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5 **AGRICULTURAL COMPOSITIONS EMPLOYING ORGANOSILOXANES
CONTAINING POLYHYDRIC GROUPS**

10 **Background of the Invention**

Many herbicides require the addition of an adjuvant to the spray mixture to provide wetting and spreading on foliar surfaces. Often that adjuvant is a surfactant, which can perform a variety of functions, such as increasing spray droplet retention on difficult to wet leaf surfaces, or to provide penetration of the herbicide into the plant
15 cuticle. These adjuvants are provided either as a tankside additive or used as a component in herbicide formulations.

Sandbrink, et al., Pest. Sci. 1993, 38, 272-273, published that a TSE antagonized glyphosate performance relative to glyphosate alone in the control of
20 *Panicum maximum* Jacq. Snow, et al., Langmuir, 1993, 9, 424-30, discusses the physical properties and synthesis of novel cationic siloxane surfactants. These siloxanes are based on the reaction of a chloropropyl modified trisiloxane with an alkanolamine, such as N-methyl-ethanolamine, which was further reacted with a halide to make a quaternary surfactant.

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Petroff, et al., EP 92116658, describes cationic, quaternary trisiloxanes to enhance the efficacy of glyphosate on velvetleaf, a broadleaf weed.

Henning, et al., DE 4318537, describes cationic siloxanyl modified
30 polyhydroxy hydrocarbon or carbohydrate for use with plant protection agents. These compounds are derived from a saccharide containing 1 to 10 pentose and/or hexose units, modified with a quaternary ammonium group, and a siloxane moiety.

Reid, et al., U.S. 3,389,160, describes amino modified siloxane
35 alkoxylates where the amino functionality appears as the terminal group on the alkyleneoxide moiety, opposite the siloxane group.



G00001

Policello, U.S. 5,998,331, discloses amino modified siloxanes wherein the amine is bound by an ether bound to the siloxane backbone wherein the amine may be terminal or pendant to the backbone and may be substituted with one or two hydroxyalkyl groups.

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Dietz et al., in U.S. 5,891,977 describes organopolysiloxanes comprising polyhydroxyorganyl radicals and polyalkylene radicals, their process and use.

10 Specifically these materials are described as being useful in coatings, paints and inks, as well as emulsifiers for water-in-oil and oil-in-water systems, such as hair care formulations. Although these materials are mentioned as being practical for many applications, these were not shown to have utility as adjuvants for agrochemical applications.

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In U.S. 6,001,140 and in copending application 09/211,909, siloxane polymers having polyhydric groups, such as hydrosilation products of trimethylpropane monoallyl ether, ethoxylated pentaerythritol allyl ether, propoxylated pentaerythritol allyl ether, tri-isopropanolamine allyl ether, ethoxylated allyl sorbitol, 1, 3-
20 allyloxypropanediol and 2-butyne-1, 4-diol are described as useful diesel fuel additives.

Summary of the Invention

The present invention teaches certain compositions comprising an
25 organosiloxane copolymer in agricultural formulations. The organosiloxane copolymers used in the present invention are characterized as containing an average of at least one polyhydric group having at least three hydroxyls, such as a sugar group, or at least one polyhydric group having at least two hydroxyls and at least one other group which comprises a polyether, attached to the organosiloxane via a bridging group.

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The copolymers described above, are useful as adjuvants and additives for applications with pesticides, such as, but not limited to, herbicides, insecticides, fungicides and growth regulators, as well as fertilizers and micronutrients.

Optionally, the polyhydric organosiloxanes used in this invention may be blended with conventional trisiloxane alkoxylates (TSAs). Blends of these polyhydric organosiloxanes with TSAs provide enhanced wetting properties on difficult to wet plant surfaces.

Additionally the polyhydric organosiloxanes of this invention may be blended with conventional organic surfactants, as emulsifiers, dispersants, coadjuvants or cosurfactants.

In various aspects, the invention embodies compositions of polyhydric organosiloxanes, treatment methods, and novel organosiloxane structures.

Detailed Description of the Invention

The polyhydric organosiloxanes are useful as adjuvants for herbicide applications.

