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SUPERINDUSTRIA Y COMERCIO
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Señores

**SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISION DE NUEVAS CREACIONES**

E. S. D.

REF: *PHARMACIA CORPORATION y CROMPTON CORPORATION*
Expediente No.00 067.893 - Solicitud de Patente

Titulada: *SUSPENSIÓN PLAGUICIDA CONCENTRADA ESTABLE*

RAMIRO CASTRO DUQUE, vecino de Bogotá, portador de la tarjeta profesional No. 1003, obrando como apoderado de las sociedades, *PHARMACIA CORPORATION y CROMPTON CORPORATION*, según lo acreditan los documentos de poder presentados en esa División, me permito anexar al presente escrito los siguientes documentos:

1. Documento de cesión de derechos sobre la invención, conferido por el solicitante, debidamente apostillado.
2. Copias certificadas por la Oficina de Patentes de Estados Unidos de las tres primeras solicitudes presentadas para la misma invención, de las cuales REIVINDICAMOS PRIORIDAD, junto con sus correspondientes traducciones del inglés al castellano.

Del señor Jefe atentamente,



RAMIRO CASTRO DUQUE

C.C. No. 170.322 de Bogotá

Código 340

Cra 7a. No. 16-56 Piso 9

Bogotá, Junio 13, 2001

CPB/hsr.

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THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

November 22, 2000

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE UNDER 35 USC 111.

APPLICATION NUMBER: 09/393,642

FILING DATE: September 10, 1999



By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS

N. Woodson
N. WOODSON
Certifying Officer

Express Mail Label No.: EL440580803US

**NEW UTILITY PATENT APPLICATION
TRANSMITTAL
(Large Entity)**

(Only for new nonprovisional applications under 37 C.F.R. 1.53(b))

Docket No. W32.2-8407

Total Pages in this Submission
(including checks and postcard)
31

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 C.F.R. 1.53(b) is a new utility patent application for an invention entitled:

and invented by:

If a CONTINUATION APPLICATION, check appropriate box and supply the requisite information:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: __

Enclosed (in addition to the 4 pages of this transmittal) are:

4 pages

Application Elements

1. ☒ Filing fee as calculated below:

a. ☒ filing fee is NOT ENCLOSED - fee will be paid at the time of responding to the Notice of Missing Parts - DO NOT CHARGE DEPOSIT ACCOUNT

b. ☐ a check in the amount of \$_____ to cover the filing fee is enclosed. ____ pages

c. ☐ charge to Deposit Account as authorized at Item 2(a) on next page.

FEE CALCULATION AND CLAIMS

For	No. Filed	No. Allowed	No. Extra	Rate	Fee
Total Claims	23	- 20 =	3	x \$18.00	\$ 54.00
Indep. Claims	2	- 3 =	0	x \$78.00	\$ 0.00
BASIC FEE					\$760.00
TOTAL FILING FEE					\$814.00

continued on next page.....

NEW UTILITY PATENT APPLICATION TRANSMITTAL (Large Entity) <i>(Only for new nonprovisional applications under 37 C.F.R. 1.53(b))</i>	Docket No. W32.2-8407
	Total Pages in this Submission <i>(including checks and postcard)</i> 31

2. The Commissioner is hereby authorized to charge and credit Deposit Account No. 22-0350 as described below. A duplicate copy of this sheet is enclosed.

- a. ☐ Charge the amount of \$____ as filing fee.
- b. ☐ Credit any overpayment.
- c. ☐ Charge any additional filing fees required under 37 C.F.R. 1.16 and 1.17.
- d. ☐ Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).

3. ☒ Specification having 22 pages and including the following: 22 pages

- a. ☒ Application Cover Sheet - 1 page
- b. ☒ Descriptive Title of the Invention -
- c. ☐ Cross References to Related Applications *(if applicable)*
- d. ☐ Statement Regarding Federally-sponsored Research/Development *(if applicable)*
- e. ☐ Reference to Microfiche Appendix *(if applicable)*
- f. ☒ Background of the Invention
- g. ☒ Brief Summary of the Invention
- h. ☐ Brief Description of the Drawings *(if applicable)*
- i. ☒ Detailed Description
- j. ☒ Claim(s) as Classified Below - 4 pages
- k. ☒ Abstract of the Disclosure - 1 page

4. ☐ Drawing(s) *(when necessary as prescribed by 35 U.S.C. 113)* ____ sheets ____ pages

5. ☒ Oath or Declaration - 3 pages

- a. ☐ Newly executed *(original or copy)* ☒ Unexecuted
- b. ☐ Copy from a prior application (37 C.F.R. 1.63(d)) *(for continuation/divisional application only)*

6. ☐ Separate Power of Attorney ____ pages

- ☐ 37 C.F.R. 3.73(B) Statement *(when there is an assignee and power of attorney is from assignee)*. It is hereby certified that the undersigned has authority to make this certification and has reviewed all the documents in the chain of title of the patent application identified herein and, to the best of undersigned's knowledge and belief, title is in the assignee identified in the accompanying Power of Attorney.

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NEW UTILITY PATENT APPLICATION TRANSMITTAL (Large Entity) <i>(Only for new nonprovisional applications under 37 C.F.R. 1.53(b))</i>	Docket No. W32.2-8407
	Total Pages in this Submission <i>(including checks and postcard)</i> 31

☐ Power of Attorney filed in parent application.

