a flowable slurry or a solution of all the components of the formulation is made and passed to a spray drier where the slurry or solution is atomised and dried. If necessary, a desired size range of particles is selected from the spray dried product and/or the product can be agglomerated for example in a fluidized bed, to form a granulate of the desired particle size range.

Extrusion granulation is generally preferred on the basis of safety, versatility and economy. They are becoming more popular because of their convenience in packaging and use, capable of high a.i. loading (50 – 90%), being non-dusty, free flowing that disperse quickly when added to water in the spray tank.

It is also desirable that the water dispersible granule form of the agrochemical formulation to have good dispersibility as well as suspensibility.

To obtain desirable dispersibility and suspensibility of WDG formulation upon dilution, choice of surfactants and fillers play a critical role.

Surfactants play several roles during the preparation of the formulation and condition the final performances of the granules. Their roles include to: (a) help the blending and the extrusion by reducing the friction forces (binding and lubricant effect); (b) provide wettability to the particles of the active ingredient; (c) decreases the interfacial tension between the solid active ingredient (which is mostly hydrophobic) and water; and (d) provide stabilization by giving cohesion to the system.

Similarly, fillers or inert carriers have a role to adjust the composition and to improve its performances. Such materials may be added as porous carriers, as moisture inhibition agents, to aid binding or agglomeration properties of a formulation or simply to fill a formulation to a convenient weight. Examples of such fillers may include natural silicates such as diatomaceous earth, synthetic precipitated silicas, clays such as kaolin, attapulgites and bentonites, zeolites, titanium dioxide, iron oxides and hydroxides, aluminium oxides and hydroxides, and organic materials such as bagasse, charcoal, and synthetic organic polymers.

Although attempts have been made in the prior art to prepare triazolone herbicides based granular formulations but still need exist for stable granular preparations with excellent suspensibility and dispersibility.

Objectives:

An objective of the present disclosure is to provide an agrochemical composition comprising triazolone herbicide or a derivative thereof.

Another objective of the present disclosure is to provide an agrochemical composition comprising triazolone herbicide or a derivative thereof in the form of water dispersible granules.

Another objective of the present disclosure is to provide an agrochemical composition comprising triazolone herbicide or a derivative thereof in combination with other active ingredients in the form of water dispersible granules.

Another objective of the present disclosure is to provide an agrochemical composition comprising triazolone herbicide or a derivative thereof with improved suspensibility and greater dispersibility.

Another objective of the present invention is to provide a process of preparing an agrochemical composition comprising triazolone herbicide.

Still another objective of the present disclosure is to provide a method of controlling pests using an agrochemical composition comprising triazolone herbicide or a derivative thereof.

Summary:

In an aspect of the present invention, an agrochemical composition comprises:

a) at least one triazolone herbicide or a derivative thereof; and
b) a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert.

In another aspect of the present invention, an agrochemical composition comprises:

a) at least one triazolone herbicide or a derivative thereof;
b) at least one additional active ingredient or derivatives thereof; and
c) a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert.

In another aspect of the present invention, an agrochemical composition comprises:

a) at least one triazolone herbicide or a derivative thereof;
b) at least one additional active ingredient comprising isoxazole, dicarboximide, N-phenylimide and/or triazinone herbicides or derivatives thereof; and
c) a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert.

In yet another aspect of the present disclosure, an agrochemical composition comprises:

a) at least one triazolone herbicide or a derivative thereof;
b) at least one additional active ingredient comprising isoxazole, dicarboximide, N-phenylimide and/or triazinone herbicides or derivatives thereof; and
c) a dispersion aid comprising at least one interface additive comprising salts of sulphonic acid derivatives and a high surface hydrophilicity inert.

In an aspect of the present disclosure, a process of preparing an agrochemical composition comprises:

(i) mixing triazolone herbicide or a derivative thereof and dispersion aid to obtain a homogeneous mixture;

(ii) obtaining granules from the homogeneous mixture; and

(iii) drying the granules to obtain an agrochemical composition,

An aspect of the present invention discloses a method of controlling weeds comprising applying to the plants or to their locus, an agrochemical composition comprising at least one triazolone herbicide or a derivative thereof, a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert, and optionally an additional active ingredient.

An aspect of the present invention discloses use of an agrochemical composition for controlling weeds wherein the composition comprises of at least one triazolone herbicide or a derivative thereof; a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert, and optionally an additional active ingredient.

An aspect of the present invention discloses a kit-of-parts comprising an agrochemical composition of at least one triazolone herbicide or a derivative thereof, a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert, and optionally at least one additional active ingredient.

Detailed description:

Inventors of the present disclosure found that the granular preparation in the form of water dispersible granules (WDG) can be prepared through extrusion process by using a unique combination of an interface additive and a high surface hydrophilicity inert. The interface additives facilitates easy and quick dispersion of granules once diluted with water and the high surface hydrophilicity inerts such as inorganic salts, clay, bentonite, kaolin remain in suspension and do not settle down immediately.

Salts of sulphonic acid derivatives (interface additives) not only act upon dilution, but they also ease preparation of dough of active ingredients. This makes granulation much easier. Careful selection of salts of aryl sulfonic acid and inerts with high surface hydrophilicity was found effective in dispersing the active ingredients in water. The salts of aryl sulphonic acid facilitate granules breaking once it is added to water and high surface hydrophilicity inerts facilitate quick wetting of the active ingredient.

Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this disclosure belongs. It must be noted that, as used in this specification, the singular forms "a," "an" and "the" include plural referents unless the content clearly dictates otherwise.

As used herein, the terms "comprising" "including," "having," "containing," "involving," and the like are to be understood to be open-ended, i.e., to mean including but not limited to. The terms "preferred" and "preferably" refer to embodiments of the disclosure that may afford certain benefits, under certain circumstances.

As used herein the term 'stable' refers to the chemical and/or physical stabilization of an active compound, i.e., a herbicide in terms of achieving chemical stability of the active ingredient and desired suspensibility of the composition, wherein the reduction in the concentration of the active content is not more than about 5%.

As used herein, the term 'interface additives' refers to ionic substances that lower the surface tension or interfacial tension between an agrochemical ingredient and a solvent/ a diluent. Such interface additives facilitate quicker wetting of the agrochemical ingredients.

As used herein, the term 'high surface hydrophilicity' refers to a property of inert carriers that quickly disperse (within 1 to 20 seconds) in water despite of being hydrophobic or hydrophilic.

The aspects and embodiments described herein shall also be interpreted to replace the clause "comprising" with either "consisting of" or with "consisting essentially of" or with "consisting substantially of".

The term "about" or "approximately" as used herein is inclusive of the stated value and means within an acceptable range of deviation for particular value as determined by one of ordinary skill in the art, considering the measurement in question and the error associated with measurement of the particular quantity (i.e., the limitations of the measurement system). For example, "about" can mean within one or more standard deviations, or within ± 10 or ± 5 of the stated value. Recitation of ranges of values are merely intended to serve as a shorthand method of referring individually to each separate value falling within the range, unless otherwise indicated herein, and each separate value is incorporated into the specification as if it were individually recited herein. The endpoints of all ranges are included within the range and independently combinable. It is understood that where a parameter range is provided, all

integers within that range, and tenths thereof, are also provided. For example, "0.1-80%" includes 0.1%, 0.2%, 0.3%, etc. up to 80%.

The terms "plants" and "vegetation" include, but are not limited to, germinant seeds, emerging seedlings, plants emerging from vegetative propagules, and established vegetation. The term "locus" as used herein shall denote the vicinity of a desired crop in which weed control, typically selective weed control, of weeds is desired. The locus includes the vicinity of desired crop plants wherein the weed infestation has either emerged or is yet to emerge. The term crop shall include a multitude of desired crop plants or an individual crop plant growing at a locus.

Therefore, according to an aspect of the present disclosure, an agrochemical composition comprises:

a) at least one triazolone herbicide or a derivative thereof; and
b) a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert.

The examples of derivatives of a triazolone herbicide and other active ingredients include salts, isomers, polymorphs and esters.

According to an embodiment of the present disclosure, the triazolone herbicide is selected from amicarbazone, bencarbazone, carfentrazone, flucarbazone, flucarbazone sodium, ipfencarbazone, propoxycarbazone, sulfentrazone, thiencarbazone or a derivative thereof.

According to an embodiment, the triazolone herbicide is amicarbazone.

According to an embodiment of the present disclosure, a stable agrochemical composition comprises:

c) at least one triazolone herbicide or a derivative thereof; and
d) a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert.

According to an embodiment of the present disclosure, the composition comprises from about 1% w/w to about 90% w/w triazolone herbicide or a derivative thereof of the total weight of the composition.

According to an embodiment of the present disclosure, the composition comprises from about 10% w/w to about 85% w/w triazolone herbicide or a derivative thereof of the total weight of the composition.

In a preferred embodiment of the present disclosure, the composition comprises from about 20% w/w to about 80% w/w triazolone herbicide or a derivative thereof of the total weight of the composition.

According to an embodiment of the present disclosure, the composition comprises a dispersion aid.

According to an embodiment of the present disclosure, the dispersion aid comprises at least one interface additive and a high surface hydrophilicity inert.

According to an embodiment of the present disclosure, the dispersion aid comprises at least one interface additive, at least one anionic surfactant and at least one high surface hydrophilicity inert.

According to an embodiment of the present disclosure, the dispersion aid comprises at least two interface additives, at least one anionic surfactant and at least one high surface hydrophilicity inert.

According to an embodiment of the present disclosure, the interface additive comprises salts of sulfonic acid derivatives.

According to an embodiment of the present disclosure, the interface additive comprises salts of alkyl sulfonic acid derivatives.

According to an embodiment of the present disclosure, the interface additive comprises salts of aryl sulfonic acid derivatives.

According to an embodiment of the present disclosure, the interface additive comprises sodium salt of a C_8-C_{18} alkyl aryl sulfonic acid.

According to an embodiment of the present disclosure, the interface additive comprises esters of C_8-C_{18} alkyl aryl sulfonic acid.

