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US005364618A

M 2,982.

United States Patent [19]

Meer et al.

[11] **Patent Number: 5,364,618**

[45] **Date of Patent: * Nov. 15, 1994**

[54] **METHOD FOR THE CONTROL OF INSECTS**

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[*] Notice: The portion of the term of this patent subsequent to Jan. 5, 2010 has been disclaimed.

[21] Appl. No.: **984,877**

[22] Filed: **Dec. 2, 1992**

Related U.S. Application Data

[63] Continuation of Ser. No. 497,113, Mar. 21, 1990, Pat. No. 5,177,107, which is a continuation of Ser. No. 256,237, Oct. 11, 1988, Pat. No. 4,921,696, which is a continuation of Ser. No. 758,856, Jul. 26, 1985, abandoned, which is a continuation of Ser. No. 455,727, Jan. 5, 1983, abandoned, which is a continuation-in-part of Ser. No. 598,908, Apr. 10, 1984, abandoned, which is a continuation of Ser. No. 361,501, Mar. 25, 1982, abandoned.

[51] Int. Cl.^{5} A01N 25/00; A01N 37/00; A01N 37/30

[52] U.S. Cl. 424/84; 424/DIG. 11; 514/553; 514/554; 514/578

[58] Field of Search 514/553, 554, 578; 424/DIG. 11, 84

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[57] **ABSTRACT**

A method has been discovered for the control of arthropod pests which comprises treating the pest with an effective amount of selected fluorocarbons.

13 Claims, No Drawings

METHOD FOR THE CONTROL OF INSECTS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of application Ser. No. 497,113 filed Mar. 21, 1990, now U.S. Pat. No. 5,177,107, which is a continuation of application Ser. No. 256,237 filed Oct. 11, 1988, now U.S. Pat. No. 4,921,696, which is a continuation of application Ser. No. 758,856 filed Jul. 26, 1985, now abandoned, which is a continuation of application Ser. No. 455,727 filed Jan. 5, 1983, now abandoned, which is a continuation-in-part of application Ser. No. 598,908 filed Apr. 10, 1984, now abandoned, which is a continuation of application Ser. No. 361,501 filed Mar. 25, 1982, now abandoned.

PRIOR ART

Discovering pesticides that are effective against a broad range of insect pests and that also can be used safely on crop lands and pastures has long been a problem. One such problem area has been in the control of ants and related insects. Particularly destructive are fire ants (such as *Solenopsis invicta*) which sting humans and livestock, feed on crop seedlings and germinating seeds thereby reducing yields, and damaging equipment which strike their mounds. Requirements for an effective pesticide formulation for the control of fire ants has been characterized as being (1) not repellent to the ants, (2) readily transferrable from one ant to another, and (3) exhibiting delayed toxicity. Repellency can reduce or negate the effectiveness of a toxicant because the ants will avoid the treated bait. The treated bait must be transferable either by carrying it back to the nest or by trophallaxis, and the toxicity must be delayed because foraging ants constitute only a small percentage of the total colony and must survive long enough to pass the toxicant onto the main colony population, especially the queen. It is preferable that the formulations exhibit delayed toxicity over a wide range of pesticide concentration because the active ingredient becomes diluted during trophallaxis (Banks et al. ARS-S-169, October 1977). Presently only one commercially available pesticide (Amdro U.S. Pat. No. 4,152,436) is registered as a bait for outdoor control of fire ants such as *Solenopsis invicta. S. xyloni S. richteri*, and other ants including *Pheidole megacephala* and *Iridomyrmex humilis*. Amdro is also effective against Lepidopterous larvae. However, it cannot be applied to edible crops. The insecticide Mirex (U. S. Pat. No. 3,220,921) is also known to be effective against fire ants, but is no longer registered for use.

SUMMARY OF THE INVENTION

We have discovered a method and a composition for the control of a population of arthropods including ants, cockroaches, flies, mosquitoes, and termites. The method comprises treating the pests with an effective amount of a toxicant substance or mixture of substances of the formula

$$R_fSO_2A$$

wherein R_f is a fluoroaliphatic radical containing up to 20 carbon atoms and A is a structurally compatible residue, or agriculturally acceptable salts of the toxicant substance or substances. The compositions in accordance with the invention comprise the above toxicant substance or mixture of substances and a bait component.