7. ☐ Incorporation by Reference *(usable if Box 5b is checked)*

The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 5b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

8. ☐ Computer Program in Microfiche *(Appendix)*

___ pages

9. ☐ Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all must be included)

___ pages

a. ☐ Paper Copy

b. ☐ Computer Readable Copy *(identical to computer copy)*

c. ☐ Statement Verifying Identical Paper and Computer Readable Copy

Accompanying Application Parts

10. ☐ Assignment Papers:

___ pages

a. ☐ Assignment Recordation Cover Sheet (Form PTO 1595)

b. ☐ Assignment

c. ☐ A check in the amount of \$___ to cover the Recordal Fee

d. ☐ Previously recorded on ___, Reel *, Frame *

11. ☐ English Translation Document *(if applicable)*

___ pages

12. ☐ Information Disclosure Statement:

___ pages

a. ☐ PTO Form 1449 b. ☐ Copies of IDS Citations

13. ☐ Preliminary Amendment

___ pages

14. ☒ Acknowledgement Postcard

1 page

15. ☒ Form of Mailing - Express Mail *(Specify Label No.):* EL440580803US

16. ☐ Certified Copy of Priority Document(s) *(if foreign priority is claimed)*

___ pages

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NEW UTILITY PATENT APPLICATION TRANSMITTAL (Large Entity) <i>(Only for new nonprovisional applications under 37 C.F.R. 1.53(b))</i>	Docket No. W32.2-8407
	Total Pages in this Submission <i>(including checks and postcard)</i> 31

17. ☒ Additional Enclosures *(please identify below)*:

1 pages

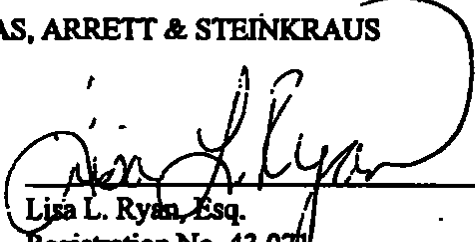
- ☒ Constructive Petition for Extension of Time and Fee Authorization Pursuant to 37 C.F.R. §1.136(a)(3) - 1 page

☐ _____

Respectfully submitted,

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DOCKET NO. W32.2-8407

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
APPLICATION FOR UNITED STATES LETTERS PATENT**

INVENTOR(S): Shawn Zhu, Shannon Snyder, Alan Stern

TITLE: STABLE CONCENTRATED PESTICIDAL SUSPENSION

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emulsifiers are therefore also typically added to the suspension concentrates to improve the dispersibility in water.

Oil-based concentrates are particularly troublesome and require an emulsifier that is capable of dispersing the oil without forming gels or lumps, and to distribute the pesticide in the aqueous phase. Again, this emulsification must take place quickly, without complications.

A further issue is that some of the highly popular, and most effective herbicidal agents especially useful for controlling undesirable plant species postemergence including N-phosphonomethylglycine (glyphosate) and 2-(4-isopropyl-4-methyl-5-oxo-2-imidazolin-2-yl)nicotinic acid (imazapyr), are zwitterionic in nature and are generally relatively insoluble in both aqueous and non-aqueous media. These types of herbicidal agents are therefore routinely supplied as salts in order to dissolve them in an aqueous carrier. Alternatively, these agents can be suspended in a non-aqueous carrier.

U.S. Pat. No. 5,397,766 to Dexter issued March 14, 1995 describes an emulsifiable suspension concentrate composition of the free acids of such herbicidal agents as N-phosphonomethylglycine and 2-(imidazolin-2-yl)pyridine carboxylic acids, without the pre-formulation of the corresponding herbicidal salt. This is accomplished using a water immiscible, non-paraffinic heavy aromatic solvent consisting of a mixture of hydrocarbons. The liquid solvent also contains an anionic surfactant and a nonionic surfactant and optionally an antifoam agent and a suspending or thickening agent. The undesirability of solvents is apparent for obvious reasons including flammability, and potential phytotoxicity.

Aqueous based carrier fluids are more desirable than either oil based carrier fluids or solvent based carrier fluids for use in pesticide suspension concentrates. However, as discussed above, some of the most effective pesticidal agents are not soluble in aqueous fluids. Also, inactive carrier fluids, whether aqueous, oil or solvent, reduce the concentration of active ingredients in the suspension concentrate.

There remains a need in the industry to supply pesticide suspension concentrates which use a liquid pesticide carrier to suspend solid pesticides, have a high concentration of active ingredients, are free from unnecessary carrier fluids, and yet are

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easily emulsified, have good storage stability and emulsion performance, and are easy to use. The compositions of the present invention further eliminate the need for formulation of two different products using two different pesticides.

5 SUMMARY OF THE INVENTION

The present invention relates to a pesticide suspension concentrate comprising at least one solid pesticide agent suspended in at least one liquid pesticide carrier. The concentrate further comprises at least one surfactant and at least one suspension aid. The suspension concentrate of the present invention has a relatively high
10 concentration of active ingredients of greater than about 40% by weight of the composition, preferably greater than about 50% by weight of the composition, even more preferably greater than about 60% by weight of the composition, and most preferably greater than about 65% by weight of the composition.