According to an embodiment of the present disclosure, the interface additive comprises alkyl naphthalene sulfonates, preferably having alkyl groups with 1-10 carbon atoms, such as methyl, isopropyl, n-butyl, sec-butyl, and nonyl; for example, sodium dodecylbenzenesulfonate, sodium lauryl sulfate, calcium dioctyl naphthalene sulfonate, linear dodecylbenzene sulfonic acid, branched dodecylbenzene sulfonic acid, linear dodecylbenzene sulfonate isopropylamine salt, sodium butyl naphthalene sulfonate and sodium nonyl naphthalene sulfonate. The naphthalene sulfonate-formaldehyde condensate or alkyl naphthalene sulfonate-formaldehyde condensate to be used in the compositions is preferably a sodium salt having a mean molecular weight of 300 to 2,000, preferably 400 to 1,000 and most preferably 500-750. Such as naphthalene sulfonate-formaldehyde condensates, alkyl substituted naphthalene sulfonate-formaldehyde condensates, sodium alkyl naphthalene sulfonate and methylene-linked condensation product of arylsulphonic acid, sodium butyl & dibutyl naphthalene sulfonate, sodium diisopropyl naphthalene sulfonate and sodium salt of sulfonated naphthalene-formaldehyde condensate. Some of the commercially available sulphonic acid derivatives are baykanol SL^{TM}, rhodacal BX-78^{TM}, supragyl WP^{TM}, Morwet D-400, borresperse NA and the like.

According to an embodiment of the present disclosure, the composition comprises from about 0.1% w/w to about 25% w/w interface additive of the total weight of the composition.

According to an embodiment of the present disclosure, the composition comprises from about 1% w/w to about 20% w/w interface additive of the total weight of the composition.

In a preferred embodiment of the present disclosure, the composition comprises from about 5% w/w to about 15% w/w interface additive of the total weight of the composition.

According to an embodiment of the present disclosure, the dispersion aid comprises at least one high surface hydrophilicity inert.

According to an embodiment of the present disclosure, the high surface hydrophilicity inert comprises of inorganic salts.

According to an embodiment of the present disclosure, the high surface hydrophilicity inert comprises treated and untreated clays.

According to an embodiment of the present disclosure, the high surface hydrophilicity inert comprises clays such as kaolin , china clay and bentonite clays, which may be natural bentonites or modified bentonites, synthetic and diatomaceous silicas, calcium and magnesium silicates, titanium dioxide, aluminium, calcium or magnesium carbonate, ammonium sulfate, sodium sulfate, potassium sulfate, calcium sulfate or barium sulfate, charcoal, starch, including modified starches such as alkyl and carboxyalkyl starches and mixtures.

According to an embodiment of the present disclosure, the high surface hydrophilicity inert is ammonium sulfate.

According to an embodiment of the present disclosure, the high surface hydrophilicity inert is kaolin.

According to an embodiment of the present disclosure, the high surface hydrophilicity inert is china clay.

According to an embodiment of the present disclosure, the composition comprises from about 1% w/w to about 70% w/w high surface hydrophilicity inert of the total weight of the composition.

According to an embodiment of the present disclosure, the composition comprises from about 5% w/w to about 60% w/w high surface hydrophilicity inert of the total weight of the composition.

In a preferred embodiment of the present disclosure, the composition comprises from about 10% w/w to about 50% w/w high surface hydrophilicity inert of the total weight of the composition.

According to an embodiment of the present disclosure, an agrochemical composition comprises:

a) at least one triazolone herbicide,
b) at least one additional active ingredient; and
c) a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert.

According to an embodiment of the present disclosure, an agrochemical composition comprises:

a) at least one triazolone herbicide,
b) at least one additional active ingredient;
c) a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert; and
d) at least one agrochemically acceptable ingredient.

According to an embodiment of the present disclosure, a stable agrochemical composition comprises:

a) at least one triazolone herbicide,
b) at least one additional active ingredient; and
c) a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert.

According to an embodiment of the present disclosure, the additional active ingredients comprise herbicides as classified by Herbicide Resistance Action Committee (HRAC).

According to an embodiment of the present disclosure, the additional active ingredients comprise Group-1 herbicides comprising Acetyl Coenzyme A Carboxylase (ACCase) inhibitor including aryloxyphenoxypropionate such as fenoxafop, fluazifop, quizalofop; phenylpyrazolin herbicides and cyclohexenedione herbicides such as clethodim and sethoxydim.

According to an embodiment of the present disclosure the additional active ingredients comprise Group-2 herbicide comprising Acetolactate Synthase (ALS) inhibitors including imidazolinones, pyrimidinylthiobenzoates, sulfonylaminocarbonyltriazolinones, sulfonylureas, and triazolopyrimidines class herbicides.

According to an embodiment of the present disclosure the additional active ingredients comprise Group-3 herbicides comprising Root growth inhibitors including benzamide, benzoic acid [dimethyl-2,3,5,6-tetrachloroterephthalate (DCPA), dinitroaniline, phosphoramidate, and pyridine class herbicides.

According to an embodiment of the present disclosure additional active ingredients comprise Group-4 herbicides comprising Plant growth regulators including phenoxycarboxylic acid, pyridine carboxylic acid, and quinoline carboxylic acid class herbicides.

According to an embodiment of the present disclosure additional active ingredients comprise Group-5, 6, and 7 herbicides comprising Photosystem-II inhibitors including triazine, triazinone (e.g., metribuzin), phenylcarbamates, pyridazinones, uracils, nitriles, benzothiadiazinones, phenylpyridazines, phenyl urea and amides class herbicides.

According to an embodiment of the present disclosure additional active ingredients comprises Group-8 and Group-15 herbicides comprising shoot-growth inhibitors including phosphorodithioates and thiocarbamates and inhibit the biosynthesis of lipids, fatty acids, proteins, isoprenoids, flavonoids, and gibberellins; chloroacetamide, acetamide, oxyacetamide, and tetrazolinone class herbicides.

According to an embodiment of the present disclosure additional active ingredients comprise Group-9 herbicides comprising aromatic amino acid inhibitors including glyphosate, which is generally available as ammonium salt, diammonium salt, dimethylammonium salt, isopropylamine salt, as well as potassium salt.

According to an embodiment of the present disclosure additional active ingredients comprise Group-10 herbicides comprising glutamine-synthesis inhibitors including glufosinate, L-glufosinate or salts thereof of or esters thereof or derivative thereof. Preferably the salts of glufosinate or L-glufosinate include ammonium salt, diammonium salt, dimethylammonium salt, isopropylamine salt, as well as potassium salt.

According to an embodiment of the present disclosure additional active ingredients comprise Groups-12, 13, and 27 herbicides comprising Pigment synthesis inhibitors including amides, anilidex, furanones, phenoxybutan-amides, pyridiazinones, pyridines; Isoxazolidinone, Isoxazole (isoxaflutole), oxazole class herbicides.

According to an embodiment of the present disclosure additional herbicides comprise Group-14 herbicides comprising PPO inhibitors including diphenylether, aryl triazolinone, N-phenylimide or dicarboxamide (e.g., flumioxazin), oxadiazoles, oxazolidinediones, phenylpyrazoles, pyrimidindiones, thiadiazoles class herbicides.

According to an embodiment of the present disclosure additional herbicides comprise Group 22 comprising Photosystem-I inhibitors including bipyridilium class herbicides.

According to an embodiment of the present disclosure the additional herbicide is metribuzin, a Group-5 herbicide.

According to an embodiment of the present disclosure the additional herbicide is flumioxazin, a Group-14 herbicide.

According to an embodiment of the present disclosure the additional herbicide is isoxaflutole, a Group-27 herbicide.

According to another embodiment of the present disclosure, an agrochemical composition comprising:

a) at least one triazolone herbicide or a derivate thereof,

b) at least one additional active ingredient selected from the group comprising of isoxazole, N-phenylimide and/or triazinone herbicides; and

c) a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert.

According to another embodiment of the present disclosure, a stable agrochemical composition comprising:

a) at least one triazolone herbicide or a derivate thereof,

b) at least one additional active ingredient selected from the group comprising of isoxazole, N-phenylimide and/or triazinone herbicides; and

c) a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert.

According to an embodiment of the present disclosure, additional active ingredient is selected from the group comprising of isoxazole herbicides is isoxaflutole and isoxachlortole.

According to a preferred embodiment of the present disclosure, additional active ingredient in combination with at least one triazolone herbicide or a derivate thereof is Isoxaflutole or a derivative thereof.

According to an embodiment of the present disclosure, additional active ingredients is selected from flumezin, flumioxazin, saflufenacil, flumiclorac or flumipropyn or derivates thereof.

According to a preferred embodiment of the present disclosure additional active ingredient in combination with at least one triazolone herbicide or a derivate thereof is flumioxazin or a derivate thereof.

According to an embodiment of the present disclosure additional ingredients are selected from amibuzin, hexazinone, metribuzin, metamitron, trifludimoxazin or derivates thereof.

According to an embodiment of the present disclosure additional herbicide is metribuzin or a derivate thereof.

According to an embodiment of the present disclosure, the composition comprises from about 1% w/w to about 60% w/w and preferably from about 5% w/w to about 50% w/w additional herbicides or derivates thereof of the total weight of the composition.

According to an embodiment of the present disclosure, the composition comprises from about 5% w/w to about 50% w/w additional herbicides or derivates thereof of the total weight of the composition.

In a preferred embodiment of the present disclosure, the composition comprises from about 10% w/w to about 45% w/w additional herbicides or derivates thereof of the total weight of the composition.

According to an embodiment of the present disclosure, the composition comprises:

a) at least one triazolone herbicide or a derivate thereof;

b) at least one additional active ingredient selected from the group comprising of isoxazole, N-phenylimide and/or triazinone herbicides or derivatives thereof; and

c) a dispersion aid comprising at least one interface additive selected from salts of alkyl or aryl sulphonic acid and a high surface hydrophilicity inert.

According to an embodiment of the present disclosure, dispersion aid comprises at least one interface additive selected from salts of sulphonic acid derivative and a high surface hydrophilicity inert.

According to an embodiment of the present disclosure, dispersion aid comprises at least one interface additive comprising salts of a C_8-C_{18} alkyl aryl sulfonic acid and a high surface hydrophilicity inert.