The fluoroaliphatic radical, R_f, is a fluorinated, monovalent moiety which is straight chain, branched chain, and if sufficiently large, cyclic, or combinations thereof, such as alkylcycloaliphatic radicals. The skeletal chain can include catenary oxygen and/or trivalent nitrogen hetero atoms bonded only to carbon atoms, such hetero atoms providing stable linkages between fluorocarbon groups and not interferring with the chemically inert character of the R_f radical. While R_f can have a large number of carbon atoms, compounds where R_f is not more than 20 carbon atoms will be adequate and preferred since Large radicals usually represent a less efficient utilization of fluorine than is possible with smaller R_f radicals. R_F will have up to 20 carbon atoms, preferably 5 to about 12. The terminal porton of the R_f group has preferably at least three fully fluorinated carbon atoms, e.g., $CF_3CF_2CF_2$—, and the preferred compounds are those in which the R_f group is fully or substantially completely fluorinated, as in the case where R_f is perfluoroalkyl, C_nF_{2n+1}.

In the above formula A is a structurally compatible residue (i.e., capable of being linked to the SO_2 radical) which includes the radicals NR_1R_2 and OR_4 wherein R_1 and R_2 are selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, aralkyl, aroyl, acyl, cycloalkyl, cycloalkenyl, cycloalkynyl, a heterocyclic ring containing atoms selected from the group consisting of C, N, S or O, hydroxyalkyl, haloalkyl, aminoalkyl, carboxyalkyl salts, esters and amides, or a group of the structure $—(C_xH_{2x}O)_n(C_yH_{2y}O)mR_3$ wherein $n+m=1–20$, x and y are 1–4 and R_3 is selected from the same group as R_1 and R_2; and wherein R_4 is H, aryl, a heterocyclic ring or an alkaline earth, alkali metal, organic amine or ammonium cation. The formula NR_1R_2 also includes radicals in which N, R_1 and R_2 are taken together to form a ring the atoms of which are selected from the group consisting of C, N, S or O. The salts of the invention are generally metal, ammonium organic amine and quaternary amine salts and can be prepared by treating the acid-form compound with an appropriate base under mild conditions. Among the metal salts of the invention are alkali metal (e.g., lithium, sodium and potassium), alkaline earth metal (e.g., barium, calcium and magnesium) and heavy metal e.g., zinc and iron) salts as well as other metal salts such as aluminum. Appropriate bases for use in preparing the metal salts include metal oxides, hydroxides, carbonates, bicarbonates and alkoxides. Some salts are also prepared by cation exchange reaction (by reacting a salt of the invention with an organic inorganic salt in a cation exchange reaction). The organic amine salts include the salts of aliphatic (e.g., alkyl), aromatic and heterocyclic amines, as well as those having a mixture of these types of structures. The amines useful in preparing the salts of the invention can be primary, secondary or tertiary and preferably contain not more than 20 carbon atoms. Such amines include, for example, morpholine, methyl cyclohexylamine, glucosamine, amines derived from fatty acids, etc. The amine and ammonium salts can be prepared by reacting the acid form with the appropriate organic base or ammonium hydroxide. Any off the salts of the types set out above are agriculturally acceptable, the one chosen depending upon the particular use and upon the economics of the situation. Of particular utility are the alkali metal, alkaline earth, ammonium and amines salts.

The salts of the invention are frequently formed by reacting the precursors in aqueous solution. This solution can be evaporated to obtain the salt of the compound, usually as a dry powder. In some cases, it may be more convenient to use a non-aqueous solvent such as alcohols, acetones, etc. The resulting solution is then utilized in formulations which are treated to remove the solvent, for example, by evaporation under reduced pressure.

These pesticides which are suitable for use in the invention fulfill the above mentioned requirements for fire ant control and in additon, possess very little mammalian toxicity. They are also effective against other arthropods.