POLYHYDRIC ORGANOSILOXANES

As used herein, the term "polyhydric organic group" refers to an organic group having two or more hydroxyl groups thereon. Preferred organic groups are saturated ether or saturated hydrocarbon groups. Polyhydric unsaturated aliphatic groups may be employed but are generally less preferred. The term "polyhydric organosiloxane" refers to compounds with at least one Si-O-Si bond, which have at least one polyhydric group attached to silicon through a bridging group by a Si-C bond.

Polyhydric organosiloxanes useful in the inventive compositions may include such copolymers as described in U.S. 5,891,977, U.S. 6,001,140 and in commonly owned copending application 09/211,909, all incorporated herein by reference. Preferred polymers have no more than 20 siloxane repeat units and/or also have polyether (i.e. polyalkylene oxide) substituents. The polyether substituents may be present as separate groups, or as part of the polyhydric group structure. In the case

where the polyhydric group contains only two hydroxyl groups thereon, the polyhydric organosiloxanes used in the invention comprise at least one other group which includes polyether structure.

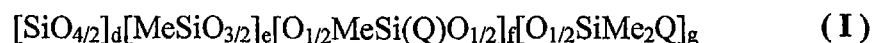
5 The polyhydric organic groups may be aliphatic, low molecular weight hydrocarbon groups, optionally interrupted with one or more ether oxygen atoms, and having at least two hydroxy groups thereon. The polyhydric group preferably is saturated completely, as disclosed in US 6,001,140, although unsaturated polyhydric groups such as disclosed in DE 4,032,006 may also be employed.

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The polyhydric group is preferably derived from a mono-, di-, oligo- or polysaccharide, or its glycosides or a corresponding derivative thereof. Examples of polysaccharides which may be utilized to form polyhydric groups, are glucose, maltose, raffinose, sorbitol, glucosamine, glucopyranosylamine, glucamine, N-methylglucamine,
15 isomaltamine, gluconic acid, and heptagluconic acid.

When the siloxane copolymer is not a trisiloxane, it is preferably further characterized by having an average at least one polyalkyleneoxide ("polyether" group). In the case of a trisiloxane a polyalkyleneoxide group may optionally be present on the
20 copolymer used in the invention. The polyalkyleneoxide groups may be provided in the bridging group which links the polyhydric group to a silicon atom of the organosiloxane, it may be provided as a separate group attached to a silicon atom of the organosiloxane, or both. As a further option, the organosiloxane copolymer may contain an amino group, either as separate substituent group or as part of the polyhydric
25 group-containing substituent or a polyether group-containing substituent.

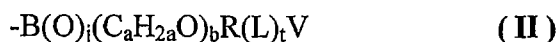
In a particular embodiment the polyhydric organosiloxanes of the present invention have the average general formula:



30 wherein

f is 0 to 50, preferably 1 to 5, more preferably 1 to 2, most preferably 1; d = 0 to 2, preferably 0, e = 0 to 3, most preferably 0, g is, if the siloxane is not cyclic, 2 + e + 2d, or zero if the siloxane is cyclic;

the Q groups are independently R^1 or



wherein

B is a divalent bridging group of C_1 to C_6 , preferably C_3 to C_4 , $j=0$ or 1 ,
 5 preferably 1 , each a is 2 to 4 , preferably 2 to 3 , each b is 0 to 15 ,
 preferably 0 to 8 , R is a divalent organic group containing 2 to 8 carbons,
 preferably 3 to 4 carbons, each optionally OH substituted, L is NR^2 , where
 R^2 may be hydrogen, an amino alkyl of one to four carbons, or an alkyl of
 2 to 4 carbon atoms which may have hydroxy substitutions thereon, or R^1 ,
 10 $t=0$ or 1 , preferably 0 , and V is a polyhydric radical containing a number,
 n , of groups $(C-OH)$, where n is ≥ 2 , preferably from 2 to 30 , most
 preferably from 5 to 15 ;

R^1 is either a polyether of the general structure $B(O)_j(C_aH_{2a}O)_bR^3$ or an alkyl
 radical containing 1 to 18 carbons, preferably methyl, R^3 is hydrogen, a
 15 hydrocarbon group of 1 to 4 carbons or $N(R^2)_2$, preferably hydrogen;

At least one Q is not R^1 ; and

When n is 2 at least one R^1 group is present of said polyether general structure.