Use of the liquid pesticide as a carrier eliminates the need for water, oil or
15 solvent, thereby reducing the amount of inactive ingredients in the concentrate. Further more, combining two different pesticides in one formulation eliminates the need to separately formulate two different products.

DETAILED DESCRIPTIONS OF THE PREFERRED EMBODIMENTS

20 A pesticide is a chemical which, when applied, kills or inhibits the growth of plants, insects, and/or microorganisms. The definition of a particular chemical pesticide may differ depending on how it is classified by the Environmental Protection Agency where the chemical is being used. In the United States, pesticides are registered by the EPA as pest control chemicals.

25 Depending on the choice of solid and liquid pesticides, both pre- and post-emergence activity on a large range of broadleaf and grassy weeds may be achieved, as well as controlling insects and fungus. Pesticide is a general term which includes in its definition herbicides, insecticides, fungicides, plant and insect growth regulators, and hereinafter when used may include each of the various types of pest control chemicals.

30 In the present invention, at least one solid pesticide is suspended in at least one liquid pesticide carrier. The composition may be any combination of liquid and

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solid pesticides providing there is at least one liquid and at least one solid component. The liquid pesticide operates as the carrier for the solid pesticide, replacing the need for an aqueous or non-aqueous carrier liquid which is otherwise an inactive ingredient.

Broadly, the solid pesticide useful herein, whether herbicide, insecticide, or fungicide, include those pesticides having a melting point of greater than about 60° C. Preferably, the solid will have a solubility of about 10% by weight or less in the liquid pesticide, more preferably about 5% or less, and most preferably about 1% or less. It is acceptable that the liquid pesticide solubilizes a small amount of solid pesticide but this is preferably kept to a minimum. It is desirable that the liquid pesticide suspends the solid without forming a solution.

One may select the appropriate liquid and solid pairs such that the solid does not dissolve in the liquid by ensuring that the solubility parameters of the liquid and solid are dissimilar. Generally speaking, a solid from the same chemical family as the liquid, will have high solubility in the liquid. In general, it is therefore better to select a solid pesticide which is from a different chemical family than the liquid pesticide. Solubility parameters may be calculated or determined by experimentation as is known in the art. The necessary difference between solubility parameters may be determined by the use of Flory-temperature which is the temperature at which the solid-solvent system has no interaction. When room temperature is much less than the Flory temperature, the solid will not be soluble in the liquid. For further discussion regarding this methodology, see Krevelene, Properties of Polymer. Correlations with Chemical Structures, and Barton, Handbook of Solubility Parameters and Other Cohesion Parameters, both of which are incorporated herein by reference. Generally, a difference of 5 MPa^{1/2} will result in the solid being insoluble in the liquid.

After a pair has been selected, it is desirable to confirm the solubility by experimental means.

Broadly, the liquid pesticides preferably have a melting point of less than about 15° C.

The liquid active ingredients for the purposes of the present invention and referred to herein, do not include solvents which have also at times been categorized as being pesticidally active compounds. Such solvents include paraffinics; oils including

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animal, mineral, vegetable, silicone, and so forth; fatty acids, esters, and amides of fatty acids; alkanes; ketones; alcohols; glycols; alkyl/aryl alkoxylates; diols; acetates; and so forth.

The liquid herbicides useful herein include but are not limited to

- 5 chloroacetamides (dimethanamid) or chloroacetanilides such as 2'-ethyl-6'-methyl-N-(ethoxymethyl)-2-chloroacetylanilide (acetochlor), 2',6'-diethyl-N-propoxyethyl-2-chloroacetanilide (pretilachlor), 2-ethyl-6-methyl-N-(1'-methyl-2'-methoxyethyl) chloroacetylanilide (metachlor), N-Butoxy methyl-2'-6'-diethyl-2-chloro acetylanilide (butachlor), and others including alachlor, metolachlor, diethatyl, metazachlor,
- 10 dimethachlor, and preferably acetochlor; dichloroacetamide (dichlormid); butylates; cinmethylin; aryloxyphenoxys including fluazifop (e.g. fluazifop-P aryloxyphenoxy propionate); phenoxys and phenoxy derivatives such as phenoxy esters, phenoxyalkanoic acid, phenoxyacetic acid including 2,4-D ester; thiocarbamates or carbamothioates including butylate, cycloate, molinate, pebulate, thiobencarb, triallate, vernolate, s-ethyl
- 15 dipropyl carbamothioate, s-ethyl diethylcarbamathioate (ethiolate); dietholate; cyclohexanedione or cyclohexanone including sethoxydim or clethodim; dinitroaniline (isopropalin); oximes (fluxofenim); aldehydes (acrolein); and so forth.