According to an embodiment of the present disclosure, dispersion aid comprises sodium lauryl sulfate and kaolin.

According to an embodiment of the present disclosure, dispersion aid comprises sodium diisopropyl naphthalene sulfonate and ammonium sulfate.

According to an embodiment of the present disclosure, dispersion aid comprises sodium butyl & dibutyl naphthalene sulfonate and ammonium sulfate.

According to an embodiment of the present disclosure dispersion aid, comprises alkyl naphthalene sulfonate formaldehyde condensate and ammonium sulfate.

According to an embodiment of the present disclosure, the interface additive, and the high surface hydrophilicity inert in the dispersion aid are present in ratio from about 1:5 to 5:1.

According to an embodiment of the present disclosure, the interface additive, and the high surface hydrophilicity inert in the dispersion aid are present in ratio from about 1:4 to 4:1.

According to an embodiment of the present disclosure, the interface additive, and the high surface hydrophilicity inert in the dispersion aid are present in ratio from about 1:3 to 3:1.

According to an embodiment of the present disclosure, the interface additive, and the high surface hydrophilicity inert in the dispersion aid are present in ratio from about 1:2 to 1:1.

According to an embodiment of the present disclosure, the interface additive, and the high surface hydrophilicity inert in the dispersion aid are present in about 1:1 ratio.

According to an embodiment of the present disclosure, the interface additive, and the high surface hydrophilicity inert in the dispersion aid are present in about 1:1.5 ratio.

According to an embodiment of the present disclosure, the composition further comprises The agrochemically suitable excipient.

The agrochemically suitable excipient may be any one or a combination of adjuvants, co-solvents, surfactants, colorants, dispersants, emulsifiers, thickeners, antifreeze agents, biocides, anti-foam agents, stabilizers, wetting agents or a mixture thereof which may be optionally added to the compositions of the present invention.

According to an embodiment of the present disclosure, the anionic surfactants are selected from the group comprising of salts of lignosulfonates such as sodium lignosulfonate, sodium sulfite lignosulfonate kraft lignin sulphonate, alkyl or aryl ethoxylates, alkyl or aryl ethoxylate derivatives, and styrene acrylic polymers.

According to an embodiment of the present disclosure, the composition comprises from about 0.1% w/w to about 25% w/w and preferably from about 0.5% w/w to about 20% w/w anionic surfactants of the total weight of the composition.

In a preferred embodiment of the present disclosure, the composition comprises from about 1% w/w to about 15% w/w anionic surfactants of the total weight of the composition.

According to an embodiment of the present disclosure, the composition further comprises non-ionic surfactants.

According to an embodiment of the present disclosure, the non-ionic surfactants are selected from the group comprising of alcohol alkoxylates e.g., ethoxylates, particularly of C_1 to C_{20} alcohols which can be linear, branched, or linear/branched mixtures; alkylamine alkoxylates, sorbitol and sorbitan fatty acid, particularly C_1 to C_{20} fatty acid, esters and their ethoxylated derivatives; ethylene oxide propylene oxide block copolymers.

According to an embodiment of the present disclosure, the composition comprises from about 0.1% w/w to about 25% w/w and preferably from about 0.5% w/w to about 20% w/w non-ionic surfactants of the total weight of the composition.

In a preferred embodiment of the present disclosure, the composition comprises from about 1% w/w to about 15% w/w non-ionic surfactants of the total weight of the composition.

According to an embodiment of the present disclosure, the composition further comprises one or more of disintegrant, binder, glidant, anticaking agents, pH-regulating agents, preservatives, biocides, antifoaming agents, colorants, stabilizers and other formulation aids.

Emulsifiers which can be advantageously employed herein can be readily determined by those skilled in the art and include various non-ionic, anionic, cationic and amphoteric emulsifiers, or a blend of two or more emulsifiers. Examples of nonionic emulsifiers useful in preparing the emulsifiable concentrates include the polyalkylene glycol ethers and condensation products of alkyl and aryl phenols, aliphatic alcohols, aliphatic amines or fatty acids with ethylene oxide, propylene oxides such as the ethoxylated alkyl phenols and carboxylic esters solubilized with the polyol or polyoxyalkylene. Cationic emulsifiers include quaternary ammonium compounds and fatty amine salts. Anionic emulsifiers include the oil-soluble salts (e.g., calcium) of

alkylaryl sulfonic acids, oil-soluble salts or sulfated polyglycol ethers and appropriate salts of phosphated polyglycol ether.

In an embodiment, colorants may be selected from iron oxide, titanium oxide and Prussian Blue, and organic dyestuffs, such as alizarin dyestuffs, azo dyestuffs or metal phthalocyanine dyestuffs, and trace elements, such as salts of iron, manganese, boron, copper, cobalt, molybdenum and zinc.

Another embodiment involves addition of a thickener or binder which may be selected from but not limited to molasses, granulated sugar, alginates, karaya gum, jaguar gum, tragacanth gum, polysaccharide gum, mucilage, xanthan gum or combination thereof. In another embodiment, the binder may be selected from silicates such as magnesium aluminium silicate, polyvinyl acetates, polyvinyl acetate copolymers, polyvinyl alcohols, polyvinyl alcohol copolymers, celluloses, including ethylcelluloses and methylcelluloses, hydroxymethyl celluloses, hydroxypropylcelluloses, hydroxymethylpropyl-celluloses, polyvinylpyrolidones, dextrins, malto-dextrins, polysaccharides, fats, oils, proteins, gum arabics, shellacs, vinylidene chloride, vinylidene chloride copolymers, calcium lignosulfonates, acrylic copolymers, starches, polyvinylacrylates, zeins, gelatin, carboxymethylcellulose, chitosan, polyethylene oxide, acrylimide polymers and copolymers, polyhydroxyethyl acrylate, methylacrylimide monomers, alginate, ethylcellulose, polychloroprene and syrups or mixtures thereof; polymers and copolymers of vinyl acetate, methyl cellulose, vinylidene chloride, acrylic, cellulose, polyvinylpyrrolidone and polysaccharide; polymers and copolymers of vinylidene chloride and vinyl acetate-ethylene copolymers; combinations of polyvinyl alcohol and sucrose; plasticizers such as glycerol, propylene glycol, polyglycols.

In another embodiment, antifreeze agent(s) added to the composition may be alcohols selected from the group comprising of but not limited to ethylene glycol, 1,2-propylene glycol, 1,3-propylene glycol, 1,2-butanediol, 1,3-butanediol, 1,4-butanediol, 1,4-pentanediol, 3-methyl-1,5-pentanediol, 2,3-dimethyl-2,3-butanediol, trimethylol propane, mannitol, sorbitol, glycerol, pentaerythritol, 1,4-cyclohexanedimethanol, xylenol, bisphenols such as bisphenol A or the like. In addition, ether alcohols such as diethylene glycol, triethylene glycol, tetraethylene glycol, polyoxyethylene or polyoxypropylene glycols of molecular weight up to about 4000, diethylene glycol monomethylether, diethylene glycol monoethylether, triethylene glycol monomethylether, butoxyethanol, butylene glycol monobutylether, dipentaerythritol, tripentaerythritol, tetrapentaerythritol, diglycerol, triglycerol, tetraglycerol, pentaglycerol, hexaglycerol, heptaglycerol, octaglycerol.

According to an embodiment, biocides may be selected from benzothiazoles, 1,2-benzisothiazolin-3-one, sodium dichloro-s-triazinetrione, sodium benzoate, potassium sorbate, 1,2-phenyl-isothiazolin-3-one, inter chloroxylenol paraoxybenzoate butyl.

According to an embodiment, antifoam agent may be selected from Polydimethoxysiloxane, polydimethylsiloxane, Alkyl poly acrylates, Castor Oil, Fatty Acids, Fatty Acids Esters, Fatty Acids Sulfate, Fatty Alcohol, Fatty Alcohol Esters, Fatty Alcohol Sulfate, Foot Olive Oil, Mono & Di Glyceride, Paraffin Oil, Paraffin Wax, Poly Propylene Glycol, Silicones Oil, Vegetable Fats, Vegetable Fats Sulfate, Vegetable Oil, Vegetable Oil Sulfate, Vegetable Wax, Vegetable Wax Sulfate, agents based on silicon or magnesium stearate.

The agrochemical formulation may also comprise one or more antioxidants. Preferably, the agrochemical formulation comprises an antioxidant. Antioxidants are, for example, amino acids (e.g. glycine, histidine, tyrosine, tryptophan) and derivatives thereof, imidazole and imidazole derivatives (e.g. urocanic acid), peptides, such as, for example, D,L-carnosine, D-carnosine, L-carnosine and derivatives thereof (e.g. anserine), carotenoids, carotenes (e.g. α-carotene, β-carotene, lycopene) and derivatives thereof, lipoic acid and derivatives thereof (e.g. dihydrolipoic acid), aurothioglucose, propylthiouracil and further thio compounds (e.g. thioglycerol, thiosorbitol, thioglycolic acid, thioredoxin, glutathione, cysteine, cystine, cystamine and the glycosyl, N-acetyl, methyl, ethyl, propyl, amyl, butyl, lauryl, palmitoyl, oleyl, γ-linoleyl, cholesteryl and glyceryl esters thereof), and salts thereof, dilauryl thiodipropionate, distearyl thiodipropionate, thiodipropionic acid and derivatives thereof (esters, ethers, peptides, lipids, nucleotides, nucleosides and salts), and sulfoximine compounds (e.g. buthionine sulfoximines, homocysteine sulfoximine, buthionine sulfones, penta-, hexa-, heptathionine sulfoximine) in very low tolerated doses (e.g. pmol/kg to pmol/kg), also metal chelating agents (e.g. α-hydroxy fatty acids, EDTA, EGTA, phytic acid, lactoferrin), α-hydroxy acids (e.g. citric acid, lactic acid, malic acid), humic acids, bile acid, bile extracts, gallic esters (e.g. propyl, octyl and dodecyl gallate), flavonoids, catechins, bilirubin, biliverdin and derivatives thereof, unsaturated fatty acids and derivatives thereof (e.g. γ-linolenic acid, linoleic acid, arachidonic acid, oleic acid), folic acid and derivatives thereof, hydroquinone and derivatives thereof (e.g. arbutin), ubiquinone and ubiquinol, and derivatives thereof, vitamin C and derivatives thereof (e.g. ascorbyl palmitate, stearate, dipalmitate, acetate, Mg ascorbyl phosphates, sodium and magnesium ascorbate, disodium ascorbyl phosphate and sulfate, potassium ascorbyl tocopheryl phosphate, chitosan ascorbate), isoascorbic acid and derivatives