Preferably most R^1 groups are methyl, but some may be polyethers of the
 structure $-(C_aH_{2a}O)_bR^3$ as defined above. Exemplary B are $-(CH_2)_2-$, $-(CH_2)_3-$, and
 20 $-CH_2CH(OH)CH_2-$. Exemplary R groups are $-(CH_2)_2-$, $-(CH_2)_3-$, $-CH_2CH(OH)CH_2-$,
 and $-CH_2C_6H_{11}(OH)CH_2-$. Examples of R^2 are $-CH_3$, $-C_2H_5$, $-C_2H_4OH$,
 $(C_2H_4O)_3(C_3H_6O)_2H$; $-(C_2H_4O)_2CH_3$; and $-(C_3H_6O)_3OH$.

The polyhydric group V is preferably a group formed from a mono-, di-,
 25 oligo- or polysaccharide, or its glycosides or corresponding derivatives. Examples
 thereof are derived from glucose, maltose, raffinose, sorbitol, glucosamine,
 glucopyranosylamine, glucamine, N-methylglucamine, isomaltamine, gluconic acid, and
 heptagluconic acid, and alkoxylates thereof. Other V groups may be derived from
 trimethylolpropane, pentaerythritol, tri-isopropanolamine, and 2-butyne-1, 4-diol.

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Preferred Q structures are wherein B is propylene, $j=1$, $a=2$, $b=0$ to 4 ,
 $R=-CH_2CH(OH)CH_2-$, t is 0 and V is $N(CH_3)CH_2[CH(OH)]_4CH_2OH$ (a radical
 obtained from N-methylglucamine). Specific Q groups of formula (II) are:

-C₃H₆OCH₂CH(OH)CH₂N(CH₃)CH₂[CH(OH)]₄CH₂OH;^f

-C₃H₆O[C₂H₄O]₄CH₂CH(OH)CH₂N(CH₃)CH₂[CH(OH)]₄CH₂OH; and

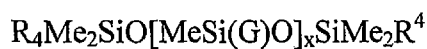
-C₃H₆O[C₂H₄O]₄[C₃H₆O]₂CH₂CH(OH)CH₂N(CH₃)CH₂[CH(OH)]₄CH₂OH.

- 5 In an alternative embodiment, some or all of the methyl groups in formula (1) above may be replaced by other alkyl groups, for instance ethyl, isopropyl, n-propyl or butyl groups, or by phenyl groups.

- 10 Particularly preferred compounds are methyl terminated trisiloxanes, that is compounds of formula (1) in which f=1, d=0, e=0, g=2, the terminal Q groups are methyl and the pendant Q group is a group of formula (II).

OTHER SILOXANES

- 15 In addition to the polyhydric polyorganosiloxanes employed in the invention, the compositions of the present invention optionally may include TSAs of the general formula:



- Wherein x=0 to 2, preferably 1, G=C_mH_{2m}O(C₂H₄O)_y(C₃H₆O)_wR⁵, m=2 to 4,
 20 preferably 3, y=3 to 20, preferably 4 to 8, w=0 to 8, providing that when w is > 0, (y + w) is preferably between 5 and 12. R⁵ is hydrogen, acetyl or a hydrocarbon radical between 1 and 4 carbon atoms. R⁴ is G, or an alkyl of one to four carbons. The preferred nonionic siloxane alkoxylates are trisiloxane alkoxylates, where x=1, m=3, y=4 to 8, w=0, R⁴ is Me and R⁵ is H or Me.

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Still further, compositions of the invention may include polyorganosiloxanes having both polyether and amino functionality, such as described in US 5, 998,331, incorporated herein by reference.

PESTICIDES

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The compositions of the present invention also optionally include pesticides, especially acid functionalized ones, i.e., compounds that contain at least one carboxylic,

sulfonic or phosphonic acid group or their salt or ester. The term "pesticide" means any compound used to destroy pests, e.g., rodenticides, fungicides, and herbicides.