Examples of useful solid herbicides include benzoic acids and derivatives of benzoic acid including 3,6-dichloro-o-anisic acid also referred to by various trade or

- 20 other names including naptalam and dicamba sold under various trades or names including BANVEL, BANFEL, BANVEL CST, BANVEL D, BANVEL XG, MEDIBEN, BANEX, and so forth, and imidazoliny benzoic acids and esters and salts thereof; triazines including the methylthio triazines or methylthio-s-triazines subfamilies such as atrazine, metribuzin, cyanazine, simazine, prometron, ametryn, prometryn,
- 25 hexazinone, and so forth; sulfonylureas such as rimsulfuron, metsulfuron, nicosulfuron, trisulfuron, primisulfuron, bensulfuron, chlorimuron, chlorsulfuron, sulfometuron, thifensulfuron, tribenuron, ethametsulfuron, triflusulfuron, clopyrasulfuron, pyrazasulfuron, prosulfuron, halosulfuron, metsulfuron-methyl, halosulfuron-methyl, chlorimuronethyl and thifensulfuron; ureas such as tebuthiuron; glyphosate (N-
- 30 phosphonomethylglycine) acids and salts; phosphorylated amino acid or amino acid derivatives such as glufosinate; imidazolines or imidazolinones such as imazaquin,

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- imazamethabenz, imazapyr, imazethapyr, imazamox and AC 263,222; imines such as CGA-248757; imides including *N*-phenylphthalimide such as Flumichlorac; phenoxys and derivatives of phenoxys including phenoxyalkanoic acid or phenoxy acetic acid such as 2,4-D (2,4-dichlorophenoxy acetic acid), 3,4-DA (3,4-dichlorophenoxy acetic acid), 2,4-DB(4-(2,4-dichlorophenoxy)acetic acid), 3,4-DB (4-(3,4-dichlorophenoxy)butanoic acid), 2,4-DEB (2-(2,4-dichlorophenoxy)ethyl benzoate), 2,4-DEP (tris[2-(2,4-dichlorophenoxy)ethyl] phosphite), MCPA acid (4-chloro-2-methylphenoxy acetic acid), MCPB acid (4-(4-chloro-2-methylphenoxy)butanoic acid) acid, mecoprop, diclofop, difenopenten, and dichlorprop; aryloxyphenoxy propionates such as fenoxaprop,
- 10 haloxyfop and Quizalofop-P; benzothiazoleacetic acids such as benazolin; dimethyl tetrachloroterephthalate (DCPA); amides and derivatives of amides such as pronamide, propanil and napropamide; acetamides such as mefluidide; benzamide such as isoxaben; chloroacetamides or chloroacetanilides such as propachlor, dichloroacetamide such as R-29148; dinitroanilines such as benefin, oryzalin and prodiamine; nitriles including
- 15 benzonitriles and hydroxybenzonitriles such as bromoxynil, ioxynil and dichlobenil; diphenylethers or nitrodiphenylethers such as acifluorfen, bifenox, fluoroglycofen, fomesafen and oxyfluorfen; dithiocarbamates such as metham; organic arsenicals such as cacodylic acid, disodium methanearsonate and MSMA; oximes such as oxabetrinil; carbamates including phenylcarbamates such as desmedipham, phenmedipham and
- 20 asulam; ureas including phenylureas such as fluometuron, linuron, siduron and diuron; pyridazinone such as norflurazon and pyrazon; pyridines such as dithiopyr and thiazopyr; pyridinone such as fluridone; pyridinecarboxylic acid or picolinic acid such as triclopyr, clopyralid and picloram; uracils and substituted uracils such as bromacil and terbacil; oxadiazolidines such as methazole; benzothiadiazole such as bentazon;
- 25 ammonium sulfamate; sodium chlorate; copper sulfate; bipyridiliums such as diquat or paraquat; triazoles such as amitrole; triazolopyrimidine or triazolopyrimidine sulfonanilide such as flumetsulam; maleic hydrazide; morpholine such as benoxacor; oxydiazoles such as oxydiazon; carboxylic acids and dicarboxylic acids such as quinclorac and endothall; phosphonates such as fosamine; and so forth.
- 30 Liquid insecticides useful herein include but are not limited to organophosphates such as fonofos (Dyfonate®), diazinon, malathion, parathion, and so

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forth; piperonyl butoxides; synthetic pyrethroids such as bioresmethrin, resmethrin and zeta-cypermethrin ; a synthetic pyrethrin-type such as allethrin; and so forth.

- Solid insecticides include but are no limited to pyrethrins; carbamates such as aldicarb; synthetic pyrethroids such as bifenthrin, permethrin and tefluthrin;
- 5 organophosphates such as methyl parathion; organophosphates such as acephate and dimethoate; organochlorines such as endosulfan; carbamates such as carbaryl(1-naphthyl N-methylcarbamate) and methomyl (s-methyl N-[methylcarbamoyl]oxy)-thioacetamimide); and so forth.

- Fungicides include categories of aliphatic nitrogen fungicides; inorganic
- 10 fungicides including copper, sulfur and tin containing fungicides; anilides; aromatic fungicides including aromatic nitriles; benzimidazoles and benzimidazole precursors; carbamates; benzimidazole carbamates; chlorophenyls; conazoles; dicarboximides; dinitrophenyls; thiocarbamates and dithiocarbamates; imidazoles; morpholines; organo phosphorous fungicides; guanidines; hydroxyanilides; morpholines; oils, phenylamides;
- 15 phenylsulfamides; phenylureas; pyridines; phthalimides; pyrimidinamines; pyrimidines; pyrimidinols; quinolines; quinones; quinoxalines; thiazoles; stobilurins; triazoles; xylylanines; various unclassified fungicides; and so forth.