thereof, tocopherols and derivatives thereof (e.g. tocopheryl acetate, linoleate, oleate and succinate, tocophereth-5, tocophereth-10, tocophereth-12, tocophereth-18, tocophereth-50, tocophersolan), vitamin A and derivatives (e.g. vitamin A palmitate), the coniferyl benzoate of benzoin resin, rutin, rutinic acid and derivatives thereof, disodium rutinyl disulfate, cinnamic acid and derivatives thereof (e.g. ferulic acid, ethyl ferulate, caffeeic acid), kojic acid, chitosan glycolate and salicylate, butylhydroxytoluene, butylhydroxyanisol, nordihydroguaiacic acid, nordihydroguaiaretic acid, trihydroxybutyrophenone, uric acid and derivatives thereof, mannose and derivatives thereof, selenium and selenium derivatives (e.g. selenomethionine), stilbenes and stilbene derivatives (e.g. stilbene oxide, trans-stilbene oxide). According to the invention, suitable derivatives (salts, esters, sugars, nucleotides, nucleosides, peptides and lipids) and mixtures of these specified active ingredients or plant extracts (e.g. teatree oil, rosemary extract and rosemarinic acid) which comprise these antioxidants can be used. In general, mixtures of the aforementioned antioxidants are possible.

According to an embodiment, examples of suitable solvents are water, aromatic solvents (for example, xylene), paraffins (for example mineral oil fractions such as kerosene or diesel oil), coal tar oils and oils of vegetable or animal origin, aliphatic, cyclic and aromatic hydrocarbons, for example toluene, xylene, paraffin, tetrahydronaphthalene, alkylated naphthalenes or their derivatives, alcohols (for example methanol, butanol, pentanol, benzyl alcohol, cyclohexanol), ketones (for example cyclohexanone, gamma-butyrolactone), pyrrolidones (NMP, NEP, NOP), acetates (glycol diacetate), glycols, fatty acid dimethylamides, fatty acids and fatty acid esters, isophorone and dimethylsulfoxide. In principle, solvent mixtures may also be used.

Suitable preservatives are for example 1,2-benzisothiazolin-3-one and/or 2-Methyl-2H-isothiazol-3-one or sodium benzoate or benzoic acid.

According to an embodiment of the present disclosure, the composition comprises from about 1% w/w to about 90% w/w triazolone herbicide or a derivative thereof of the total weight of the composition, from about 0.1% w/w to about 25% w/w interface additive and from about 1% w/w to about 70% w/w high surface hydrophilicity inert of the total weight of the composition.

According to an embodiment of the present disclosure, the composition comprises from about 10% w/w to about 85% w/w triazolone herbicide or a derivative thereof of the total weight of

the composition, from about 1% w/w to about 20% w/w interface additive and from about 5% w/w to about 60% w/w high surface hydrophilicity inert of the total weight of the composition.

According to an embodiment of the present disclosure, the composition comprises from about 20% w/w to about 80% w/w triazolone herbicide or a derivative thereof of the total weight of the composition, from about 5% w/w to about 15% w/w interface additive and from about 10% w/w to about 50% w/w high surface hydrophilicity inert of the total weight of the composition.

According to an embodiment of the present disclosure, the composition comprises from about 1% w/w to about 90% w/w triazolone herbicide or a derivative thereof of the total weight of the composition, from about 0.1% w/w to about 25% w/w interface additive and from about 1% w/w to about 70% w/w high surface hydrophilicity inert of the total weight of the composition wherein the composition is in the form of water dispersible granules.

According to an embodiment of the present disclosure, the composition comprises from about 1% w/w to about 90% w/w amicarbazone or a derivative thereof of the total weight of the composition, from about 0.1% w/w to about 25% w/w sodium lauryl sulfate and from about 1% w/w to about 70% w/w kaolin of the total weight of the composition.

According to an embodiment of the present disclosure, the composition comprises from about 1% w/w to about 90% w/w amicarbazone or a derivative thereof of the total weight of the composition, from about 0.1% w/w to about 25% w/w sodium lauryl sulfate and from about 1% w/w to about 70% w/w ammonium sulfate of the total weight of the composition.

According to an embodiment of the present disclosure, the composition comprises from about 1% w/w to about 90% w/w amicarbazone or a derivative thereof of the total weight of the composition, from about 0.1% w/w to about 25% w/w sodium polycarboxylate and from about 1% w/w to about 70% w/w ammonium sulfate of the total weight of the composition.

According to an embodiment of the present disclosure, the composition comprises from about 1% w/w to about 90% w/w amicarbazone or a derivative thereof of the total weight of the composition, from about 1% w/w to about 50% w/w flumioxazin or a derivative thereof of the total weight of the composition, from about 0.1% w/w to about 25% w/w sodium lauryl sulfate and from about 1% w/w to about 70% w/w kaolin of the total weight of the composition.

According to an embodiment of the present disclosure, the composition comprises from about 1% w/w to about 90% w/w amicarbazone or a derivative thereof of the total weight of the composition, from about 1% w/w to about 50% w/w flumioxazin or a derivative thereof of the total weight of the composition, from about 0.1% w/w to about 25% w/w sodium lauryl sulfate, sodium polycarboxylate and sodium dodecylbenzenesulfonate and from about 1% w/w to about 70% w/w kaolin of the total weight of the composition.

According to an embodiment of the present disclosure, the composition comprises from about 1% w/w to about 90% w/w amicarbazone or a derivative thereof of the total weight of the composition, from about 1% w/w to about 50% w/w isoxaflutole or a derivative thereof of the total weight of the composition, from about 0.1% w/w to about 25% w/w sodium polycarboxylate and from about 1% w/w to about 70% w/w ammonium sulfate of the total weight of the composition.

According to an embodiment of the present disclosure, the composition comprises from about 1% w/w to about 90% w/w amicarbazone or a derivative thereof of the total weight of the composition, from about 1% w/w to about 50% w/w metribuzin or a derivative thereof of the total weight of the composition, from about 0.1% w/w to about 25% w/w sodium dodecylbenzenesulphonate and from about 1% w/w to about 70% w/w ammonium sulfate of the total weight of the composition.

According to an embodiment of the present disclosure, a process of preparing an agrochemical composition comprises:

(i) mixing triazolone herbicide or a derivative thereof and dispersion aid to obtain a homogeneous mixture;

(ii) obtaining granules from the homogeneous mixture;

(iii) drying the granules to obtain an agrochemical composition

According to an embodiment, dispersion aid comprises at least one interface additive and a high surface hydrophilicity inert.

According to an embodiment, the granules in step (ii) are obtained by granulation, spray drying or extrusion method.

According to an embodiment of the present disclosure, the process of preparing an agrochemical composition comprises:

(i) mixing, blending, and milling a triazolone herbicide or a derivative thereof and dispersion aid to obtain a homogeneous mixture;
(ii) obtaining granules from the homogeneous mixture;
(iii) drying the granules to obtain an agrochemical composition.

According to an embodiment, the dispersion aid comprises at least one interface additive and a high surface hydrophilicity inert.

According to an embodiment of the present disclosure, the process of preparing an agrochemical composition comprises:

(i) mixing, blending, and milling a triazolone herbicide or a derivative thereof and a dispersion aid to obtain a homogeneous mixture;
(ii) preparing a dough by mixing water with the homogeneous mixture;
(iii) extruding the dough to obtain granules;
(iv) drying the granules to obtain the composition,

According to an embodiment, the dispersion aid comprises at least one interface additive and a high surface hydrophilicity inert.

According to an embodiment of the present disclosure, the process of preparing an agrochemical composition comprises:

(i) mixing, blending, and milling a triazolone herbicide or a derivative thereof, at least one additional active ingredient or derivatives thereof and dispersion aid to obtain a homogeneous mixture;
(ii) preparing a dough by mixing water with the homogeneous;
(iii) extruding the dough to obtain granules;
(iv) drying the granules to obtain the composition,

According to an embodiment, the dispersion aid comprises at least one interface additive and a high surface hydrophilicity inert.

According to an embodiment of the present disclosure, the process of preparing agrochemical composition comprising: (a) at least one triazolone herbicide or a derivative thereof, and (b) dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert; in the form of WDG comprises pan granulation, spray drying or extrusion.

According to an embodiment of the present disclosure, the process of preparing agrochemical composition comprising: (a) at least one triazolone herbicide or a derivative thereof, and (b) dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert; in the form of WDG by way of extrusion.

According to an embodiment of the present disclosure, the process of preparing an agrochemical composition comprises:

(i) mixing, blending, and milling amicarbazone or a derivative thereof and dispersion aid comprising of alkylsulfonic acid and ammonium sulfate to obtain a homogeneous mixture;

(ii) preparing a dough by mixing water with the homogeneous mixture;

(iii) extruding the dough to obtain granules;

(iv) drying the granules to obtain the composition,

wherein the composition comprises

amicarbazone or a derivative thereof, alkylsulfonic acid and ammonium sulfate.

According to an embodiment of the present disclosure, the process of preparing an agrochemical composition comprises:

(i) mixing, blending, and milling amicarbazone or a derivative thereof, flumioxazin or a derivative thereof, arylsulfonic acid, kaolin, and optionally other excipients to obtain a homogeneous mixture;

(ii) preparing dough by mixing water with the homogeneous mixture;

(iii) extruding the dough to obtain granules;

(iv) drying the granules to obtain the composition, wherein the composition comprises amicarbazone or a derivative thereof, flumioxazin or a derivative thereof, arylsulfonic acid, kaolin, and optionally other excipients.

