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(54) Title: INSECTICIDAL COMPOSITIONS COMPATIBLE WITH FERTILIZERS

(57) Abstract: The present subject matter relates to an insecticidal composition which is stable in the presence of a fertilizer.



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INSECTICIDAL COMPOSITIONS COMPATIBLE WITH FERTILIZERS

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims the benefit of U.S Provisional Application No.
5 61/856,874, filed July 22, 2013, which is hereby incorporated by reference herein in its entirety.

FIELD OF THE PRESENT SUBJECT MATTER

The present subject matter relates to pesticidal compositions for use in
10 agricultural and non-agricultural pest control applications. In particular, this subject matter provides a stable insecticidal composition compatible with fertilizers.

BACKGROUND OF THE PRESENT SUBJECT MATTER

Many current pesticide compositions are tank-mixed as liquids in the field with
15 many other pesticides, adjuvants, and the like, in order to maximize application efficiency. Such combinations also include mixtures of pesticides and fertilizers. These have considerable economic advantages as a result of the elimination of additional field operations. These agricultural compositions must exhibit excellent chemical stability and a high level of physical stability in the application process.

20 However, such tank-mixtures have an unpredictable and complex nature due to the physical incompatibility of many mixed pesticides and fertilizers. This incompatibility can result in the formation of agglomerates due to coagulation, flocculation, gelling, or precipitation of crystals of the pesticide in the spray tank. These formations may thereby produce poor spraying performance with resultant damage to
25 crops and/or ineffectiveness of treatment. It has been recognized that this physical incompatibility could be overcome to some limited extent by the use of combinations containing surfactants, wetting agents and dispersants or by the addition of various compatibility agents.

Based on the fact that no general solution of the incompatibility problem of
30 pesticides and fertilizers exists, there is a need in the art for new pesticidal compositions with improved physical stability, and which are also compatible with fertilizers.

Pyrethroid insecticides are known as effective insecticides in agricultural and

non-agricultural pest control. However, a known problem of this class of insecticides in general is the low compatibility between compositions including pyrethroids and fertilizers.

Water-soluble polymeric cellulose ethers, such as hydroxyethyl cellulose, carboxymethyl cellulose, and their derivatives, are known as thickeners. These polymeric cellulose ethers are biodegradable and therefore less harmful to the environment.

During the last decade the need for new agrochemical compositions with high performance has been increasing, while the number of chemicals approved for use in agrochemical compositions by regulatory authorities has been decreasing due to more rigid standards for the toxicological and ecological properties of these materials.

Based on the aspects discussed above, there is a need in the art for new pesticidal compositions comprising combinations and applications of auxiliary chemicals which have both high compatibility characteristics and a good environmental safety profile.

SUMMARY OF THE PRESENT SUBJECT MATTER

The present subject matter relates to pesticidal compositions for use in agricultural and non-agricultural pest control applications. In particular, this subject matter provides a stable insecticidal composition which is compatible with fertilizers.

An embodiment of the present subject matter relates to an insecticidal composition compatible with fertilizer. The composition comprises (a) at least one insecticide; (b) a cellulose polymer; (c) at least one surfactant; and (d) at least one agriculturally acceptable carrier, wherein the composition is compatible with fertilizer, in use.

A further embodiment relates to a method for controlling unwanted insects. The method includes applying to an area infested with the insects an effective amount of the abovementioned composition.

An embodiment of the present subject matter relates to a fertilizer composition comprising a) an insecticide; b) a cellulose polymer; c) at least one surfactant; and d) a fertilizer. Another embodiment relates to a method for controlling unwanted insects and providing nutrients to plants. The method includes applying to an area infested with said

insects and containing said plants an effective amount of the fertilizer composition.

An embodiment of the present subject matter relates to an insecticidal composition which includes: (a) at least one insecticide; (b) a cellulose polymer; and (c) at least one surfactant; wherein the composition is stable in the presence of a fertilizer.

5 A further embodiment relates to a method for controlling unwanted insects. The method includes applying to an area infested with the insects an effective amount of the composition comprising (a) at least one insecticide; (b) a cellulose polymer; and (c) at least one surfactant; wherein the composition is stable in the presence of a fertilizer.

10 An embodiment of the present subject matter relates to a composition for use with a fertilizer comprising (a) at least one insecticide; (b) a cellulose polymer; and (c) at least one surfactant; wherein the composition is stable in the presence of a fertilizer.

DETAILED DESCRIPTION OF THE PRESENT SUBJECT MATTER

Definitions

15 All technical and scientific terms used herein have the same meanings as commonly understood by someone ordinarily skilled in the art to which the present subject matter belongs. The following definitions are provided for clarity.