- Examples of liquid fungicides useful herein include but are not limited to morpholines such as fenpropidin, fenpropimorph and tridermorph; piperalin; conazoles
- 20 such as flusilazole, propiconazole, tebuconazole, triadimefon, and so forth; pyridines such as pyrifenoxy; thiazoles such as etradiazole; organo phosphorous compounds such as phosdiphen; imidazoles such as pefurazoate; and so forth.

- Solid fungicides useful herein include but are not limited to benzimidazoles such as benomyl; chlorophenyls such as chlorothalonil and PCNB-
- 25 quintozone; inorganics such as sulfur, copper hydroxide, copper oxychloride, mercurous chloride and so forth; aromatic nitriles such as chlorothalonil; carbamates such as carbendazim (methyl-2-benzimidazolecarbamate); phenylamides such as metalaxyl; dithiocarbamates such as captan, mancozeb, maneb, thiram, zineb and so forth; morpholines such as dimethomorph; piperazines such as triforine; strobilurins such as
- 30 azoxystrobin; dicarboximides such as iprodione; conazoles such as diniconazoles; pyrimidines such as fenarimol; and so forth.

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Solid pesticides which are preferable to the present invention include glyphosate acids and salts; triazines; substituted ureas including the phenylureas; sulfonylureas; phenoxys; uracils; benzoic acids and salts, especially dicamba; pyridinecarboxylic acids; pyridines; phenylcarbamates; imidazalinones; and so forth.

- 5 These solid pesticides are preferably used in combination with liquid pesticides from the categories of aryloxyphenoxy propionates; chloroacetamides or chloroacetanilides including acetochlor, butachlor, metolachlor, and so forth; dichloroacetamides; dinitroanilines; oximes; cinmethyline; dietholate; cyclohexanones; carbamates; thiocarbamates or carbamothioates; aldehydes; phenoxys including
- 10 phenoxyalkanoic acids and phenoxy acetic acids; and so forth.

- Preferably, the amount of total pesticide in the suspension concentrate is 40% by weight or greater. Preferably, the amount of total pesticide in the suspension concentrate is between about 40% to about 97% by weight, even more preferably about 50% to about 95%, even more preferably from about 60% to about 90%, and most
- 15 preferably about 65% to about 85%.

 Preferably the weight ratio of total solid pesticide to total liquid pesticide is from about 1:9 to about 2:1.

- When selecting the pesticide ingredients for the concentrates of the present invention, it is also desirable to determine both the physical and the chemical
- 20 compatibility. It is desirable to select a pesticide combination which complements one another. For instance, the following general rules may be utilized as a guideline in the selection of pesticide combinations: (1) fungicides should not be used in combination with herbicides or plant growth inhibitors; (2) broad leaf weed herbicides and growth inhibitors may be used in combination with grass herbicides and growth inhibitors; (3)
- 25 insecticides may be used in combination with herbicides or plant growth inhibitors; and (4) insecticides may be utilized in combination with fungicides.

- A surfactant is preferably used in the concentrates in order to facilitate dispersion and emulsification. Pesticide concentrates typically supplied to the agricultural industry, for instance, as concentrates which are subsequently diluted with
- 30 water before use in order to facilitate spraying the liquid on the field or plants with conventional equipment.

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A suspension aid is preferably utilized in the pesticide concentrates of the present invention to improve the physical stability by maintaining a stable suspension of the solid pesticide in the liquid pesticide. Compositions without suspension aid may show separation into two layers in several days or less.

- 5 The preferred suspension aids useful herein are capable of providing thixotropic or shear thinning characteristics. A preferred thixotropic index of the final pesticide concentrate is 2.5 or greater, and more preferably the thixotropic index is 3.0 or greater at a viscosity ratio of 3 rpms to 30 rpms as measured using a Brookfield Viscometer model LVT DV II and a spindle #4 at room temperature.

- 10 Preferably the suspension aid is a silica, and even more preferably the suspension aid is a hydrophilic fumed or precipitated silica. The silica preferably have a BET surface area of about 100 to about 300 m²/g, more preferably about 120 to about 250 m²/g and most preferably about 150 to about 250 m²/g, and a bulk density of about 10 g/l to about 70 g/l and preferably about 20 g/l to about 50 g/l.

- 15 The suspension aid should be selected so as to have a minimum separation of the products of less than about 2% in two weeks at room temperature, and less than about 5% in 4 weeks at room temperature. If separation should occur, the particles should be easily resuspended by utilizing a minimum of agitation.

- Specific examples of preferred silicas include AEROSIL® 200, an
20 amorphous, hydrophilic fumed silicone dioxide available from Degussa Corp. in Ridgefield Park, NJ, and HI-SIL® T-152, an untreated amorphous precipitated silica available from PPG Industries, Inc. in Monroeville, PA. AEROSIL® 200 has a surface area of 175-225 m²/g and a bulk density of about 30 g/l. HI-SIL® T-152 has a surface area of 150 m²/g, and a bulk density of about 48 g/l.

- 25 Preferably, the silica is used in amounts of about 0.05% to about 5%, more preferably from about 0.2% to about 3%, and most preferably from about 0.5% to about 2%.

- The compositions of the present invention are preferably free from aqueous, non-aqueous and solvent liquid carriers including water, oils, hydrocarbon
30 solvents and water soluble solvents. Such liquids may be present in the composition in relatively small amounts of less than about 10% by weight of the composition without

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substantially affecting the properties of the compositions.