DETAILED DESCRIPTION OF THE INVENTION

Arthropod pests are suitably treated in accordance with the invention in any manner known to the prior art which is compatible with the above described toxicant compounds and mixtures. Suitable treatments include applying the toxicants as sprays in solutions, emulsions and dispersions; in traps with or without pheromone attractants and the like; and in bait formulations scattered in the vicinity of nests or in crop lands.

Substances suitable for use in this invention must De effective for at least one species of arthropod. However, there are several factors which may affect the effectiveness of specific substances with specific insects and with specific treatment techniques. These factors include:

1. Odor repellency.
2. Taste repellency.
3. Solubility in carriers such as solvents and baits.
4. Enzymatic effects.
5. Degradation by atmospheric oxygen, UV radiation and the like.

Using the invention for control of ants, in particular imported fire ants, it is preferable to prepare bait formulations into which the toxicants can be incorporated. The term is understood by those skilled in the art to be any substance that will entice the insect to ingest the toxicant. Suitable baits include edible oils and fats, vegetable seed meals, meat by-products such as blood, fish meal, syrups, honey, sucrose and other sugars, peanut butter, cereals and the like (see U.S. Pat. No. 3,220,921). Preferred baits for fire ants are mixtures of edible oils (as solvents for the toxicant compounds) with granular carriers such as corncob grits, pregel defatted corn grits and the like. These impregnated granular bait formulations readily fall to the ground when dispersed by aerial or ground applicators where the ants forage. When found by the ants they are carried into the nest where the toxicants are ingested and distributed to workers and queen.

These compounds of the invention are known; but they are not known to be useful in pesticide formulations. Disclosures relevant to their preparation are found in the following U.S. Pat. Nos:

2,803,615
2,346,612
2,732,378
2,759,019
2,803,656
2,915,554
3,398,182 and
3,787,351

The tests in the following examples indicate the effectiveness of the invention but are not intended to limit the invention's scope which is defined by the claims. All percentages and parts are by weight unless otherwise specified.

For fire ants any compound showing % mortality which significantly greater than the bait without the toxicant is considered to be effective for the purposes of this invention. The use of preferred toxicants should result in less than 15% mortality at 24 hours and more than 50% and most preferably more than 85% mortality by the end of the test. The preferred compounds also should have at least a 10-fold difference between maximum and minimum dosages exhibiting delayed toxicity.

EXAMPLE 1

Each compound to be screened for fire ant toxicity was tested in 3 replications of 20 worker ants (*Solenopsis invicta*) which were placed in 30 ml cups for 14 days.

Cotton swabs saturated with soybean oil containing 1.0% of a test compound were offered to the ants in the cups for a 24 hour period. The swabs were removed and the ants remained without food for 24 hours. Cotton swabs saturated with SBO only were then-placed in the cups and left there for the remainder of the testing period. Mortality counts were recorded for the test compounds and for a standard fire ant toxicant, Table 1.

EXAMPLE 2

Some of the compounds tested in Example 1 were retested as in Example 1 at concentrations of 0.01%, 0.10% and 1.0%, Table 2.

EXAMPLE 3

Some of the compounds listed in Table 1, which were not readily soluble in SBO were retested in the same manner as in Example 1 with the exception that SBO was replaced with a 1:1 v/v mixture of honey and water, Table 3.

EXAMPLE 4

Some of the preferred compounds from Example 2 were tested against duplicate laboratory colonies of fire ants.

The colonies consisted of a queen, eggs, larvae, pupae and greater than 40,000 workers. The test compounds were dissolved in SBO at 1.0% concentration and impregnated on pregel defatted corn grits so that the corn grits contained 30% SBO mixture. The test compound, therefore, was 0.30% of the total bait weight. Five grams of the bait was made available to each colony for 4 days. The bait was removed and the colonies fed a standard diet for the remainder of the test which consisted of 1:1 honey-water mixture, boiled eggs and frozen fly pupae and cockroaches. Two colonies were treated with bait without toxicant as a control. Observation on the status of the queen and workers are recorded in Table 4. The ultimate fate of the colony is indicated as QD (queen dead) or CN (colony normal), Table 4.