20 As used herein, the term "insecticide" broadly refers to compounds or compositions that are used as acaricides, insecticides, insecticide synergists, ixodocides, nematocides, and molluscicides. For chemical classes and applications, as well as specific compounds of each class, see "The Pesticide Manual Thirteenth Edition" (British Crop Protection Council, Hampshire, UK, 2003), as well as "The e-Pesticide Manual, Version 3" (British Crop Protection Council, Hampshire, UK, 2003-04), the contents of each of which are incorporated herein by reference in their entirety.

25 The term "plants" as used herein includes seeds, seedlings, saplings, roots, tubers, stems, stalks, foliage and fruits.

The term "a" or "an" as used herein includes the singular and the plural, *unless specifically stated* otherwise. Therefore, the terms "a," "an" or "at least one" can be used interchangeably in this application.

30 Throughout the application, descriptions of various embodiments use the term "comprising"; however, it will be understood by one of skill in the art, that in some specific instances, an embodiment can alternatively be described using the language

“consisting essentially of” or “consisting of.”

For purposes of better understanding the present teachings and in no way limiting the scope of the teachings, unless otherwise indicated, all numbers expressing quantities, percentages or proportions, and other numerical values used in the specification and claims, are to be understood as being modified in all instances by the term “about.” Accordingly, unless indicated to the contrary, the numerical parameters set forth in the following specification and attached claims are approximations that may vary depending upon the desired properties sought to be obtained. At the very least, each numerical parameter should at least be construed in light of the number of reported significant digits and by applying ordinary rounding techniques.

Pesticidal Agricultural Concentrates

The present subject matter relates to pesticidal agricultural concentrates that exhibit good chemical and physical stability in normal storage conditions and also show good compatibility in a mixture with fertilizers. Suitable agrochemically active compounds used according to this purpose include insecticides.

In a further embodiment, the pesticidal agricultural concentrate or composition discussed herein is an agrochemical composition comprising an insecticide; cellulose polymer; and at least one surfactant. These formulations have the advantage that the compatibility agent is already built in. No calculation is required to obtain a correct ratio of compatibility agent versus active pesticidal composition.

More specifically, non-limiting chemical classes of insecticides useful herein include 2-dimethyl-aminopropane-1, 3-dithiol, 2-dimethylaminopropane-1, 3-dithiol analogs, amidines, arylpyrroles, avermectins, benzoylureas, carbamates, carbamoyl-triazoles, cyclodienes, diacylhydrazines, dinitrophenols, fiprole, METI, neonicotinoids, non-ester pyrethroids, organochlorines, organophosphates, oxadiazines, oximes, carbamates, pyrethroids, and spinosyns.

In one embodiment, the agrochemically active compounds used herein are pyrethroids which can be selected from the group consisting of bifenthrin, zeta-cypermethrin, beta-cypermethrin, cypermethrin, deltamethrin, permethrin, lambda-cyhalothrin, gamma-cyhalothrin, tralomethrin, cyfluthrin, beta-cyfluthrin, esfenvalerate, fluvalinate, tau-fluvalinate, natural pyrethrum, and combinations thereof. In a specific

embodiment, the pyrethroid is bifenthrin.

Suitable non-limiting examples of cellulose polymers used in the present subject matter include cellulose ethers, such as hydroxyethyl cellulose, hydroxypropyl cellulose, methyl cellulose, carboxymethyl cellulose, sodium carboxymethylcellulose, methylhydroxyethylcellulose, methylhydroxypropylcellulose, hydroxypropylmethyl cellulose, hydroxyethylcarboxymethylcellulose, carboxymethylcellulose, carboxymethylhydroxyethylcellulose, and mixtures thereof.

Suitable classes of surfactants useful herein include, but are not limited to, anionic surfactants such as alkali metal fatty acid salts, including alkali metal oleates and stearates; alkali metal lauryl sulfates; alkali metal salts of diisooctyl sulfosuccinate; alkyl aryl sulfates or sulfonates, lignosulfonates, alkali metal alkylbenzene sulfonates such as dodecylbenzene sulfonate, alkali metal soaps, oil-soluble salts of alkyl aryl sulfonic acids, oil soluble salts of sulfated polyglycol ethers, salts of the ethers of sulfosuccinic acid, and half esters thereof with nonionic surfactants and appropriate salts of phosphated polyglycol ethers; cationic surfactants such as long chain alkyl quaternary ammonium surfactants including cetyl trimethyl ammonium bromide, as well as fatty amines; nonionic surfactants such as polyalkyleneoxide siloxanes, ethoxylated derivatives of fatty alcohols, alkyl glucosides, alkyl phenols, polyalkylene glycol ethers and condensation products of alkyl phenols, amines, fatty acids, fatty esters, mono-, di-, or triglycerides, various block copolymeric surfactants derived from alkylene oxides such as ethylene oxide/propylene oxide, aliphatic amines or fatty acids with ethylene oxides and/or propylene oxides such as the ethoxylated alkyl phenols or ethoxylated aryl or polyaryl phenols, carboxylic esters solubilized with a polyol or polyvinyl alcohol/polyvinyl acetate copolymers, polyvinyl alcohol, polyvinyl pyrrolidinones and acrylic acid graft copolymers and mixtures, reaction products, and/or copolymers thereof.