Solvents may be utilized at a concentration of 10 wt-% or less. These solvents are in a liquid state at room temperature. Examples include water, alcohols, aromatic solvents, oils (i.e. mineral oil, vegetable oil, silicone oil, and so forth), lower alkyl esters of vegetable oils, fatty acids, ketones, glycols, polyethylene glycols, diols, paraffinics, and so forth.

It is advantageous to have a relatively solvent-free composition due to the flammability of most solvents.

Further, the elimination of the inactive liquid carrier increases the efficacy of the concentrate due to the increased concentration of the active ingredients.

Preferably, the compositions of the present invention have viscosities of about 500 cPs to about 7000 cPs at 25° C, more preferably from about 1000 cPs to about 5000 cPs at 25° C, and most preferably from about 2000 cPs to about 3000 cPs at 25° C. The viscosity should be low enough to ensure good pumpability and dispersibility prior to dispersion, yet high enough so that the suspension has sufficient stability. Viscosities are measured at ambient temperatures using a Brookfield Viscosity, Model LVT DV II, and a no. 4 spindle.

Suspension aids such as silicas, or standard thickeners typically used in oil based systems such as ATTAGEL 50, may be optionally used to increase the viscosity of the pesticide concentrate.

The suspension concentrates of the present invention are employed in a simple manner by diluting the concentrate with the intended amount of water, stirring the solution for a short time, and applying it to the field or plant. Typically, the concentrates will be diluted in water at ambient temperatures to about a 0.1% to about a 5% solution of pesticide concentrate in water with adequate agitation. It is preferable that the concentrates are easily emulsified in water with agitation kept to a minimum. Once diluted, the solution is then applied to the targeted surface typically by means of spraying, through the use of conventional equipment. Often such solutions are applied to plants or farm fields. In the agricultural industry, pesticide solutions are often sprayed through the use of equipment adapted either for tractors or for airplanes.

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EXAMPLES

Test Methods

5 1. Viscosity

The viscosity was measured using a Brookfield Viscometer Model LVT DV II at 25° C at various rpms using a no. 4 spindle.

2. Product Stability

Product stability was measured at room temperature by visual observation of the product appearance over a 4 week period. The amount of oil on the top of the mixture was measured after 2, 3 and 4 weeks. Suspensions will generally separate into two phases, typically with a clear oily phase on top. A product with less than about 2% of the separated oily phase on the top of the suspension in 2 weeks, or less than about 5% of the separated oily phase on top of the suspension in 4 weeks is considered acceptable and passes. If separation should occur, resuspension should occur with a minimum amount of agitation.

3. Bloom

The bloom (or spontaneity) of the product was rated by visual observation of the ease with which emulsion formation, i.e. formation of the white cloud, occurs after the addition of 5 ml of the product into 95 ml of water having a desired hardness rating, in a cylinder without any agitation. The formation of the white cloud is then observed while inverting the cylinder by hand. The mixture is then rated on its ability to form an emulsion as excellent, good, fair and poor.

4. Emulsion Stability

After bloom observation, the cylinder was inverted ten times and allowed to rest undisturbed. Visual observation of the amount of cream or sediment was conducted at specified time intervals of 30 minutes, 1 hour, 2 hours, and over night. The mixture is then rated excellent, good, fair and poor.

Emulsification spontaneity and emulsion quality were evaluated using ASTM Method E1116-86. The pesticide compositions were rated after conditioning at room temperature overnight. A rating of excellent indicates a composition that exhibited

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Table 1

	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5
	24.1	23.94	24.1	24.1	24.1
5	50.9	50.71	50.9	50.9	50.9
	1.31	1.30	1.31	1.31	1.31
10	11.44	11.37	11.44	11.44	11.44
	2.	1.99	2	2	2
	2	1.99	2	2	2
15	4.6	3.28	4.25	4.75	4.6
	1.75	3.41	2	2.75	1.75
20	1.9	-	2	-	1.9
	-	2	-	0.75	-
25	1800	1700	3500	4360	4960
	<2% oil @ 2 wks	<2% oil @ 2 wks	<5% oil @ 4 wks	<2% oil @ 2 wks	<1% oil @ 3 wks
	fair	fair	fair	fair	fair
	excellent	excellent	excellent	excellent	excellent

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Ingredients 3-8 are surfactants.

Ingredients 9-10 are suspension aids.

As can be seen from the table, the examples exhibited satisfactory bloom and excellent emulsion stability, and satisfactory product stability.

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Example 6

Example 6 was prepared using a high shear homogenizer. The following example was prepared in order to illustrate that a small amount of a solvent can be present in the formula without adversely affecting the properties.