EXAMPLE 5

Mixed sexes of adult house flies (*Musca domestica*) from an insecticide-resistant laboratory strain were fed after emergence exclusively on a fly food bait (6 parts sugar, 6 parts powdered nonfat dry milk, and 1 part powdered egg yolk) containing 1% of the test compounds. The bait was prepared by adding 10 ml of a solution or suspension of the test compound in a volatile solvent to 10 g of fly food in a small container. The solvent was allowed to evaporate for 4 to 6 hours, then the treated fly food was repulverized. The container of treated fly food and a container of water was placed in a cage with 100 newly emerged adult flies. Percent mortality for two replicate tests was determined after 3 days and compared to the results of feeding untreated fly food, Table 5.

Some of the above compounds may be more effective than the data indicates. If solubilities were poor in the SBO or honey-water formulation, concentrations of toxicants may not have reached the desired level. Many of these compounds showing poor effectiveness may be highly effective in other formulations.

EXAMPLE 6

Compounds 29757, 29758 and 29759 (see Table 1 for structures) were each dissolved in SBO at 1% concentration. Bait was prepared by impregnating the SSD mixture on pregel defatted corn grits so that the corn grit mixture contained 30% SBO mixture and 0.3% test compound. Compound 29759 was also used at 2.5% concentration so that it was 0.75% of the total bait weight.

Treated baits were scattered by tractor on field plots containing a number of active fire ant mounds at a concentration of one pound per acre. Other plots containing fire ant mounds were treated in the same manner with untreated pregel defatted corn grits and with grits treated with a standard fire ant toxicant as control. Results were evaluated as described by D. P. Harlan, W. H. Banks and C. E. Stringer, Southwest Entomologist, Vol. 6, pp 150–157, 1981, Table 6.

EXAMPLE 7

Compounds 29756, 29757, 29759 and 29778 were used to treat Orlando normal colonies of American cockroaches (*Periplaneta americana*) each containing 10 adults of mixed sexes as described by G. S. Burden, Pest Control Vol. 48, pp 22–24, 1980. A bait was formulated which consisted of a 3:1 mixture of cornmeal and powdered sugar containing 2.0% of the above compounds or a standard cockroach toxicant (trichlorfon). Untreated 3:1 mixture of cornmeal and powdered sugar was used as a control. A container with 2 grams of candidate or standard bait and a container with 2 grams of normal diet (Purina Lab Chow 5001) were placed in each arena with the cockroaches and left until the test was ended. Percent mortality is shown in Table 7.

EXAMPLE 8

Orlando normal colonies of German cockroaches (*Blattella germanica*) containing 25 adults were treated in the same manner as in Example 7. Results are shown in Table 8.

EXAMPLE 9

Twenty-five late 3rd- and early 4th-stage larvae of *Anopheles quadrimaculatus* were placed in a 500 ml glass jar (9×8.5 cm diam) containing 100 ml of well water, 0.05 g ground hog supplement for larval food, and a known amount of the candidate compound in not more than 1.0 ml acetone. The jars were covered with cloth netting and held in constant temperature incubators at 26.7°–28.9° C. (80°–84° F.) and 65–75% RH; a low level of illumination (ca. 0.5 footcandles inside the incubators) was maintained during nonworking hours. Seven days after set up, the jars were examined for the number of dead pupae, the number of adults that were dead or unable to complete eclosion, and the number of exuviae. The live adults were observed for gross abnormalities. Tests were replicated for at least 1 concn. and a standard larvicide, methoprene, was used as a control with each test series.

Several concns. of each compound were tested so that a dose-response relationship could be established. Using the Statistical Analysis System supported by NERDC, the resulting data were corrected for control mortality (Abbott's formula) and a probit analyses was made using log transformed mortality data. This analysis provided estimates for the LC-50 and LC-90, in ppm, for the compound.

EXAMPLE 10

Compounds were screened as mosquito larvicides (insect growth regulators, IGR) by exposing early 4th-instar larvae of *Anopheles quadrimaculatus* to solutions or suspensions of the compounds in water (duplicate tests). The compounds were dissolved in acetone and added to water; water-soluble compounds remained in solution and the others became finely divided suspensions. Mosquito larvae were added to the treated water and mortality was determined after 24 hour of exposure. The compounds were initially tested at concns.of 10 and 1 parts per million. If 50% mortality occurred at 1 ppm, additonal tests were conducted with lower concns. A standard larvicide, temephos (Abate), was tested as a control concurrently.