In one embodiment, the surfactant which is contained in the composition comprises at least one anionic surfactant. In another embodiment, the surfactant may further comprise at least one non-ionic surfactant.

In a specific embodiment, the surfactant component is selected from alkylaryl sulfonates and alkyl polyglycosides and/or at least one dispersing agent such as those selected from acrylic graft polymers, polyalkylene siloxane, and mixtures thereof.

Optionally, the composition may also further comprise formulation auxiliaries suitable for the formulation of agrochemicals, such as additional surfactants, antifoaming agents, anti-freezing agents, stabilizers, preservatives and/or antioxidants. Suitable stabilizers are, for example carboxylic acids (citric acid, acetic acid, dodecylbenzensulfonic acid), orthophosphoric acid dodecylbenzensulfonic acid and suitable salts thereof. Suitable antioxidants are for example as butylhydroxytoluene. Suitable preservatives are for example 1,2-benzisothiazolin-3-one and/or 2-methyl-2H-isothiazol-3-one or sodium benzoate or benzoic acid. Suitable antifreeze agents are for example glycerine, ethylene glycol, hexyleneglycol and propylene glycol. Suitable antifoaming agents are for example antifoaming agents based on modified silicon, for example polydimethylsiloxanes.

Fertilizers that are compatible with the present composition are generally measured by a nitrogen-phosphorous-potassium index providing the amounts of each ingredient as a weight- weight percentage of each major component. In this regard, nitrogen content is generally from 1 to 40%; phosphorous content is generally from 0 to 55%, and potassium content is generally from 0 to 15%. Such fertilizers are known to those of ordinary skill in the art. The present composition is also substantially compatible with micronutrient compositions containing such elements as boron, cobalt, copper, iron, magnesium, molybdenum, potassium, sodium, sulfur and zinc ions.

In an embodiment, the amount of insecticide in the composition may be about 0.1-99 wt. %, about 0.1-95 wt. %, or about 0.1-90 wt. %, based on the total weight of the composition. In a specific embodiment, the pyrethroid is preferably present in a concentration of from about 1.0% by weight to about 25% by weight, more particularly, from about 15% by weight to about 25% by weight based upon the total weight of the composition.

In an embodiment, the amount of cellulose polymer present in the composition may be between about 0.01% to about 10% by weight, based on the total weight of the composition. In an another specific embodiment, the amount of cellulose polymer present in the composition may be between about 0.05 to about 5% based on the total weight of the composition. In a further embodiment, the amount of cellulose polymer present in the composition may be between about 0.05 to about 3% based on the total weight of the composition. In an even further embodiment, the amount of cellulose

polymer present in the composition may be between about 0.07 to about 2% based on the total weight of the composition.

In an embodiment, the amount of surfactant/s present in the composition may be between about 1 to about 20% by weight, based on the total weight of the composition.

5 In a further embodiment, the amount of surfactant/s present in the composition may be between about 4 to about 10% by weight, based on the total weight of the composition.

In another embodiment, the composition is a dispersion (e.g. emulsion or suspension, or suspoemulsion), preferably a suspension. More preferably, the agrochemical composition is an aqueous dispersion, such as an aqueous suspension
10 (SC). The pesticide may be present in any form, such as solid, liquid or dissolved. Preferably the pesticide is present in solid form, more preferably in the form of solid particles, which are suspended in the composition.

The agricultural compositions herein may be mixed with water and/or fertilizers and may be applied preemergence and/or postemergence to a desired locus by any
15 means, such as airplane spray tanks, knapsack spray tanks, cattle dipping vats, farm equipment used in ground spraying (e.g., boom sprayers, hand sprayers), and the like. The desired locus may be soil, plants, and the like.

Methods of Use

20 The compositions and fertilizer mixtures herein are suitable for the control of insects that are encountered in horticulture, agriculture, and forestry. The compositions and fertilizer mixtures herein are active against normally sensitive and resistant species (i.e. pests) and during all or individual stages of development. The above-mentioned pests include the following: From the order of *Siphonaptera*, for example,
25 *Ctenocephalides felis*, *Ctenocephalides canis*, *Pulex irritans*, *Spilopsyllus cuniculi*, *Tunga penetrans*, and *Xenopsylla cheopis*. From the order of *Acari*, for example, *Rhipicephalus sanguineus*, *Ixodes pacificus*, *Ixodes scapularis*, *Amblyomma americanum*, *Amblyomma maculatum*, *Dermatocentor andersoni*, *Dermatocentor variabilis*, *Haemaphysalis chordeilis*, and *Boophilus annulatus*. From the order of
30 *Isopoda*, for example, *Oniscus asellus*, *Armadillidium vulgare* and *Porecellio scaber*. From the order of *Diplopoda*, for example, *Blaniulus guttulatus*. From the order of *Chilopoda*, for example, *Geophiluscarpophagus* and *Scutigera spec.* From the order of