Illustrative examples of pesticides which can be employed include, but are not limited to, growth regulators, photosynthesis inhibitors, pigment inhibitors, mitotic disrupters, lipid biosynthesis inhibitors, cell wall inhibitors, and cell membrane disrupters. The amount of pesticide employed in compositions of the invention varies with the type of pesticide employed. More specific examples of pesticide compounds that can be used with the compositions of the invention are: phenoxy acetic acids, phenoxy propionic acids, phenoxy butyric acids, benzoic acids, triazines and s-triazines, substituted ureas, uracils, bentazon, desmedipham, methazole, phenmedipham, pyridate, amitrole, clomazone, fluridone, norflurazone, dinitroanilines, isopropalin, oryzalin, pendimethalin, prodiamine, trifluralin, glyphosate, sulfonyleureas, imidazolinones, clethodim, diclofop-methyl, fenoxaprop-ethyl, fluazifop-p-butyl, haloxyfop-methyl, quizalofop, sethoxydim, dichlobenil, isoxaben, and bipyridylium compounds.

EXCIPIENTS

The composition also may include fatty acid esters, e.g., methyl soyate, for crop oil concentrate formulations, as well as water, for aqueous applications. Buffers, preservatives and other standard excipients known in the art also may be included in the composition. When the compositions of the present invention are insoluble in distilled water, spreading may be achieved by the addition of a small amount of an acid, such as acetic acid, to protonate the amine functionality, thereby increasing water solubility. Moreover, other cosurfactants which do not interfere with superspreading, may be included, for instance cosurfactants which have short chain hydrophobes (C₁₀ or less, not counting any branching carbons) or alkyleneoxide copolymers such as sold under the trademarks PLURONIC[®] and TETRONIC[®] (both BASF Corp.) and UNCON[®] (Union Carbide/Dow Corp). Examples of such cosurfactants and their use can be found in US 5,104,647, US 5,558,806 and EP 0862857, all incorporated herein by reference.

MANUFACTURE

The polyhydric organosiloxanes used in the present invention may be made by the hydrosilation of a hydridosiloxane with an epoxy intermediate, such as allyl glycidyl ether, vinyl cyclohexene monoxide, or an epoxy terminated allyl polyalkyleneoxide, followed by ring opening the epoxide with the appropriate amino group. The hydridosiloxanes described are commercially available and may be made as known in the art. Hydrosilation are within the general conditions taught in Marciniak, *Comprehensive Handbook of Hydrosilylation*, edited by Bogdan Marciniak, Pergamon Press.

Alternatively an epoxy terminated allyl polyalkyleneoxide may be hydrosilated onto a hydridosiloxane backbone and then the epoxide is ring opened with the desired amine. Epoxy terminated, allyl polyethyleneoxide can be prepared by the method outlined by Xue-Ping Gu, et al., (Synthesis of Glycol Diglycidyl Ethers Using Phase Transfer Catalysis; in *Synthesis Communications June/July 1985*, p.649-651) from an epoxide and commercially available allyl started polyalkylene oxides.

Alternatively one may start from the reaction product of an allyl or methallyl chloride and a polyhydric amine compound and hydrosilate this allylic polyhydric amine onto hydridosiloxanes.

Still an alternate approach is to start with an alkoxyated allyl or methallylamine and hydrosilate this onto hydridosiloxanes. Hydrosilation conditions depend on the amine and siloxane, but are within the general conditions taught in Marciniak.

Additionally, one may employ a hydrosilation reaction of a hydridosiloxane and an aliphatically unsaturated polyhydric species, preferably an olefinically unsaturated polyhydric species. Exemplary olefinically unsaturated polyhydric species include allyl glucose, sorbitol monoallylether, allylpolyalkylenoxides terminated with a polyhydric group, and monoallylethers of an alkoxyated polyhydric group, such as the monoallylether of alkoxyated sorbitol or glucose. Trimethylolpropane monoallyl ether (TMPMAE), alkoxyated trimethylolpropane monoallyl ether, pentaerythritol allyl ether, alkoxyated pentaerythritol allyl ether, tri-isopropanolamine monoallyl ether and 2-butyne-1, 4-diol are further examples of compounds which may be hydrosilated in

this manner to form a polyhydric polyorganosiloxane. Alkoxylation may be ethoxylate, propoxylate, butoxylate or mixtures thereof and may contain multiple alkoxy units per molecule, preferably from 1-6 such repeat units.