Results are shown in Table 10.

The following indicates the criteria for compounds tested against mosquitoes:

Classification of IGR's Against Mosquitoes

Class	Criteria	LC-90 (ppm)
1	Ineffective at screening dose	>1.000
2	Partially effective but not promising	0.101–1.000
3	Effective enough to justify full investigation	0.021–0.100
4	Exceptional	≦0.020

TABLE I

Number	Structure	Mortality at Specified Days % 1	2	3	6	8	10	14
29752	C_2H_5 O | ‖ $C_8F_{17}SO_2NC_2H_4OP(OH)_2$	2	3	3	3	3	3	10
29753	C_2H_5 | $C_8F_{17}SO_2N(C_2H_4O)_3H$	0	0	0	8	65	87	93

TABLE I-continued

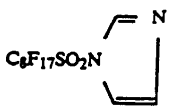
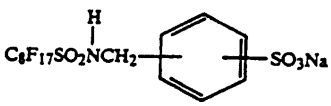
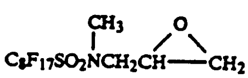
Number	Structure	Mortality at Specified Days % 1	2	3	6	8	10	14
29770	$C_6F_{13}SO_2\overset{\overset{H}{\mid}}{N}C_2H_5$	68	100					
29771	$C_8F_{17}SO_2\overset{\overset{C_2H_5}{\mid}}{N}C_2H_4O\overset{\overset{O}{\Vert}}{C}C_{17}H_{35}$	0	2	2	48	90	100	
29772	$C_8F_{17}SO_2\overset{\overset{C_4H_9}{\mid}}{N}C_2H_4O(C_3H_6O)_8H$	0	0	0	2	5	17	62
29773	$C_8F_{17}SO_2\overset{\overset{C_2H_5}{\mid}}{N}C_2H_4O(C_3H_6O)_8H$	0	2	2	2	2	12	43
29774	$C_4F_9SO_2\overset{\overset{H}{\mid}}{N}C_{12}H_{25}$	0	0	0	0	2	3	7
29775	$C_4F_9SO_2\overset{\overset{H}{\mid}}{N}C_3H_6N(CH_3)_2$	0	0	3	3	3	5	13
29776	$C_8F_{17}SO_2\overset{\overset{H}{\mid}}{N}C_3H_6N(CH_3)_2$	0	0	0	0	0	3	23
29777	$C_8F_{17}SO_2\overset{\overset{H}{\mid}}{N}C_{12}H_{25}$	0	0	5	47	82	98	100
29778		0	0	70	93	98	98	100
29779	$C_2F_5C_6F_{10}SO_3K$	0	2	2	7	7	10	15
29780	$C_7F_{15}CO_2NH_4$	0	0	2	2	3	3	5
29781		0	0	0	13	40	80	97
29782	$C_8F_{17}SO_2\overset{\overset{C_2H_5}{\mid}}{N}C_2H_4OH$	0	0	5	15	53	83	100
50950	$C_8F_{17}SO_3K$	0	0	0	0	0	0	0
10700	$C_8F_{17}SO_2\overset{\overset{H}{\mid}}{N}Na$	0	3	7	58	70	80	87
10701	$C_8F_{17}SO_2\overset{\overset{CH_3}{\mid}}{N}Na$	0	15	80	97	98	98	100
10702	$C_6F_{13}SO_2NH_2$	3	8	40	80	83	85	92
10703	$CF_3SO_2NH_2$	3	13	25	58	70	72	72
10704	$C_4F_9SO_2\overset{\overset{H}{\mid}}{N}CH_3$	68	97	100				
10705		2	2	2	3	8	15	30
10706	$C_8F_{17}SO_2\overset{\overset{CH_3}{\mid}}{N}-C_2H_4\overset{\overset{O}{\Vert}}{C}NH_2$	0	0	0	0	3	5	10
10707	$C_8F_{17}SO_2N(C_2H_5)_2$	17	100					