Thysanura, for example, *Lepisma saccharina*. From the order of *Collembola*, for example, *Onychiurus armatus*. From the order of *Orthoptera*, for example, *Scapteriscus* spp. such as *Scapteriscus abbreviatus*, *Scapteriscus acletus*, *Scapteriscus borelii*, *Scapteriscus didactylus*, and *Scapteriscus vicinus*, *Neocurtilla hexadactyla*, *Blatta*
 5 *orientalis*, *Periplaneta americana*, *Leucophaea maderae*, *Blattella germanica*, *Acheta domesticus*, *Gryllotalpa* spp., *Locusta migratoria migratorioides*, *Melanoplus differentialis* and *Schistocerca gregaria*. From the order of *Dermaptera*, for example, *Forficula auricularia*. From the order of *Isoptera*, for example *Reticulitermes* spp. From the order of *Mallophaga*, for example, *Trichodectes* spp. and *Damalinae* spp. From the
 10 order of *Thysanoptera*, for example, *Hercinothrips femoralis* and *Thrips tabaci*. From the order of *Heteroptera*, for example, *Eurygaster* spp., *Dysdercus intermedius*, *Piesma quadrata*, *Cimex lectularius*, *Rhodnius prolixus* and *Triatoma* spp. From the order of *Homoptera*, for example, *Aleurodes brassicae*, *Bemisia tabaci*, *Trialeurodes vaporariorum*, *Aphis gossypii*, *Brevicoryne brassicae*, *Cryptomyzus ribis*, *Aphis fabae*,
 15 *Doralispomi*, *Eriosoma lanigerum*, *Hyalopterus arundinis*, *Macrosiphum avenae*, *Myzus* spp., *Phorodon humuli*, *Rhopalosiphum padi*, *Empoasca* spp., *Euscelis bilobatus*, *Nephotettix cincticeps*, *Lecanium corni*, *Saissetia oleae*, *Laodelphax striatellus*, *Nilaparvata lugens*, *Aonidiella aurantii*, *Aspidiotus hederae*, *Pseudococcus* spp. and *Psylla* spp. From the order of *Lepidoptera*, for example, *Pectinophora gossypiella*,
 20 *Bupalus piniarius*, *Cheimatobia brumata*, *Lithocolletis blancardella*, *Hyponomeuta padella*, *Plutellamaculipennis*, *malacosoma neustria*, *Euproctis chrysorrhoea*, *Lymantria* spp., *Bucculatrix thurberiella*, *Phyllocnistis citrella*, *Agrotis* spp., *Spodoptera exigua*, *Mamestra brassicae*, *Panolis flammea*, *Prodenia litura*, *Spodoptera* spp., *Trichoplusiani*, *Carpocapsa pomonella*, *Pieris* spp., *Chilo* spp., *Pyrausta nubilalis*,
 25 *Ephestia kuehniella*, *Galleria mellonella*, *Tineola bisselliella*, *Tinea pellionella*, *Hofmannophila pseudospretella*, *Cacoecia podana*, *Capua reticulana*, *Choristoneura fumiferana*, *Clysiaambiguella*, *Homona magnanima* and *Tortrix viridana*. From the order of *Coleoptera*, for example, *Anobium punctatum*, *Rhizopertha dominica*, *Acanthoscelides obtectus*, *Acanthoscelides obtectus*, *Hylotrupes bajulus*, *Agelastica*
 30 *alni*, *Leptinotarsadecemlineata*, *Phaedon cochleariae*, *Diabrotica* spp., *Psylliodes chrysocephala*, *Epilachna varivestis*, *Atomaria* spp., *Oryzaephilus surinamensis*, *Anthonomus* spp., *Sitophilus* spp., *Otiorrhynchus sulcatus*, *Cosmopolites sordidus*,

Ceuthorrhynchus assimilis, *Hypera postica*, *Dermestes* spp., *Trogoderma* spp., *Anthrenus* spp., *Attagenus* spp., *Lyctus* spp., *Meligethes aeneus*, *Ptinus* spp., *Niptus hololeucus*, *Gibbium psylloides*, *Tribolium* spp., *Tenebrio molitor*, *Agriotes* spp., *Conoderus* spp., *Melolontha melolontha*, *Amphimallon soistitialis* and *Costelytra* 5 *zealandica*. From the order of *Hymenoptera*, for example, *Diprion* spp., *Hoplocampa* spp., *Lasius* spp., *Monomorium pharaonis* and *Vespa* spp. From the order of *Diptera*, for example, *Aedes* spp., *Anopheles* spp., *Culex* spp., *Drosophila melanogaster*, *Musca* spp., *Fannia* spp., *Calliphora erythrocephala*, *Lucilia* spp., *Chrysomyia* spp., *Cuterebra* spp., *Gastrophilus* spp., *Hyppobosca* spp., *Stomoxys* spp., *Oestrus* spp., *Hypoderma* 10 spp., *Tanaus* spp., *Tannia* spp., *Bibiohortulanus*, *Oscinella frit*, *Phorbia* spp., *Pegomyia hyoscyami*, *Ceratitis capitata*, *Dacus oleae* and *Tipula paludosa*.