- 5 The polyhydric compound may be commercially available, e.g., N-Methylglucamine, but polyalkylene oxide modified or substituted versions thereof may be manufactured as known in the art.

10 Polyhydric organosiloxanes having both polyether and polyhydric species on the same molecule may be provided by sequential or simultaneous hydrosilations of allyl started polyethers and allyl functional polyhydric compounds using hydridosiloxanes having greater than one hydrido groups per molecule.

USE

- 15 The polyhydric organosiloxanes may be used in agricultural applications as adjuvants for pesticides, wherein the siloxane is applied in a pesticide formulation to agricultural products. The composition of the present invention is useful as a tank side additive, or as a component in a herbicide formulation. In addition the compositions of
20 the present invention are useful as adjuvants for other pesticides, such as, fungicides, insecticides, plant growth regulators, acaricides and the like. The pesticide formulations may be wet, dry, slurries or other formulations as are known in the art.

- 25 The siloxanes are added directly to a spray tank along with an acid functional pesticide, or as part of a pesticide formulation. When used as a tankside additive, the siloxane is present at weight concentrations between 0.001% and 5.0% preferably between 0.025% and 0.5%. Likewise, when the polyhydric organosiloxanes are used in a pesticide formulation (in-can), they are present at weight concentrations that will deliver between 0.001% and 5.0% to the final use dilution, preferably between 0.025%
30 and 0.5%, of the final use dilution.

It is noted that most dilutions will be made with water, but in the case of crop oil concentrates, oils (mineral, silicone, animal or vegetable oils) will be the diluents.

When the compositions of the present invention are used in conjunction with a TSA, the weight ratio of the TSA to the polyhydric organosiloxanes is between 5:95 and 95:5, preferably between 5:95 and 40:60. The blend may be accomplished by
5 mixing physically the two components prior to use, or by adding them separately to a spray mixture at the point of use.

When the compositions of the present invention are used in conjunction with nonsilicone surfactants, the weight ratio of the nonsilicone surfactant to the polyhydric
10 organosiloxane is between 1:99 and 99:1, preferably between 99:1 and 40:60.

The polyhydric organosiloxanes also may be used generally as surface active agents in aqueous formulation where there is an acid functionalized component. The polyhydric organosiloxanes also may be used as surface active agents, including, but
15 not limited to, as surfactants, wetting agents and softeners for textiles, flow and leveling agents in coatings, hair care products, skin care and creams for personal care applications and anti-static agents, detergents and softeners for laundry products.

EXAMPLES

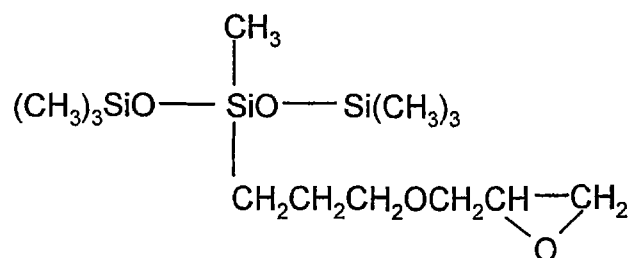
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Unless otherwise indicated, all parts and percentages are by weight, and are based on the weight at the particular stage of the processing being described.

Example 1

a. Invention Polyhydric Silicone Surfactant

The polyhydric organosiloxane was prepared by the slow addition of the
5 desired polyhydric amino compound to a reaction vessel containing
heptamethyltrisiloxane modified with allyl glycidyl ether, using 2-propanol (30 wt%)
as a solvent. The epoxy siloxane intermediate was