According to an embodiment of the present disclosure, the process of preparing an agrochemical composition comprising:

(i) mixing, blending, and milling amicarbazone or a derivative thereof, metribuzin or a derivative thereof, arylsulfonic acid, ammonium sulfate and optionally other excipients to obtain homogeneous mixture;

(ii) preparing dough by mixing water with the homogeneous mixture;
(iii) extruding the dough to obtain granules;
(iv) drying the granules to obtain the composition,
wherein the composition comprises amicarbazone or a derivative thereof, metribuzin or a derivative thereof, arylsulfonic acid, and ammonium sulfate.

According to an embodiment of the present disclosure, the process of preparing an agrochemical composition comprises:
(i) mixing, blending, and milling amicarbazone or a derivative thereof, isoxaflutole or a derivative thereof, arylsulfonic acid, ammonium sulfate and optionally other excipients to obtain a homogeneous mixture;
(ii) preparing a dough by mixing water with the homogeneous mixture;
(iii) extruding the dough to obtain granules; and
(iii) drying the granules to obtain the composition, wherein the composition comprises amicarbazone or a derivative thereof, isoxaflutole or a derivative thereof, arylsulfonic acid, and ammonium sulfate.

The order of addition and mixing of the agrochemical ingredients and/ or excipients is not narrowly critical. In one embodiment, for example, the dry ingredients are blended, and the composition is then mixed with water to obtain dough.

According to an embodiment of the present disclosure, water may be added as a fine spray to prepare dough.

According to an embodiment of the present disclosure, the blend is obtained using a suitable blender such as ribbon blender, V-blender, high intensity low mixer, plough shear mixer, and kneader mixer.

According to an embodiment of the present disclosure, blend of triazolone herbicide or a derivative thereof, dispersion aid and agrochemical excipients may be taken for milling.

The grinding may be performed in a suitable device such as air jet mill, air classifier mill, hammer mill, and pin disc mill. Jet mills are shear or pulverizing machines in which the particles to be milled are accelerated by gas flows and pulverized by collision. There are several

different types of jet mill designs, such as double counterflow (opposing jet) and spiral (pancake) fluid energy mills.

According to an embodiment of the present disclosure, water dispersible granules are normally made through an extrusion process.

According to an embodiment of the present disclosure, drying of granules may be performed in a suitable drying equipment such as spray drier or fluidized bed spray drier or fluid bed spray granulator.

According to an embodiment of the present disclosure, the drying of extruded granules is done at a temperature not more than 40 to 80 ^{0}C.

According to preferred embodiment of the present disclosure, the drying of granules is done at a temperature range of 40 to 65 ^{0}C.

The drying process will preferably remove as much water as possible in order to reduce weight and to provide good stability to the granules while still in a dry flowable state. Preferably the granules will less than 2% weight loss on drying and most preferably less than 1% weight loss on complete drying.

According to an embodiment of the present disclosure, ingredients used in the process of preparing the composition may be in a finely divided form, preferably in an air-milled form.

After thorough mixing or after otherwise putting the mix into a form suitable for extrusion, extrusion takes place through suitable orifices. The size of the granules will depend upon the size of the orifices and the extruder may thus be fitted with a mesh or die selected to provide a desired size of granule.

Preferably extrusion orifices are chosen to provide extrusions between 800 and 1200 microns in diameter. The extrusions can vary considerably in length, for example up to 0.5 cm or more long.

In an embodiment of the present disclosure, pH of the agrochemical composition is adjusted between 4 to 7.

The process of the disclosure considerably reduces the amount of oversized and undersized material which must be recycled. Consequently, the granule composition is essentially dust free.

According to an embodiment of the present disclosure, there is provided a method of controlling weeds by applying to the plants or to their locus, an agrochemical composition comprising: (a) at least one triazolone herbicide, and (b) dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert.

According to an embodiment of the present disclosure, there is provided a method of controlling weeds by applying to the plants or to their locus, an agrochemical composition comprising: (a) amicarbazone, and (b) dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert.

According to an embodiment of the present disclosure, there is provided a method of controlling weeds by applying to the plants or to their locus, an agrochemical composition comprising: (a) at least one triazolone herbicide or a derivative thereof; (b) at least one additional active ingredient selected from of isoxazole, N-phenylimide and triazinone group of herbicides; and (c) a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert.

According to an embodiment of the present disclosure, there is provided a method of controlling weeds by applying to the plants or to their locus, an agrochemical composition comprising: (a) amicarbazone, (b) isoxaflutole, and (c) dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert.

According to an embodiment of the present disclosure, there is provided a method of controlling weeds by applying to the plants or to their locus, an agrochemical composition comprising: (a) amicarbazone, (b) flumioxazin, and (c) dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert.

According to an embodiment of the present disclosure, a method of controlling weeds by applying to the plants or to their locus, an agrochemical composition comprising: (a) amicarbazone, (b) metribuzin, and (c) dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert.

An embodiment of the present invention discloses use of an agrochemical composition for controlling weeds wherein the composition comprises of at least one triazolone herbicide or a

derivative thereof; a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert, and optionally at least one additional active ingredient.

The agrochemical composition of the present disclosure may be used to target weeds among the crops such as corn, rice, wheat, barley, rye, oat, sorghum, cotton, soybean, peanut, buckwheat, beet, rapeseed, sunflower, sugar cane, and tobacco; solanaceous vegetables such as eggplant, tomato, pimento, popper, and potato, cucurbit vegetables such as cucumber, pumpkin, zucchini, water melon, melon, and squash, cruciferous vegetables such as radish, white turnip, horseradish, kohlrabi, Chinese cabbage, cabbage, leaf mustard, broccoli, and cauliflower, asteraceous vegetables such as burdock, crown daisy, artichoke, and lettuce, liliaceous vegetables such as green onion, onion, garlic, and asparagus, ammiaceous vegetables such as carrot, parsley, celery, and parsnip, chenopodiaceous vegetables such as spinach, and Swiss chard, lamiaceous vegetables such as Perilla frutescens, mint, and basil, strawberry, sweet potato, Dioscorea japonica, colocasia, flowers, foliage plants, turf grasses, fruits such as pome fruits such as apple, pear, quince, stone fleshy fruits such as peach, plum, nectarine, Prunus mume, cherry fruit, apricot, prune, citrus fruits such as orange, lemon, rime, grapefruit, nuts such as chestnuts, walnuts, hazelnuts, almond, pistachio, cashew nuts, macadamia nuts, berries such as blueberry, cranberry, blackberry, raspberry, grape, kaki fruit, olive, plum, banana, coffee, date palm, coconuts, trees otter than fruit trees; tea, mulberry, flowering plant, trees such as ash, birch, dogwood, Eucalyptus, Ginkgo biloba, lilac, maple, Quercus, poplar, Judas tree, liquidambar formosana, plane tree, zelkova Japanese arborvitae, fir wood, hemlock, juniper, Pinus, Picea, and Taxus cuspidate.

According to an embodiment of the present disclosure, target weeds include *Alopecurus myosuroides* (blackgrass, ALOMY), *Amaranthus palmeri* (Palmer amaranth, AMAPA), *Amaranthus viridis* (slender amaranth, AMAVI), *Avena fatua* (wild oat, AVEFA), *Brachiaria decumbens*, *Urochloa decumbens* (Stapf), *Brachiaria brizantha, Urochloa brizantha*, *Brachiaria platyphylla* (Groseb.) Nash, *Urochloa platyphylla* (broadleaf signalgrass, BRAPP), *Brachiaria plantaginea*, *Urochloa plantaginea* (alexandergrass, BRAPL), *Cenchrus echinatus* (southern sandbar, CENEC), *Digitaria horizontalis* Willd. (Jamaican crabgrass, DIGHO), *Digitaria insularis* (sourgrass, TRCIN), *Digitaria sanguinalis* (large crabgrass, DIGSA), *Echinochloa crus-galli* (barnyardgrass, ECHCG), *Echinochloa colonum* (junglerice, ECHCO), *Eleusine indica Gaertn.* (goosegrass, ELEIN), *Lolium multiflorum Lam.* (Italian ryegrass, LOLMU), *Panicum dichlotomiflorum Michx.* (fall panicum, PANDI), *Panicurn miliaceum L.* (wild-proso millet, PANMI), *Sesbania exaltata* (hemp sesbania, SEBEX), *Setaria faberi*

Herrm. (giant foxtail, SETFA), *Setaria viridis* (green foxtail, SETVI), *Sorghum halepense* (Johnsongrass, SORHA), *Sorghum bicolor, Moench ssp., Arundinaceum* (shattercane, SORVU), *Cyperus esculentus* (yellow nutsedge, CYPES), *Cyperus rotundus* (purple nutsedge, CYPRO), *Abutilon theophrasti* (velvetleaf, ABUTH), Amaranthus species (pigweeds and amaranths, AMASS), *Ambrosia artemislifolia L.* (common ragweed, AMBEL), *Ambrosia psilostachya DC.* (western ragweed, AMBPS), *Ambrosia trifida* (giant ragweed, AMBTR), *Arioda aristata* (spurred anoda, ANVCR), *Asclepias syriaca* (common milkweed, ASCSY), *Bidens pilosa* (hairy beggarticks, BIDPI), *Borreria species* (BOISS), *Borreria alata Spermacoce alata Aubl., Spermacoce latifolia* (broadleaf buttonweed, BOILF), *Chenopodium album L.* (common lambsquarters, CHEAL), *Cirsium arvense* (Canada thistle, CIRAR), *Commelina benghalensis* (tropical spiderwort, COMBE), *Datura stramonium* (jimsonweed, DATST), *Daucus carota* (wild carrot, DAUCA), *Euphorbia heterophylla* (wild poinsettia, EPHHL), *Euphorbia hirta, Chamaesyce hirta* (garden spurge, EPHHI), *Euphorbia dentata Michx.* (toothed spurge, EPHDE), Erigeron *bonariensis, Conyza bonariensis* (hairy fleabane, ERIBO), *Erigeron canadensis, Conyza canaderisis* (horseweed, ERICA), *Conyza sumatrensis* (tall fleabane, ERIFL), *Helianthus annuus* (common sunflower, HELAN), *Jacquemontia tamnifolia* (smallflower morningglory, IAQTA), *Ipomoea hederacea* (ivyleaf morningglory, IPOHE), Ipomoea lacunosa (white morningglory, IPOLA), *Lactuca serriola* (prickly lettuce, LACSE), *Portulaca oleracoa* (common purslane, POROL), *Richardia species* (pusley, RCHSS), *Salsola tragus* (Russian thistle, SASKR), Sida species (sida, SIDSS), *Sida spinosa* (prickly sida, SIDSP), *Sinapis arvensis* (wild mustard, SINAR), *Solanum ptychanthum* (eastern black nightshade, SOLPT), *Tridax procumbens* (coat buttons, TRQPR), *Xanthium strumarium* (common cocklebur, XANST).