According to some embodiments, the composition of the present subject matter may be applied in conjunction with one or more co-insecticides to control a wider variety of insects. When used in conjunction with co- insecticides, the composition can 15 be formulated with the co- insecticide, tank mixed with the co- insecticide or applied sequentially with the co- insecticide. Some of the co- insecticides that can be employed in conjunction with the composition include but are not limited to acetamiprid, imidacloprid, thiamethoxam, chlorpyrifos, novaluron, pyriproxyfen, abamectin, emamectin benzoate.

20 **EXAMPLES**

Example 1

Preparation of HEC solutions (Natrosol 250 HHBR 1.5%)

An amount of 0.75 grams of Natrosol 250 HHBR was gradually added to 49.25 grams of soft water under continuous mixing and heated to 70°C. Then the resulting 25 mixture was agitated until the dispersion is homogenous. After that the resulting homogenous dispersion was cooled to room temperature under continuous mixing.

Preparation of Composition 1

An amount of 1.1 grams of Silwet L-77, 27.0 grams of Atlox 4913, 16.0 grams 30 of Triton CG-50, 1.0 grams of Proxel GXL and 15.0 grams of Rhodorsil 432 was gradually added to 566.8 grams of soft water heated to 35°C and the mixture was

agitated until the dispersion became homogenous.

To this mixture was added 252.4 grams of bifenthrin (98 weight % active ingredient) and the resultant mixture was sheared and then milled in a bead mill at least two times until PSD D90 < 6 m. Then 16.0 grams of Rhodacal 60/BE, 18.0 grams of Rhodorsil 432 and 46.7 grams of previously prepared Natrosol 250 HHBR 1.5% solution was added to the dispersion and mixed until the dispersion is homogenous. After that 100.0 grams of propylene glycol was added to the mixture and sheared to produce the present composition.

10 **Example 2: Compatibility test of Formulation with Fertilizer**

The following example summarized in Table 1 represents stability studies that were performed on Composition 1 prepared in accordance with Example 1 herein. Results were compared with the commercial formulation Capture CFR (FMC).

The compatibility of the formulation with the fertilizers was evaluated by mixing of 9% of the formulation prepared in Example 1 with 91% of fertilizer (at 2% of A.I. in the mixture).

The following commercially available fertilizers were used for the tests: Liquid Ammonium Phosphate 10-34-0 (% N - % P₂O₅ - % K₂O), Liquid Starter 6-24-6 , Optistart, GF blend—WECO, Nutripack-WECO, Till it – IT RZ 07—WECO.

20 The following parameters were tested:

1. Immediate suspension ability, measured in ml of separated phase in 100 ml measuring cylinder (good result is less than 2 ml)
2. Suspension ability after 1 hr., measured in ml of separated phase in 100 ml measuring cylinder (good result is less than 2 ml)
- 25 3. Suspension ability after re-suspension in 16 hrs., measured in ml of separated phase in 100 ml measuring cylinder (good result is less than 2 ml)
4. Wet sieve test was measured as amount of solids retained on 50 mesh screen after 10 sec. wash after passing 400 ml of the above indicated mixture through the screen
- 30 5. Foaming was measured as ml of the foam after 1 min. staying of the above mentioned mixture after mixing of 200 ml mixture in 250 ml measuring cylinder

TABLE 1

applied fertilizers	formulation	<u>immediate</u> suspension ability, (ml of separated phase)	<u>1 hr</u> suspension ability, (ml of separated phase)	suspension ability after re-suspension after 16 hrs., (ml of separated phase)	amount of solids retained on 50 mesh screen, after 10 sec. wash with water	Foaming after re- suspension after 16 hrs.
Liquid Ammonium Phosphate 10-34-0	CAPTURE CFR	1	1	0	< 0.01%	50 ml
	Example 1	0	0	0	< 0.01%	10 ml
Liquid Starter 6-24-6	CAPTURE CFR	1	< 2	0	< 0.01%	50 ml
	Example 1	0	1	0	0	10 ml
Optistart 9-18-6-2S-0.5Zn-0.05Mn	CAPTURE CFR	0	< 2	0	< 0.01%	45 ml
	Example 1	0	< 2	0	0	20 ml
GF blend- WECO	CAPTURE CFR	1	0	1	0	50 ml
	Example 1	0	< 2	0	0	10 ml
Nutripack- WECO	CAPTURE CFR	0	1	0	< 0.1%	40 ml
	Example 1	0	1	0	< 0.1%	20 ml
TILL IT RZ- 7 7-17-3	CAPTURE CFR	0	0	0	< 0.01%	50 ml
	Example 1	0	1	0	0	25 ml