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Table 2

		Function	Form	Example 6	
		Glyphosate (isopropylamine salt)	herbicide	solid	25
5		2,4-Disooctyl ester (phenoxy)	herbicide	liquid	50
		Witconate® 1298HA (sulfonic acid)	surfactant	liquid	7.64
		Alkylamine	surfactant	liquid	1.36
10		2-ethylhexanol	surfactant	liquid	0.55
		Witconol® CO-360 castor oil ethoxylate	surfactant	liquid	2.43
		Witconol® NS500 LQ (EO/PO butanol copolymer)	surfactant	liquid	4.85
15		Witconol® CO-550 castor oil ethoxylate	surfactant	liquid	2.43
		Cyclosol® 150	aromatic hydrocarbon solvent	liquid	4.99
		Aerosil® 200 fumed silicon dioxide	suspension aid	liquid	0.75
20		Viscosity (cPs)	-	-	2910
		Product Stability @ room temp	-	-	stable
		Bloom	-	-	satisfactory
25		Emulsion Stability	-	-	satisfactory

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CLAIMS:

1. A pesticide suspension concentrate composition comprising a solid pesticide suspended in a liquid pesticide carrier.
- 5 2. The pesticide composition of Claim 1 wherein said composition is substantially free of water, oil or solvent.
- 10 3. The pesticide composition of Claim 1 wherein said composition is free of water, oil or solvent carrier fluid.
4. The pesticide composition of Claim 1 wherein said total pesticide concentration is from about 40% to about 97% by weight of the pesticide concentrate.
- 15 5. The pesticide composition of Claim 1 wherein said total pesticide concentration is from about 60% to about 90% by weight of the pesticide concentrate.
6. The pesticide composition of Claim 1 wherein the ratio of said at least one solid pesticide to said at least one liquid pesticide is about 1:9 to about 2:1.
- 20 7. The pesticide composition of Claim 1 further comprising at least one surfactant and at least one suspension aid.
8. The composition of Claim 1 wherein said solid pesticide comprises at least one member selected from the group consisting of glyphosates; triazines; substituted ureas; sulfonylureas; phenoxy; uracils; benzoic acids; pyridinecarboxylic acids; pyridines; carbamates; phenylcarbamates; imidazolines; imidazolinones; and mixtures thereof.
- 25 9. The composition of Claim 8 wherein said solid pesticide is a glyphosate selected from the group consisting of glyphosate acids, glyphosate salts, glyphosate
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derivatives, and mixtures thereof.

10. The composition of Claim 8 wherein said solid pesticide is a triazine selected from the group consisting of atrazine, metribuzin, cyanazine, simazine, prometon, ametryn, prometryn, hexazinone, and mixtures thereof.
11. The composition of Claim 8 wherein said solid pesticide is a benzoic acid selected from the group consisting of dicamba, naptalam, the salts thereof, and mixtures thereof.
12. The composition of Claim 8 wherein said solid pesticide is a phenoxy selected from the group consisting of 2,4-D; 3,4-DA; 2,4-DB; 3,4-DB; 2,4-DEB; 2,4-DEP; MCPA acid; MCPB acid; mecoprop; diclofop; difenopenten; dichlorprop; and mixtures thereof.
13. The composition of Claim 1 wherein said solid pesticide is an insecticide selected from the group consisting of pyrethrin, aldicarb; permethrin; methyl parathion; tefluthrin; dimethoate; methomyl; acephate; endosulfan; bifenthrin; carbaryl; and mixtures thereof.
14. The composition of Claim 1 wherein said solid pesticide is a fungicide selected from the group consisting of benomyl; PCNB-quintozene; captan; sulfur; chlorothalonil; carbendazim; thiram; mancozeb; metalaxyl; maneb; copper hydroxide; copper oxychloride; zineb; dimethomorph; triforine; azoxystrobin; iprodione; diniconazole; fenarimol; and mixtures thereof.
15. The composition of Claim 1 wherein said liquid pesticide is selected from the group consisting of aryloxyphenoxy propionates; chloroacetamides or chloroacetanilides; dichloroacetamides; dinitroanilines; oximes; cinmethyline; dietholate; cyclohexanones; aldehydes, phenoxys, and mixtures thereof.

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16. The composition of Claim 15 wherein said liquid pesticide is a chloroacetamide selected from the group consisting of acetochlor, pretilachlor, metachlor, butachlor, alachlor, metolachlor, diethatyl, metazachlor, dimethachlor, dimethenamid, and mixtures thereof.

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17. The composition of Claim 7 comprising from about 3% to about 60% by weight of at least one surfactant selected from the group consisting of nonionic, anionic, cationic, amphoteric, zwitterionic and polymeric.

- 10 18. The composition of Claim 7 wherein said surfactant is selected from the group consisting of ethylene oxide/propylene oxide copolymers; amine ethoxylates; fatty alcohol alkoxyates; alkyl benzene sulfonates; sorbitol ethoxylates; vegetable oil ethoxylates; and mixtures thereof.

- 15 19. The composition of Claim 7 comprising from about 0.05% to about 5% by weight of at least one suspension aid selected from the group consisting of fumed silicas and precipitated silicas capable of providing thixotropic characteristics to said pesticide composition.

- 20 20. The composition of Claim 7 wherein said suspension aid is a silica having a surface area of about 100 m²/g to about 300 m²/g and a bulk density of about 10 g/l to about 70 g/l.

21. The composition of Claim 7 wherein said suspension aid is a silica having a
25 surface area of about 120 m²/g to about 250 m²/g and a bulk density of about 20 g/l to about 50 g/l.