According to an embodiment, the composition according to the present disclosure may be applied either pre or post emergent. The advantage of the composition is surprisingly good residual effects, when applied in pre-emergent as well as quick knockdown when applied post emergent leading to quick control of weeds.

In another embodiment, the composition according to the present disclosure may be applied for quick burndown of weeds.

According to an embodiment of the present disclosure, the agrochemical composition is used as herbicide.

According to an embodiment of the present disclosure, the agrochemical composition comprising amicarbazone or a derivative thereof and dispersion aid; is used as herbicide.

According to an embodiment of the present disclosure, the agrochemical composition comprising amicarbazone or a derivative thereof, at least one additional herbicide or derivatives thereof and dispersion aid is used as herbicide.

In an embodiment, the present invention provides a composition comprising at least one triazolone herbicide or a derivative thereof for controlling weeds selected from the group of *Alternaria tenella, Brachiaria decumbens, Cyperus rotundus, Digitaria nuda, Eleusine indica, Ipomoea hederifolia, Merremia cissoides.*

In an embodiment, the present composition is applied at pre-emergence or post-emergence stage of the weed.

In an embodiment, the present composition is applied at a spray volume in the range from 100 to 200 L/ha.

According to an embodiment of the present disclosure, a kit-of-parts comprising an agrochemical composition is provided. The kit comprises a plurality of components, each of which components may include at least one of the ingredients of the agrochemical composition of the present disclosure.

An embodiment of the present invention discloses a kit-of-parts comprising an agrochemical composition of at least one triazolone herbicide or a derivative thereof, a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert, and optionally at least one additional active ingredient.

In one embodiment of the present disclosure, the kits may include one or more, including all, components that may be used to prepare the agrochemical composition. E. g., kits may include triazolone herbicide, another herbicide and a dispersion aid comprising interface additive and high surface hydrophilicity inert. One or more of the components may already be combined or pre-formulated. In those embodiments where more than two components are provided in a kit, the components may already be combined and as such are packaged in a single container such as a vial, bottle, can, pouch, bag, or canister.

It will be understood that the specification and examples are illustrative but not limitative of the present disclosure and that other embodiments within the spirit and scope of the disclosure

will suggest themselves to those skilled in the art. Other embodiments can be practiced that are also within the scope of the present disclosure. The following examples illustrate the disclosure, but by no means intend to limit the scope of the claims.

Example-1: Amicarbazone 700 WG

Ingredients	**Amount (% w/w)**
Amicarbazone Technical	71.79
Sodium lignosulfonate	8
Alkyl Naphthalene Sulfonate	10
Ammonium sulfate	q.s
Total	100

Amicarbazone, sodium lignosulfonate, alkyl naphthalene sulfonate, and ammonium sulfate were were added in above mentioned quantity and blended in a ribbon blender for 20-30 min to obtain blend. The blend was further grounded in air jet mill to obtain grounded mix. The grounded mix was then blended for 40-50 min to obtain homogeneous mixture. The homogeneous mixture was taken to prepare dough using water spray. Granules were then extruded in a granulator having sieve size 0.8 to 1.2 mm aperture. The extruded granules were dried on a fluid bed dryer at a temperature ranging between 50°C to 55°C. The dried granules were passed through sieve to obtain uniformly sized granules. Undersized and oversized granules were recycled back. Finished granules were packed in a suitable packaging.

Example-2: Amicarbazone 700 WG

Ingredients	**Amount (% w/w)**
Amicarbazone	71.79
Binder (vinyl pyrrolidone/ vinyl acetate copolymer)	2
Sodium lignosulfonate	8
Alkyl Naphthalene Sulfonate Formaldehyde Condensate	10
Kaolin	q.s
Total	100

Amicarbazone, vinyl pyrrolidone/ vinyl acetate copolymers, sodium lignosulfonate, alkyl naphthalene sulfonate formaldehyde condensate and kaolin were mixed in above mentioned quantity and WDG were obtained as per the process of Example-1.

Example-3: Amicarbazone 700 + Flumioxazin 125 WG

Ingredients	**Amount (%w/w)**
Amicarbazone	71.79
Flumioxazin	12.51
Sodium Polycarboxylate	7.0
Sodium Lauryl Sulfate	4.0
Kaolin	q.s
Total	100

Amicarbazone, flumioxazin, Sodium Polycarboxylate, sodium lauryl sulfate, and kaolin were mixed in above mentioned quantity and WDG were obtained as per the process of Example-1.

Example-4: Amicarbazone 700 + Flumioxazin 125 WG

Ingredients	**Quantity (% w/w)**
Amicarbazone	71.79
Flumioxazin	12.51
Sodium polycarboxylate	7.00
Sodium lauryl sulfate	3.00
Kaolin	q.s

Amicarbazone, flumioxazin, Sodium polycarboxylate, sodium lauryl sulfate and kaolin were mixed in above mentioned quantity and WDG were obtained as per the process of Example-1.

Example-5: Amicarbazone 700 + Isoxaflutole 75 WG

Ingredients	**Amount (% w/w)**
Amicarbazone	71.93

Isoxaflutole	7.96
methylene-linked condensation product of arylsulphonic acid	8
Sodium butyl & dibutyl naphthalene sulfonate	2
Sodium Diisopropyl naphthalene sulfonate	0.5
Ammonium sulfate	q.s
Total	100

Amicarbazone, isoxaflutole, methylene-linked condensation product of arylsulphonic acid, sodium butyl & dibutyl naphthalene sulfonate, sodium diisopropyl naphthalene sulfonate, and ammonium sulfate were mixed in above mentioned quantity and WDG were obtained as per the process of Example-1.

Example-6: Amicarbazone 432g/Kg + Metribuzin 280 WG

Ingredients	**Amount (% w/w)**
Amicarbazone Technical	43.5
Metribuzin Technical	28.5
Sodium Lauryl Sulfate	5
sodium lignosulfonate	16.5
Ammonium Sulfate Total	q.s 100

Amicarbazone, metribuzin, sodium lauryl sulfate, sodium lignosulfonate, and ammonium sulfate were mixed in above mentioned quantity and WDG were obtained as per the process of Example-1.

Example-7: Amicarbazone 432 g/Kg + Metribuzin 280 WG

Ingredients	**Amount (% w/w)**
Amicarbazone	43.5

Metribuzin Technical	28.5
Sodium Lauryl Sulfate	5
Sodium lignosulfonate	10
Ammonium Sulfate Total	q.s 100

Amicarbazone, metribuzin, sodium lauryl sulfate, sodium lignosulfonate and ammonium sulfate were mixed in above mentioned quantity and WDG were obtained as per the process of Example-1.

Stability study of agrochemical composition

The agrochemical compositions of Example 1-7 were prepared according to the present disclosure utilizing a dispersion aid that comprises salts of alkyl or aryl sulphonic acid and a high surface hydrophilicity inert. It was found that the compositions of Examples 1-7 were stable passing all the parameters of stability testing. Inversions of Example 1-7 remained under acceptable range from 10-18. Negligible degradation was observed for actives such as amicarbazone, isoxaflutole and flumioxazin. Suspensibility of the compositions found to be above 95% in all the compositions. pH remained within acceptable range within 4.5-6. Controlled foaming was observed in all the compositions of Example 1-7. (Table 1 and Table 2).

Table 1

	Example-1		**Example-2**		**Example-3**		**Example-4**	
Parameters	**Ambient 25°C**	**14D 54°C**	**Ambient 25°C**	**14D 54°C**	**Ambient 25°C**	**14D 54°C**	**Ambient 25°C**	**14D 54°C**
No of Inversions	15	18	10	16	13	14	14	18
Wet Sieve, % w/w pass through 200 mesh	100	100	100	100	99.2	99.85	99.6	99.56
Susp. @20ppm, % w/w	95.51	96.12	-	--	98.60	98.30	97.79	97.56
Susp. @342ppm, % w/w	95.11	95.03	95.0	87.6	95.84	96.47	95.70	96.66
pH, 1% aq. Solution	4.8	4.79	4.70	4.55	5.5	5.57	5.54	5.62
persistent foam @20, cm	2	2.1	2	2	0	0	1	3

Amicarbazone content, % w/w	71.24	71.13	71.30	70.17	70.25	70.10	70.25	- 70.10
Flumioxazin Content (g % w/w	-	-	--	--	12.89	12.79	12.89	12.79
Remarks	Desired & Stable		Desired & Stable		Desired & Stable		Desired & Stable	

Table 2

	Example-5		**Example-6**		**Example-7**	
Parameters	**Ambient 25°C**	**14 Days 54°C**	**Ambient 25°C**	**14 Days 54°C**	**Ambient 25°C**	**14 Days 54°C**
No of Inversions	5	6	12	11	10	10
Wet Sieve, % w/w pass through 200 mesh	100	100	100	100	100	100
Susp. @20ppm, % w/w	96.86	96.79	98.86	98.86	--	--
Susp. @342ppm, % w/w	94.58	94.5	89.82	87.87	98.0	96.02
pH , 1% aq. Solution	5.69	6.38	5.12	5.02	4.5	4.9
persistent foam @20, cm	1.5	1.8	3	3	3	3
Amicarbazone content % w/w	72.19	71.84	42.81	42.75	44.08	44.06
Isoxaflutole content %w/w	7.77	7.74	--	--	--	--
Metribuzin content %w/w	--	--	29.83	29.05	29.00	28.06
Remarks	Desired & Stable		Desired & Stable		Desired & Stable	

Example-8: Amicarbazone 700 + Flumioxazin 125 WG (comparative example)

Ingredients	**Amount (% w/w)**

Amicarbazone (97.5%)	71.79
Flumioxazin (99.9%)	12.51
Ethoxylated polyarylphenol	8.00
Lactose	q.s
Total	100

Amicarbazone, flumioxazin, ethoxylated polyarylphenol and lactose were mixed in above mentioned quantity and WDG were obtained as per the process of Example-1.