5 With the information contained herein, various departures from a precise description of the present subject matter will be readily apparent to those skilled in the art to which the present subject matter pertains, without departing from the spirit and the scope of the below claims. The present subject matter is not to be considered limited in scope to the procedures, properties or components defined, since the preferred

embodiments and other descriptions are intended only to be illustrative of particular aspects of the presently provided subject matter. Indeed, various modifications of the described modes for carrying out the present subject matter which are obvious to those skilled in molecular biology or related fields are intended to be within the scope of the

5 following claims.

What is claimed is:

1. An insecticidal composition compatible with fertilizer comprising:
 - (a) at least one insecticide;
 - (b) a cellulose polymer;
 - (c) at least one surfactant; and
 - (d) at least one agriculturally acceptable carrier,wherein the composition is compatible with fertilizer, in use.
2. The composition of claim 1, wherein the insecticide is a pyrethroid.
3. The composition of claim 1 or 2, wherein the insecticide is selected from the group consisting of bifenthrin, zeta-cypermethrin, beta-cypermethrin, cypermethrin, deltamethrin, permethrin, lambda-cyhalothrin, gamma-cyhalothrin, tralomethrin, cyfluthrin, esfenvalerate, fluvalinate, tau-fluvalinate, natural pyrethrum, beta-cyfluthrin, and a combination thereof.
4. The composition of claim 3, wherein the pyrethroid is bifenthrin.
5. The composition of any one of claims 1 to 4, wherein the pyrethroid is present in a concentration of about 1% to about 25% by weight of the total weight of all components in the composition.
6. The composition of any one of claims 1 to 5, further comprising an insecticidally effective amount of at least one additional insecticide selected from the group consisting of acetamiprid, imidacloprid, thiamethoxam, chlorpyrifos, novaluron, pyriproxyfen, abamectin, emamectin benzoate, and a mixture thereof.
7. The composition of any one of claims 1 to 6, wherein the surfactant is selected from the group consisting of alcohol alkoxylates, acrylic graft copolymers, glucosides, alkylaryl sulfonates, EO/PO block copolymers, polyalkyleneoxide siloxanes, and a mixture thereof.

8. The composition of any one of claims 1 to 7, wherein the at least one surfactant is present in a concentration of about 1% to about 20% by weight of the total weight of all components in the composition.
9. The composition of any one of claims 1 to 8, wherein the cellulose polymer is selected from the group consisting of hydroxyethyl cellulose, hydroxypropyl cellulose, methyl cellulose, carboxymethyl cellulose, sodium carboxymethylcellulose, methylhydroxyethylcellulose, methylhydroxypropylcellulose, hydroxypropylmethyl cellulose, hydroxyethylcarboxymethylcellulose, carboxymethylcellulose, carboxymethylhydroxyethylcellulose, and a mixture thereof.
10. The composition of any one of claims 1 to 9, wherein the cellulose polymer is present in a concentration of about 0.01% to about 10% by weight of the total weight of all components in the composition.
11. The composition of any one of claims 1 to 10, further comprising at least one of an anti-freeze agent, an anti-foam agent and a preservative.
12. A method for controlling unwanted insects comprising applying to an area infested with said insects an effective amount of the composition of any one of claims 1 to 11.
13. The method of claim 12, wherein the composition is applied jointly with a fertilizer.
14. The method of any claim 12 or 13, wherein the composition is applied in-furrow.
15. A fertilizer composition comprising a) an insecticide; b) a cellulose polymer; c) at least one surfactant; and d) a fertilizer.
16. The composition of claim 15, further comprising an agriculturally acceptable carrier.

17. The composition of claim 15 or 16, further comprising an insecticidally effective amount of one or more additional insecticides selected from the group consisting of acetamiprid, imidacloprid, thiamethoxam, chlorpyrifos, novaluron, pyriproxyfen, abamectin, emamectin benzoate, and a mixture thereof.
18. The composition of any one of claims 15 to 17, wherein the at least one surfactant is selected from the group consisting of alcohol alkoxylates, acrylic graft copolymers, glucosides, alkylaryl sulfonates, EO/PO block copolymers, polyalkyleneoxide siloxanes, and a mixture thereof.
19. The composition of any one of claims 15 to 18, wherein the fertilizer is present in a concentration of about 95% to about 99.99% by weight of the total weight of all components in the composition.
20. The composition of any one of claims 15 to 19 further comprising an anti-freeze agent, an anti-foam agent, a preservative or a combination thereof.
21. A method for controlling unwanted insects and providing nutrients to plants, comprising applying to an area infested with said insects and containing said plants an effective amount of the composition of any one of claims 15-20.
22. An insecticidal composition comprising:
 - (a) at least one insecticide;
 - (b) a cellulose polymer; and
 - (c) at least one surfactant;wherein the composition is stable in the presence of a fertilizer.
23. The composition of claim 22, further comprising an agriculturally acceptable carrier.
24. The composition of claim 22 or 23, wherein the insecticide is a pyrethroid.