22. The composition of Claim 7 wherein said composition comprises:

- a) at least one solid herbicide selected from the group consisting of
30 glyphosate acids and glyphosate salts;
b) at least one liquid herbicide carrier;

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- c) about 5% to about 15% by weight of at least one amine ethoxylate;
- d) about 1% to about 10% by weight of at least one polyethylene oxide/polypropylene oxide copolymer;
- e) from about 1% to about 10% by weight of at least one additional nonionic surfactant;
- f) from about 1% to about 5% by weight of at least one sulfonate; and
- g) from about 0.5% to about 5% by weight of at least one silica;

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wherein said herbicides are present at a concentration of about 65% to about 85% by weight of said pesticide composition and said ratio of said solid glyphosate herbicide to said liquid herbicide is about 1:4 to about 1:1.

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23. A pesticide composition, comprising:

- a) at least one solid pesticide;
- b) at least one liquid pesticide carrier;
- c) at least one surfactant; and
- d) at least one suspension aid;

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wherein said composition is free from water, oil and solvent carriers.

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[Signature]

DECLARATION

As a below-named inventor, I(we) hereby declare that:

TYPE OF DECLARATION

This declaration is of the following type:

- ☐ original
- ☐ design
- ☐ supplemental
- ☐ national stage of PCT
- ☐ divisional
- ☐ continuation
- ☐ continuation-in-part (CIP)

INVENTORSHIP DECLARATION

My residence, post office address, and citizenship are as stated below next to my name;

I verily believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

STABLE CONCENTRATED PESTICIDAL SUSPENSION

the specification of which:

- a) ☐ is being filed concurrently herewith
- b) ☐ was filed on _____ and assigned Serial No. _____
- c) ☐ was filed as PCT International Application No. _____ filed on _____ and amended under PCT Article 19 on _____

ACKNOWLEDGMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations §1.56 including information occurring between the filing date of any prior application of which the present application is a continuation-in-part.

- ☐ In compliance with this duty there is attached an Information Disclosure Statement.
37 CFR 1.97.

PRIORITY CLAIM

I hereby claim foreign priority benefits under Title 35, United States Code, §119(a)-(d), of any foreign application(s) for patent or inventor's certificate or of any PCT international applications(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application for patent or inventor's certificate or any PCT international applications(s) designating at least one country other than the United States of America filed by me having the same subject matter having a filing date before that of the application on which priority is claimed.

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- a) ☒ no such applications have been filed.
b) ☐ such applications have been filed as follows:

COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 37 USC 119
			☐ YES ☐ NO
			☐ YES ☐ NO
			☐ YES ☐ NO
			☐ YES ☐ NO

I hereby claim the benefit under Title 35 United States Code, §119(e) of any United States provisional application identified below.

- a) ☒ no such applications have been filed.
b) ☐ such applications have been filed as follows:

U.S. APPLICATIONS	
SERIAL NUMBER	U.S. FILING DATE
1.	
2.	

CLAIM FOR BENEFIT OF EARLIER U.S./PCT APPLICATION(S) UNDER 35 U.S.C. §120

I hereby claim the benefit under Title 35, United States Code, §120 of any United States applications(s) or PCT international applications(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior applications(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior applications(s) and the national or PCT international filing date of this application.

- a) ☒ no such applications have been filed.
b) ☐ such applications have been filed as follows:

U.S. APPLICATIONS	
SERIAL NUMBER	U.S. FILING DATE
1.	
2.	
PCT APPLICATIONS DESIGNATING THE U.S.	
PCT APPLICATION NO.	PCT FILING DATE
3.	

I hereby declare that all statements made herein of my knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Telephone calls and correspondence should be directed to: Lisa L. Ryan, Esq., at
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Fourth Inventor

Full name: _____
Inventor's signature: _____
Date: _____
Citizenship: _____
Post office Address: _____
Residence:
(If different than above)

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g) desde alrededor de 0.5% a alrededor de 5% en peso de por lo menos una sílice;

teniendo dicha composición una concentración total de herbicida de alrededor de 65% a alrededor de 85% en peso, y teniendo una relación de peso de glifosato, expresada como-equivalente ácido, con respecto a dicho herbicida líquido de alrededor de 1:5 a alrededor de 1:1.

23. Una composición pesticida que comprende:

- a) por lo menos un pesticida sólido;
- b) por lo menos un portador de pesticida líquido;
- c) por lo menos un tensioactivo; y
- d) por lo menos una ayuda de suspensión;

donde dicha composición está libre de agua, aceite y portadores solventes.

ES TRADUCCIÓN FIEL Y COMPLETA DE LAS
REIVINDICACIONES CONTENIDAS EN EL DOCUMENTO ANEXO
TERMINADA ESTE 11 DE MAYO, 2001.

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PATENT
39-21(3682)B

PROVISIONAL PATENT APPLICATION

for

STABLE CONCENTRATED PESTICIDAL SUSPENSION

by

Tracy A. Powers, Deborah H. Carter, Henry E. Agbaje, Shawn Zhu,
Shannon K. Hawkins and Alan J. Stern

60221297-072700

EXPRESS MAIL MAILING LABEL	
NUMBER	TB015691192US
DATE OF DEPOSIT	July 27, 2000
I hereby certify that this Patent Application is being deposited with the United States Postal Service "EXPRESS MAIL POST OFFICE TO ADDRESSEE" service under 37 C.F.R. §1.10 on the date indicated above and is addressed to: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231.	
Signature	Michelle A. Spudis