Physico-chemical study of Example-8

Composition of Example-8 was developed using Ethoxylated polyarylphenol and lactose. It failed due to higher number of inversions as well as poor wet sieve retention. Therefore, it could not consider for further physico-chemical study as well as AHS. (Table-3)

Table 3

Parameters	**Ambient@25°C**
No. of Inversions	30+
Wet Sieve, % w/w pass through 200 mesh	91.74
Remark	Failed in no. of inversion, not analysed further.

Example-9: Amicarbazone 700 + Flumioxazin 125 WG (comparative example)

Ingredients	**Amount (% w/w)**
Amicarbazone (97.5%)	71.79
Flumioxazin (99.9%)	12.51
Sodium polycarboxylate	8.00
Lactose	q.s
Total	100

Amicarbazone, flumioxazin, sodium polycarboxylate and lactose were mixed in above mentioned quantity and WDG were obtained as per the process of Example-1.

Physico-chemical study of Example-9

Composition of Example-9 was developed using sodium polycarboxylate and lactose. The WDG processing yielded thread like granules which were not acceptable as finished composition being too fragile and failed to pass quality check. The high pH as well as greater amount of persistent foam was noticed. Moreover, amicarbazone degradation was recorded. (Table-4)

Table 4

Parameters	**Initial**	**14D 54°C**
No of Inversions	16	18
Wet Sieve, % w/w pass through 200 mesh	100	100
Susp. @20ppm, % w/w	98.66	93.45
Susp. @342ppm, % w/w	93.01	93.84
pH , 1% aq. Solution	10.77	11.08
persistent foam @20, cm	3.5	4
Amicarbazone Content, (%w/w)	69.06	67.10
Flumioxazin Content, (%w/w)	13.09	13.17

Example-10: Amicarbazone 700 + Flumioxazin 125 WG (comparative example)

Ingredients	**Amount (% w/w)**
Amicarbazone (97.5%)	71.79
Flumioxazin (99.9%)	12.51
Sodium polycarboxylate	8.00
Sodium lauryl sulfate	3.00
Sodium lignosulphonate	7.00

Lactose	3.7

Amicarbazone, flumioxazin, sodium polycarboxylate, sodium lauryl sulphate, sodium lignosulphonate and lactose were mixed in above mentioned quantity and WDG were obtained as per the process of Example-1.

Physico-chemical study of Example-10

Composition of Example-10 was developed using sodium polycarboxylate, sodium lauryl sulphate and lactose. During phys-chem study performed on 0 days at ambient condition, the composition appeared suitable on suspensibility parameter but resulted into high foam and pH. The high pH as well as greater amount of persistent foam was noticed. When the composition was kept for storage for 14 days at 54°C and later analysed, it resulted into high inversions (30+). The granules were not able to disintegrate and hence it could not be analysed further. Moreover, amicarbazone degradation was recorded. (Table-4)

Table 4

Parameters	**Initial**	**14D 54°C**
No of Inversions	20	30+
Wet Sieve, % w/w pass through 200 mesh	100	
Susp. @20ppm, % w/w	95.04	
Susp. @342ppm, % w/w	93.46	
pH , 1% aq. Solution	10.55	
persistent foam @20, cm	4.5	
Amicarbazone Content, (%w/w)	69.71	
Flumioxazin Content, (%w/w)	13.02	

Real Time Physico-chemical Study

To evaluate the physico-chemical parameters in real time, few compositions developed according to the present invention were kept in storage. Observations were made after 30 months (for composition of Example-3), 12 months (for compositions of Example-3 and 4), 16

months (for composition of Example-5) and 12 months (for composition of Example-7). All the compositions were found to be stable with respect to degradation of active ingredients. Suspensibility of the granules found was to be greater than 90% in both 30-ppm hardness water and 342 ppm hardness water. pH of the compositions was also found to be within neutral range. All the compositions were found to generate foam within acceptable limit. Therefore, it was concluded that the compositions kept under real time study were stable. (Table-5)

Table-5

	Example-2 (30 Months)	**Example-3 (12 months)**	**Example-4 (12 months)**	**Example-5 (16 Months)**	**Example-7 (12 Months)**
Parameters					
No of Inversions	18	20	18	8	12
Wet Sieve, % w/w pass through 200 mesh	99.92	99.84	99.87	99.99	99.99
Susp. @20ppm, % w/w	90.5	93.40	96.30	96.3	98.12
Susp. @342ppm, % w/w	90.1	92.17	94.80	95.3	88.11
pH , 1% aq. Solution	4.90	5.70	5.66	6.47	5.32
persistent foam @20, cm	Nil	2.8	3.2	1.8	3
Amicarbazone content, (%w/w)	69.56	70.12	70.10	70.29	42.82
Flumioxazin Content (%w/w)	-	12.66	12.70	-	-
Metribuzin content (%w/w)	-	-	-	-	26.95
Isoxaflutole content %w/w	-	-	-	7.50	-
Remarks	Desired and stable	Desired and stable	Desired and stable	Desired and stable	Desired and stable

Field Trial Efficacy Data

Composition of Example-3 was taken for field trial evaluation in sugar cane fields. Some of the common weeds prevailing in sugar cane fields are *Alternaria tenella, Brachiaria*

decumbens, Cyperus rotundus, Digitaria nuda, Eleusine indica, Ipomoea hederifolia, Merremia cissoides. Single pre-emergence (both crop and weed) application was made on the sugar cane field and observations were made at different intervals with the final observation made at 120 days after application (DAA). The composition of Example-3 found very effective in controlling more than 80% weeds of sugar cane. (Table 6 & 7)

Table 6

Treatment Detail

Treatments	Formulation	Rates (kg L/ha)	Active Ingredient (g of a.i/ha)
Example-3	WG	1,20	amicarbazone (840) & flumioxazin (150)

Table 7

Weed(s)	Trial	% Control evaluated at 120DAA
Alternanthera tenella	Trial 1	100
Brachiaria decumbens	Trial 1	95
	Trial 2	88
	Trial 3	100
Cyperus rotundus	Trial 1	100
Digitaria nuda	Trial 1	98
	Trial 2	93
Eleusine Indica	Trial 1	98
	Trial 2	86
Ipomoea hederifolia	Trial 1	100
	Trial 2	100
	Trial 3	95
	Trial 4	97
Merremia cissoides	Trial 1	100
	Trial 2	99

The inventors of the present disclosure successfully developed various stable agrochemical compositions in the form of extruded granules of triazolone herbicide, alone or in combination

with other active ingredients using a dispersion aid. The stable agrochemical compositions demonstrated excellent suspensibility and dispersibility upon dilution. The active ingredients were found to remain quite stable after preparation and even during storage studies. pH of the composition remained quite stable. The current disclosure also demonstrated advantageous methods of controlling weeds both pre and post emergently.

We Claim:

1. An agrochemical composition comprises:

a) at least one triazolone herbicide or a derivative thereof; and

b) a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert.

2. The composition as claimed in claim 1, wherein said triazolone herbicide is selected from amicarbazone, bencarbazone, carfentrazone, flucarbazone, flucarbazone sodium, ipfencarbazone, propoxycarbazone, sulfentrazone, thiencarbazone or a derivative thereof.

3. The composition as claimed in claim 1, wherein said composition comprises from about 20% w/w to about 80% w/w triazolone herbicide of the total weight of the composition.

4. The composition as claimed in claim 1, wherein said dispersion aid comprises from about 10% w/w to about 50% w/w high surface hydrophilicity inert and from about 5% w/w to about 15% w/w interface additive of the total weight of the agrochemical composition.

5. The composition as claimed in claim 1, wherein the interface additive and the high surface hydrophilicity inert are present in ratio from about 1:5 to 5:1.

6. The composition as claimed in claim 1, wherein said interface additive is selected from the group comprising of salts of sulphonic acid derivatives.

7. The composition as claimed in claim 6, wherein said interface additive is selected from the group comprising of salts of alkyl and aryl sulphonic acid derivatives.

8. The composition as claimed in claim 6, wherein said salts of sulfonic acid derivatives are selected from the group comprising of sodium butyl naphthalene sulfonate, sodium nonyl naphthalene sulfonate, naphthalene sulfonate-formaldehyde condensate, alkyl naphthalene sulfonate-formaldehyde condensate, sodium isopropyl naphthalene sulfonate, sodium dodecylbenzenesulphonate, sodium lauryl sulfate, calcium dioctyl naphthalene sulfonate,

linear dodecylbenzene sulfonic acid, branched dodecylbenzene sulfonic acid, linear dodecylbenzene sulfonate isopropylamine salt, naphthalene sulfonate-formaldehyde condensates, alkyl substituted naphthalene sulfonate-formaldehyde condensates, sodium alkyl naphthalene sulfonate, and sodium salt of sulfonated naphthalene-formaldehyde condensate, methylene-linked condensation product of arylsulphonic acid, sodium butyl & dibutyl naphthalene sulfonate and sodium diisopropyl naphthalene sulfonate.

9. The composition as claimed in claim 1, wherein said high surface hydrophilicity inert is selected from the group comprising of kaolin, china clay and bentonite clays (natural bentonite or modified bentonite), synthetic and diatomaceous silicas, calcium and magnesium silicates, titanium dioxide, aluminium, calcium or magnesium carbonate, ammonium sulfate, sodium sulfate, potassium sulfate, calcium sulfate or barium sulfate, charcoal, starch, including modified starches such as alkyl and carboxyalkyl starches and mixtures thereof.

10. An agrochemical composition comprises:

a) at least one triazolone herbicide or a derivative thereof;

b) at least one additional active ingredient or derivative thereof; and

c) a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert.