25. The composition of any one of claims 22 to 24, wherein the insecticide is selected from the group consisting of bifenthrin, zeta-cypermethrin, beta-cypermethrin, cypermethrin, deltamethrin, permethrin, lambda-cyhalothrin, gamma-cyhalothrin, tralomethrin, cyfluthrin, esfenvalerate, fluvalinate, tau-fluvalinate, natural pyrethrum, beta-cyfluthrin, and a combination thereof.
26. The composition of claim 5, wherein the pyrethroid is bifenthrin.
27. The composition of any one of claims 22 to 26, wherein the pyrethroid is present in a concentration of about 1% to about 25% by weight based on the total weight of the composition.
28. The composition of any one of claims 22 to 27, wherein the surfactant is selected from the group consisting of alcohol alkoxylates, acrylic graft copolymers, glucosides, alkylaryl sulfonates, EO/PO block copolymers, polyalkyleneoxide siloxanes, and a mixture thereof.
29. The composition of any one of claims 22 to 28, wherein the at least one surfactant is present in a concentration of about 1% to about 20% by weight based on total weight of the composition.
30. The composition of any one of claims 22 to 29, wherein the cellulose polymer is selected from the group consisting of hydroxyethyl cellulose, hydroxypropyl cellulose, methyl cellulose, carboxymethyl cellulose, sodium carboxymethylcellulose, methylhydroxyethylcellulose, methylhydroxypropylcellulose, hydroxypropylmethyl cellulose, hydroxyethylcarboxymethylcellulose, carboxymethylcellulose, carboxymethylhydroxyethylcellulose, and a mixture thereof.
31. The composition of any one of claims 22 to 30, wherein the cellulose polymer is present in a concentration of about 0.01% to about 10% by weight based on the total weight of the composition.

32. The composition of any one of claims 22 to 31 further comprising at least one of an anti-freeze agent, an anti-foam agent and a preservative.
33. The composition of any one of claims 22 to 32, further comprising an insecticidally effective amount of at least one additional insecticide selected from the group consisting of acetamiprid, imidacloprid, thiamethoxam, chlorpyrifos, novaluron, pyriproxyfen, abamectin, emamectin benzoate, and a mixture thereof.
34. A method for controlling unwanted insects comprising applying to an area infested with said insects an effective amount of the composition comprising (a) at least one insecticide; (b) a cellulose polymer; and (c) at least one surfactant; wherein the composition is stable in the presence of a fertilizer.
35. The method of claim 34, wherein the insecticide is a pyrethroid.
36. The method of claim 34 or 35, wherein the insecticide is selected from the group consisting of bifenthrin, zeta-cypermethrin, beta-cypermethrin, cypermethrin, deltamethrin, permethrin, lambda-cyhalothrin, gamma-cyhalothrin, tralomethrin, cyfluthrin, esfenvalerate, fluvalinate, tau-fluvalinate, natural pyrethrum, beta-cyfluthrin, and a combination thereof.
37. The method of claim 36, wherein the pyrethroid is bifenthrin.
38. The method of any one of claims 34 to 37, wherein the pyrethroid is present in a concentration of about 1% to about 25% by weight based on the total weight of the composition.
39. The method of any one of claims 34 to 38, wherein the surfactant is selected from the group consisting of alcohol alkoxylates, acrylic graft copolymers, glucosides, alkylaryl sulfonates, EO/PO block copolymers, polyalkyleneoxide siloxanes, and a mixture thereof.

40. The method of any one of claims 34 to 39, wherein the at least one surfactant is present in a concentration of about 1% to about 20% by weight based on total weight of the composition.
41. The method of any one of claims 34 to 40, wherein the cellulose polymer is selected from the group consisting of hydroxyethyl cellulose, hydroxypropyl cellulose, methyl cellulose, carboxymethyl cellulose, sodium carboxymethylcellulose, methylhydroxyethylcellulose, methylhydroxypropylcellulose, hydroxypropylmethyl cellulose, hydroxyethylcarboxymethylcellulose, carboxymethylcellulose, carboxymethylhydroxyethylcellulose, and a mixture thereof.
42. The method of any one of claims 34 to 41, wherein the cellulose polymer is present in a concentration of about 0.01% to about 10% by weight based on the total weight of the composition.
43. The method of any one of claims 34 to 42 wherein the composition further comprises at least one of an anti-freeze agent, an anti-foam agent and a preservative.
44. The method of any one of claims 34 to 43, wherein the composition further comprises an agriculturally acceptable carrier.
45. The method of any one of claims 34 to 44, further comprising applying an insecticidally effective amount of at least one additional insecticide selected from the group consisting of acetamiprid, imidacloprid, thiamethoxam, chlorpyrifos, novaluron, pyriproxyfen, abamectin, emamectin benzoate, and a mixture thereof.
46. The method of any one of claims 34 to 45, wherein the composition is applied jointly with a fertilizer.
47. The method of any one of claims 34 to 46, wherein the composition is applied in-furrow.