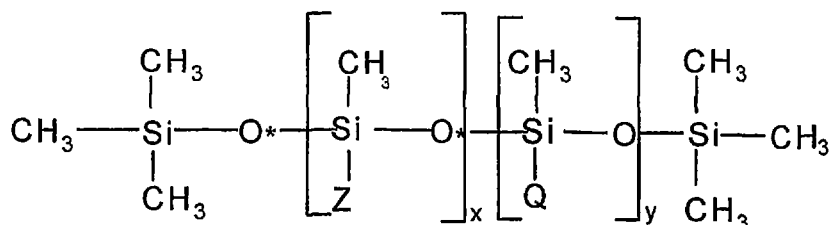


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Therefore, 50.0g (0.149 moles) of a trisiloxane, epoxy intermediate, 37.8g (0.194 moles) of N-methylglucamine along with 37.6g 2-propanol were combined in a roundbottom flask equipped with a reflux condenser and an overhead stirrer. The reaction mixture was catalyzed with 0.2g titanium (IV) butoxide and the flask temperature was slowly to reach a maximum of 83° C. The flask contents were held at this temperature until the epoxy content, as determined by a perchloric acid titration, on a sample of the reaction mixture, showed that the epoxide content was nil, indicating the reaction was complete (~ 23h). A small amount of water along with 15g of isopropanol was added to the reaction mixture and stirred for 1 hour. The addition of the water deactivated the titanium catalyst. The mixture was filtered through a medium filter pad and stripped on a rotary evaporator for 1.5 hours at 70 °C and 1.0 mm Hg to afford the desired product, which had an aqueous surface tension of 20 mN/m (0.1 wt%, 25°C).

25 An example of a polyhydric organosiloxane is described in Table 1. Other compositions of polyhydric organosiloxanes may be prepared according to this procedure.

Table 1
Description of Polyhydric Organosiloxanes



Reference	x	y	Description
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SIL-1	0	1	$\text{Q} = \text{C}_3\text{H}_6\text{OCH}_2\text{CH}(\text{OH})\text{CH}_2\text{-N}(\text{CH}_3)\text{CH}_2[\text{CH}(\text{OH})]_4\text{CH}_2\text{OH}$
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b. Comparative Silicone Based Surfactant:

$\text{Me}_3\text{SiO}[\text{MeSi}(\text{C}_3\text{H}_6\text{O}(\text{C}_2\text{H}_4\text{O})_8\text{H})\text{O}]_1\text{SiMe}_3$ (SIL-A) is a comparative TSA. This material was prepared by standard hydrosilation of an allyl terminated polyether with heptamethyltrisiloxane.

c. Comparative Nonsilicone Surfactants:

Table 2 provides descriptions of typical, comparative, nonsilicone surfactants.

Table 2- Description of Comparative Conventional Nonsilicone Surfactants

<u>Reference</u>	<u>Moles EO</u>	<u>Remarks</u>
OPE	10	Octylphenol ethoxylate (TRITON® X-100) (Union Carbide Corp., Danbury, CT)
TAE	15	Tallow amine ethoxylate (ETHOMEEN® T/25) (Akzo Nobel Chemicals Inc.; Chicago, IL)

Example 2

This example demonstrates the utility of the polyhydric organosilicone used in this present invention as surfactants. Surface tension was measured using a Cahn microbalance, with a sand blasted platinum blade as the sensor. Solutions of the various components were prepared at 0.1 wt% in 0.005M NaCl water (Deionized), as an equilibrium aid. Aqueous solutions of these unique compositions provide a significant reduction in surface tension relative to conventional surfactants. Additionally the polyhydric moiety does not detract from the surface tension lowering associated with traditional TSA (SIL-A), see Table 4.

The compositions of the present invention also provide enhanced spreading similar to the TSAs (SIL-A), and relative to conventional surfactants (OPE and TAE), see Table 4.

Spreading was determined by applying a 10 μ L droplet of surfactant solution to a polyester film (3M, IR 1140 transparency film) and measuring the spread diameter after 30 seconds. The solution was applied with an automatic pipette to provide droplets of reproducible volume. Deionized water that was further purified with a Millipore filtration system was used to prepare the surfactant solutions.

The spreading properties of the polyhydric organosiloxane SIL-1 are equal to those of trisiloxane ethoxylates such as SIL-A, demonstrating that the siloxane having a polyhydric moiety was an effective spread enhancer.