11. The composition as claimed in claim 10, wherein the additional active ingredient is selected from the group comprising of isoxazole, N-phenylimide and triazinone group of herbicides and their derivatives thereof.

12. The composition as claimed in claim 10, wherein said active ingredient is selected from the group comprising of isoxaflutole, flumioxazin and metribuzin.

13. The composition as claimed in claim 10, wherein the triazolone herbicide is amicarbazone, additional active ingredient is metribuzin, and the dispersion aid is a mixture of sodium lignosulfonate and kaolin.

14. The composition as claimed in claim 10, wherein the triazolone herbicide is amicarbazone, additional active ingredient is flumioxazin, and the dispersion aid is a mixture of sodium lauryl sulfate and kaolin.

15. The composition as claimed in claim 10, wherein the triazolone herbicide is amicarbazone, additional active ingredient is isoxaflutole, and the dispersion aid is a mixture of sodium isopropyl naphthalene sulfonate and ammonium sulfate.

16. The composition as claimed in claim 1 and 10, wherein the composition is in the form of water dispersible granule.

17. The composition as claimed in claim 1 and 10, wherein said composition further comprises of anionic surfactant selected from the group comprising of sodium lignosulfonate, kraft lignin sulphonate, sodium polycarboxylate, alkyl or aryl ethoxylates, alkyl or aryl ethoxylate derivatives, and styrene acrylic polymers.

18. A process of preparing an agrochemical composition comprises:
(i) mixing triazolone herbicide or a derivative thereof and a dispersion aid to obtain a homogeneous mixture;
(ii) obtaining granules from the homogeneous mixture; and
(iii) drying the granules to obtain the composition.

19. The process as claimed in claim 18, wherein said granules in step (ii) are obtained by granulation, spray drying or extrusion method.

20. The process as claimed in claim 18, wherein the dispersion aid is a mixture of interface additive and high surface hydrophilicity inert.

21. The process as claimed in claim 18, wherein additional active ingredient or derivatives thereof is further added in said homogeneous mixture.

22. A method of controlling weeds comprising applying to the plants or to their locus, an agrochemical composition comprising at least one triazolone herbicide or a derivative thereof, a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert, and optionally an additional active ingredient.

23. The method as claimed in claim 22, wherein the triazolone herbicide is selected from amicarbazone, bencarbazone, carfentrazone, flucarbazone, flucarbazone sodium, ipfencarbazone, propoxycarbazone, sulfentrazone, thiencarbazone or a derivative thereof .

24. Use of an agrochemical composition for controlling weeds wherein the composition comprises of at least one triazolone herbicide or a derivative thereof; a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert, and optionally at least one additional active ingredient.

25. A composition comprising at least one triazolone herbicide or a derivative thereof for controlling weeds selected from the group of *Alternaria tenella, Brachiaria decumbens, Cyperus rotundus, Digitaria nuda, Eleusine indica, Ipomoea hederifolia, Merremia cissoides.*

26. A kit-of-parts comprising an agrochemical composition of at least one triazolone herbicide or a derivative thereof, a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert, and optionally at least one additional active ingredient.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN2022/050869

A. CLASSIFICATION OF SUBJECT MATTER

A01N 25/08 (2006.01) ***A01N 25/14 (2006.01)*** ***A01N 25/30 (2006.01)*** ***A01N 43/707 (2006.01)*** ***A01N 43/80 (2006.01)*** ***A01N 43/84 (2006.01)*** ***A01N 47/38 (2006.01)*** ***A01P 13/00 (2006.01)***

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)

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)

Databases: PATENW, Espacenet, Google Search/Patents/Scholar, CAPLUS, Registry, CASFORMULATNS

IPC/CPC symbols: A01N (47/38, 43/653, 25/30, 25/08, 43/707, 43/80, 43/84)

Keywords: Triazolone, from amicarbazone, bencarbazone, carfentrazone, flucarbazone, flucarbazone sodium, ipfencarbazone, propoxycarbazone, sulfentrazone, thiencarbazone, interface additive, sodium lignosulfonate, Sodium lauryl sulfate, alkyl naphthalene sulfonate, sodium polycarboxylate, high surface hydrophilicity inert, kaolin, ammonium sulfate, isoxaflutole, flumioxazin, metribuzin, Alternaria tenella, Brachiaria decumbens, Cyperus rotundus, Digitaria nuda, Eleusine indica, Ipomoea hederifolia, Merremia cissoides and like terms

Applicant/Inventor/s: UPL LIMITED, Anil SAINI, Luiz CAMPOS, Rajan Ramakant SHIRSAT, Ritesh PAGARE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	

[X] Further documents are listed in the continuation of Box C

[X] 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	Date of mailing of the international search report
25 October 2022	25 October 2022
Name and mailing address of the ISA/AU	**Authorised officer**
AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustralia.gov.au	Stefanie-Ann Zavras AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. +61 2 6283 2069

INTERNATIONAL SEARCH REPORT C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		International application No. **PCT/IN2022/050869**
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2018104337 A (SDS BIOTECH CORP) 05 July 2018 Para. [0192], [0108]; Tables	1-26
X	CN 112514905 A (JINGBO AGROCHEMICALS TECH CO LTD) 19 March 2021 Examples; claim 3; para. [0014]	1-26
X	CN 108849930 A (NANJING RED SUN CO LTD) 23 November 2018 Abstract, Examples 3-5 and 7-9	1-26
X	GB 2562072 A (ROTAM AGROCHEM INTERNATIONAL COMPANY LIMITED) 07 November 2018 Page 14 lines 15-30; Biological examples; claim 22	1-26
X	US 2012/0190547 A1 (LIU) 26 July 2012 Examples 1 and 2; Table 1	1-12 and 16-26
A	WO 2021/024221 A1 (UPL DO BRASIL INDUSTRIA E COMERCIO DE INSUMOS AGROPECUARIOS S.A. et al.) 11 February 2021 Pages 21 and 23	
A	WO 2020/113301 A1 (UPL CORPORATION LIMITED et al.) 11 June 2020 Claim 7	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN2022/050869

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
the subject matter listed in Rule 39 on which, under Article 17(2)(a)(i), an international search is not required to be carried out, including

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See Supplemental Box for Details

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

Supplemental Box

Continuation of: **Box III**

This International Application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept.

This Authority has found that there are different inventions based on the following features that separate the claims into distinct groups:

- **Invention 1:** Claims 1-17, 24 and 26 are directed to an agrochemical composition, a use of said composition and a kit-of-parts. The feature of at least one triazolone herbicide or a derivative thereof and a dispersion aid comprising at least one interface additive and a high surface hydrophilicity inert, is specific to this group of claims.

- **Invention 2:** Claims 18-23 are directed to a process of preparing an agrochemical composition. The feature of mixing triazolone herbicide or a derivative thereof and a dispersion aid to obtain a homogeneous mixture, is specific to this group of claims.

- **Invention 3:** Claims 25 is directed to a composition. The feature of at least one triazolone herbicide or a derivative thereof, is specific to this group of claims.

Unity of invention is only fulfilled when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. A special technical feature is one which makes a contribution over the prior art (see PCT Rule 13.2). When there is no special technical feature common to all the claimed inventions there is no unity of invention.

In the above groups of claims, the identified features may have the potential to make a contribution over the prior art but are not common to all the claimed inventions and therefore cannot provide the required technical relationship. The only feature common to all of the claimed inventions is at least one triazolone herbicide or a derivative thereof.

Because this feature is generic in this particular art, it cannot be a special technical feature, and therefore there is no special technical feature common to all the claimed inventions. The requirements for unity of invention are consequently not satisfied *a priori*.

INTERNATIONAL SEARCH REPORT Information on patent family members	International application No. **PCT/IN2022/050869**

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document/s Cited in Search Report		Patent Family Member/s	
Publication Number	**Publication Date**	**Publication Number**	**Publication Date**
JP 2018104337 A	05 July 2018	JP 2018104337 A	05 Jul 2018
CN 112514905 A	19 March 2021	CN 112514905 A	19 Mar 2021
CN 108849930 A	23 November 2018	CN 108849930 A	23 Nov 2018
GB 2562072 A	07 November 2018	GB 2562072 A	07 Nov 2018
		GB 2562072 B	13 Nov 2019
		BR 102017023313 A2	08 May 2018
		CN 108782568 A	13 Nov 2018
US 2012/0190547 A1	26 July 2012	US 2012190547 A1	26 Jul 2012
		US 10806143 B2	20 Oct 2020
		CA 2775943 A1	21 Apr 2011
		CN 102573467 A	11 Jul 2012
		CN 102573467 B	08 Apr 2015
		MX 2012004422 A	08 May 2012
		WO 2011046867 A2	21 Apr 2011
WO 2021/024221 A1	11 February 2021	WO 2021024221 A1	11 Feb 2021
		AR 119585 A1	29 Dec 2021
		AU 2020326491 A1	03 Mar 2022
		CN 114449894 A	06 May 2022
		CO 2022001180 A2	20 May 2022
		DO P2022000029 A	18 Apr 2022
		EC SP22008888 A	31 Mar 2022
		JP 2022544475 A	19 Oct 2022
		US 2022272979 A1	01 Sep 2022
WO 2020/113301 A1	11 June 2020	WO 2020113301 A1	11 Jun 2020
		AR 117250 A1	21 Jul 2021
		AU 2019391645 A1	03 Jun 2021
		BR 102018075132 A2	16 Jun 2020
		CL 2021001431 A1	03 Dec 2021
		CN 113163767 A	23 Jul 2021
		CO 2021007236 A2	20 Oct 2021
		DO P2021000108 A	30 Jul 2021
		EA 202191289 A1	29 Jul 2021

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

INTERNATIONAL SEARCH REPORT Information on patent family members	International application No. **PCT/IN2022/050869**

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document/s Cited in Search Report		Patent Family Member/s	
Publication Number	**Publication Date**	**Publication Number**	**Publication Date**
		EC SP21039558 A	30 Jul 2021
		JP 2022511810 A	01 Feb 2022
		US 2022015365 A1	20 Jan 2022

End of Annex

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.