48. A composition for use with a fertilizer comprising (a) at least one insecticide; (b) a cellulose polymer; and (c) at least one surfactant; wherein the composition is stable in the presence of a fertilizer.
49. The composition of claim 48, further comprising an agriculturally acceptable carrier.
50. The composition of claim 48 or 49, wherein the insecticide is a pyrethroid.
51. The composition of any one of claims 48 to 50, wherein the insecticide is selected from the group consisting of bifenthrin, zeta-cypermethrin, beta-cypermethrin, cypermethrin, deltamethrin, permethrin, lambda-cyhalothrin, gamma-cyhalothrin, tralomethrin, cyfluthrin, esfenvalerate, fluvalinate, tau-fluvalinate, natural pyrethrum, beta-cyfluthrin, and a combination thereof.
52. The composition of claim 51, wherein the pyrethroid is bifenthrin.
53. The composition of any one of claims 48 to 52, wherein the pyrethroid is present in a concentration of about 1% to about 25% by weight based on the total weight of the composition.
54. The composition of any one of claims 48 to 53, wherein the surfactant is selected from the group consisting of alcohol alkoxylates, acrylic graft copolymers, glucosides, alkylaryl sulfonates, EO/PO block copolymers, polyalkyleneoxide siloxanes, and a mixture thereof.
55. The composition of any one of claims 48 to 54, wherein the at least one surfactant is present in a concentration of about 1% to about 20% by weight based on total weight of the composition.
56. The composition of any one of claims 48 to 55, wherein the cellulose polymer is selected from the group consisting of hydroxyethyl cellulose, hydroxypropyl cellulose, methyl cellulose, carboxymethyl cellulose, sodium

carboxymethylcellulose, methylhydroxyethylcellulose,
methylhydroxypropylcellulose, hydroxypropylmethyl cellulose,
hydroxyethylcarboxymethylcellulose, carboxymethylcellulose,
carboxymethylhydroxyethylcellulose, and a mixture thereof.

57. The composition of any one of claims 48 to 56, wherein the cellulose polymer is present in a concentration of about 0.01% to about 10% by weight based on the total weight of the composition.
58. The composition of any one of claims 48 to 57, further comprising an insecticidally effective amount of at least one additional insecticide selected from the group consisting of acetamiprid, imidacloprid, thiamethoxam, chlorpyrifos, novaluron, pyriproxyfen, abamectin, emamectin benzoate, and a mixture thereof.
59. The composition of any one of claims 48 to 58 further comprising at least one of an anti-freeze agent, an anti-foam agent and a preservative.

INTERNATIONAL SEARCH REPORT

International application No
PCT/IL2014/050665

A. CLASSIFICATION OF SUBJECT MATTER		
INV.	A01N53/00	A01P7/04
	A01N43/40	
		A01N47/40
		A01N57/16
		A01N47/34
ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
A01N		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
EPO-Internal, CHEM ABS Data, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2013/041975 A2 (VIVE CROP PROT INC [CA]; NORTON DANIELLE [CA]; LOUKINE NIKOLAI [CA]; G) 28 March 2013 (2013-03-28) claims 1, 39, 44, 71, 77, 91, 111 page 28 - page 30 page 41, line 6 - page 42, line 15 page 5, lines 12-22, 27-28 page 22, line 27 - page 23, line 3 page 2, lines 12-19 page 4, lines 7-21 page 68, line 25 ----- -/-	1-59
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "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
16 September 2014		26/09/2014
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Davies, Maxwell

INTERNATIONAL SEARCH REPORT

International application No

PCT/IL2014/050665

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2006/128655 A2 (SYNGENTA PARTICIPATIONS AG [CH]; WEISS MARTIN [CH]; BRANDL FRANZ [CH]) 7 December 2006 (2006-12-07) Suspension concentrate (b); page 19 claim 1 -----	1,2,6, 8-12, 22-24, 30-35, 40-45, 48-50, 55-59

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IL2014/050665

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WO 2013041975 A2	28-03-2013	AU 2012311247 A1 CN 104039140 A EP 2747556 A2 US 2014187424 A1 WO 2013041975 A2	13-03-2014 10-09-2014 02-07-2014 03-07-2014 28-03-2013
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