Table 4- Comparison of Aqueous Surface Tension Properties

<u>Surfactant</u>	<u>Surface Tension (mN/m)</u>	<u>Spread Diameter (mm)</u>	
		<u>0.1 wt%</u>	<u>0.2 wt%</u>
SIL-1	20	45	48
SIL-A	21	44	42
OPE	29	nd	8
TAE	41	nd	6
None ^(b)	72	*	--

- a. Surface tension in mN/m at 25°C.
- b. Surface tension of water from CRC Handbook of Chemistry and Physics; 63 Edition, 1982-1983.

5 * Spread diameter of distilled water = 4 mm

10 The above examples and disclosure are intended to be illustrative and not exhaustive. These examples and description will suggest many variations and alternatives to one of ordinary skill in this art. All these alternatives and variations are intended to be included within the scope of the attached claims. Those familiar with the art may recognize other equivalents to the specific embodiments described herein which equivalents are also intended to be encompassed by the claims attached hereto. Further, the specific features recited in the respective dependant claims can be combined in any other manner
15 with the features of the independent claims and any of the other dependent claims, and all such combinations are expressly contemplated to be within the scope of the invention.

20 All published documents, including all US patent documents, mentioned anywhere in this application are hereby expressly incorporated herein by reference in their entirety. Any copending patent applications, mentioned anywhere in this application are also hereby expressly incorporated herein by reference in their entirety.

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Claims

1. A composition comprising:
- a) at least one polyhydric organosiloxane selected from the group consisting of:
- 5 i) organosiloxanes having at least one organic group thereon which comprises three or more hydroxyl groups, and
- ii) organosiloxanes having at least one first organic group thereon which comprises two or more hydroxyl groups and at least one second group thereon which comprises a polyether;
- 10 and
- b) a pesticide.
2. A composition as in claim 1 wherein the polyhydric organosiloxane a) has at least one polyether group thereon.
- 15 3. A composition as in claim 1 wherein the polyhydric organosiloxane a) has at least one amino group thereon.
4. A composition as in claim 1 polyhydric organosiloxane is an organosiloxane comprising a group formed from a mono-, di-,
- 20 oligo- or polysaccharide, or a glycoside thereof.
5. A composition as in claim 1 wherein the polyhydric organosiloxane a) has the average general formula:
- 25
$$[\text{SiO}_{4/2}]_d[\text{MeSiO}_{3/2}]_e[\text{O}_{1/2}\text{MeSi}(\text{Q})\text{O}_{1/2}]_f[\text{O}_{1/2}\text{SiMe}_2\text{Q}]_g \quad (\text{I})$$
- wherein
- f is 0 to 50, d=0 to 2, e=0 to 3, g is, if the siloxane is not cyclic, 2+e+2d, or zero if the siloxane is cyclic;
- the Q groups are independently R¹ or
- 30
$$-\text{B}(\text{O})_j(\text{C}_a\text{H}_{2a}\text{O})_b\text{R}(\text{L})_t\text{V} \quad (\text{II})$$

B is a divalent bridging group of C₁ to C₆, j=0 or 1, each a is 2 to 4, preferably 2 to 3, each b is 0 to 15, preferably 0 to 8, R is a divalent organic group containing 2 to 8

carbons which may be optionally OH substituted, L is NR^2 , R^2 is hydrogen, an amino alkyl of one to four carbons, an alkyl of 2 to 4 carbon atoms which may have hydroxy substitutions thereon, or R^1 , $t = 0$ or 1, preferably 0, and V is a polyhydric radical containing a number, n, of groups (C-OH), where n is ≥ 2 ;

- 5 R^1 is either a polyether of the general structure $\text{B}(\text{O})_j(\text{C}_a\text{H}_{2a}\text{O})_b\text{R}^3$ or an alkyl radical containing 1 to 18 carbons,

R^3 is hydrogen, a hydrocarbon group of 1 to 4 carbons or $\text{N}(\text{R}^2)_2$; at least one Q is not R^1 ; and

when n is 2 at least one R^1 group is present of said polyether general structure.

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6. A composition as in claim 5 wherein f is 1-5, d is 0, e is 0, and g is 2.

7. A composition as in claim 5 wherein at least one Q is R^1 and at least one R^1 is $-(\text{C}_a\text{H}_{2a}\text{O})_b\text{R}^3$.

8. A composition as in claim 5 wherein, in formula (II), B is propylene, $j=1$, $a=2$, $b=0$ to 4, R is $-\text{CH}_2\text{CH}(\text{OH})\text{CH}_2-$ and t is 0.

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9. A composition as in claim 5 wherein the group of formula (II) is

$-\text{C}_3\text{H}_6\text{OCH}_2\text{CH}(\text{OH})\text{CH}_2\text{N}(\text{CH}_3)\text{CH}_2[\text{CH}(\text{OH})]_4\text{CH}_2\text{OH}$;

$-\text{C}_3\text{H}_6\text{O}[\text{C}_2\text{H}_4\text{O}]_4\text{CH}_2\text{CH}(\text{OH})\text{CH}_2\text{N}(\text{CH}_3)\text{CH}_2[\text{CH}(\text{OH})]_4\text{CH}_2\text{OH}$; or

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$-\text{C}_3\text{H}_6\text{O}[\text{C}_2\text{H}_4\text{O}]_4[\text{C}_3\text{H}_6\text{O}]_2\text{CH}_2\text{CH}(\text{OH})\text{CH}_2\text{N}(\text{CH}_3)\text{CH}_2[\text{CH}(\text{OH})]_4\text{CH}_2\text{OH}$.

10. A composition as in claim 5 wherein the group V is derived from glucose, maltose, raffinose, sorbitol, glucosamine, glucopyranosylamine, glucamine, N-

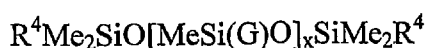
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methylglucamine, isomaltamine, gluconic acid, heptagluconic acid, trimethylolpropane, pentaerythritol, tri-isopropanolamine or 2-butyn-1, 4-diol.

11. A composition as in claim 1 wherein the pesticide is an acid functional pesticide.

12. A composition as in claim 1 further comprising c) a trisiloxane alkoxylate of the formula:

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Wherein $x=0$ to 2 , $G=C_mH_{2m}O(C_2H_4O)_y(C_3H_6O)_wR^5$, $m=2$ to 4 , $y=3$ to 20 , $w=0$ to 8 , R^5 is hydrogen, acetyl or a hydrocarbon radical between 1 and 4 carbon atoms, and R^4 is G, or an alkyl of one to four carbons.

5 13. A composition as in claim 12 wherein the weight basis ratio of the trisiloxane alkoxylate c) to the polyhydric organosiloxane a) is between 5:95 and 95:5.

14. A composition as in claim 1 further comprising a nonionic organic, anionic or cationic surfactant.

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15. A composition as in claim 1 further comprising a water diluent.

16. A composition as in claim 15 where the polyhydric organosiloxane a) is present at a concentration of from 0.001% to 5.0% by weight.

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17. A composition as in claim 1 wherein the weight basis ratio of the polyhydric organosiloxane a) to the pesticide b) is from 1:99 to 99:1.

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18. A composition as in claim 1 where the pesticide is selected from the group consisting of: growth regulators, photosynthesis inhibitors, pigment inhibitors, mitotic disrupters, lipid biosynthesis inhibitors, cell wall inhibitors, and cell membrane disrupters.

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19. A composition as in claim 1 wherein the pesticide is a herbicide selected from the group consisting of: phenoxy acetic acids, phenoxy propionic acids, phenoxy butyric acids, benzoic acids, triazines and s-triazines, substituted ureas, uracils, bentazon, desmedipham, methazole, phenmedipham, pyridate, amitrole, clomazone, fluridone, norflurazone, dinitroanilines, isopropalin, oryzalin, pendimethalin, prodiamine, trifluralin, glyphosate, sulfonylureas, imidazolinones, clethodim, diclofop-methyl, fenoxaprop-ethyl, fluazifop-p-butyl, haloxyfop-methyl, quizalofop, sethoxydim, dichlobenil, isoxaben, and bipyridylum compounds.

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20. A composition as in claim 5 wherein n is from 2nd to 30.
21. A composition as in claim 5 wherein n is 5 to 15.
- 5 22. A process for treating plants comprising applying to plants a composition as in claim 1.
23. A composition as in claim 5 wherein in formula (I), f=1, d=0, e=0, g=2, the terminal Q groups are methyl and the pendant Q group is a group of formula
- 10 (II).