TABLE I-continued

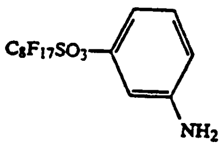
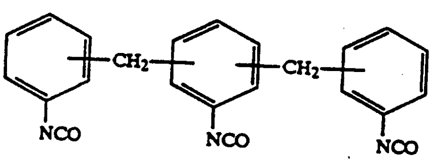
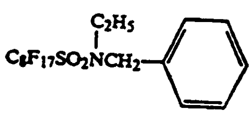
Number	Structure	Mortality at Specified Days %						
		1	2	3	6	8	10	14
29754	$C_8F_{17}SO_2\overset{C_4H_9}{\overset{\mid}{N}}C_2H_4OH$	0	0	0	3	32	72	93
29755	$C_6F_{13}SO_2\overset{C_2H_5}{\overset{\mid}{N}}C_2H_4OH$	0	0	0	17	38	87	97
29756	$C_8F_{17}SO_2\overset{CH_3}{\overset{\mid}{N}}C_4H_8OH$	3	3	13	73	90	97	98
29757	$C_8F_{17}SO_2\overset{H}{\overset{\mid}{N}}C_2H_5$	33	88	100				
29758	$C_8F_{17}SO_2\overset{H}{\overset{\mid}{N}}CH_3$	18	88	100				
29759	$C_8F_{17}SO_2NH_2$	18	63	85	88	97	100	
29760		0	0	0	0	0	3	70
29761	$C_8F_{17}SO_2\overset{H}{\overset{\mid}{N}}C_2H_4NH_2$	2	2	2	2	2	2	10
29762	$C_8F_{17}SO_2\overset{C_2H_5}{\overset{\mid}{N}}(C_2H_4NH)_2C_2H_4NH_2$	2	2	2	2	2	2	10
29763	$C_6F_{13}SO_2\overset{C_2H_5}{\overset{\mid}{N}}(C_2H_4O)_{12}H$	2	3	3	7	7	13	40
29764	$C_{10}F_{21}SO_2\overset{C_2H_5}{\overset{\mid}{N}}(C_2H_4O)_{14}H$	0	0	0	0	0	0	17
29765	$C_8F_{17}SO_2\overset{C_{12}H_{25}}{\overset{\mid}{N}}C_2H_4OH$	0	0	0	2	17	47	83
29766	Adduct from 1 mole  1 mole $C_{18}H_{37}OH$ and 2 moles $C_8F_{17}SO_2\overset{C_2H_5}{\overset{\mid}{N}}C_2H_4OH$	0	0	0	3	3	3	23
29767		0	0	0	2	25	80	97
29768	$C_8F_{17}SO_2\overset{C_2H_5}{\overset{\mid}{N}}(C_2H_4O)_{12.5}CH_3$	0	0	0	7	42	87	97
29769	$C_8F_{17}SO_2\overset{C_2H_5}{\overset{\mid}{N}}(C_2H_4O)_{17}CH_3$	0	0	13	70	90	95	98

TABLE I-continued

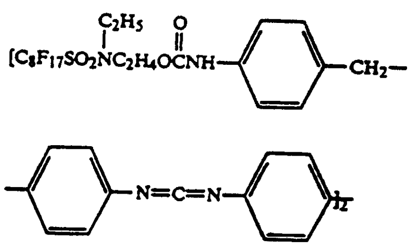
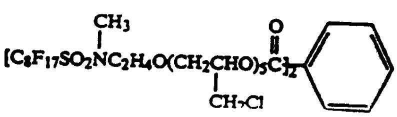
Number	Structure	Mortality at Specified Days % 1	2	3	6	8	10	14
10708	$C_8F_{17}SO_2N(CH_3)(CH_2)_{10}N(CH_3)SO_2C_8F_{17}$	0	2	2	7	7	7	7
10709	$C_8F_{17}SO_2N(C_2H_5)CH_2C{\equiv}CH$	0	2	2	48	53	72	85
10710	$n\text{-}C_8F_{17}SO_2N(H)CH_2CH{=}CH_2$	2	25	55	90	95	98	98
10711	$C_8F_{17}SO_2N(H)CH_2CH{=}CH_2$	0	12	40	93	97	98	98
10712	$C_8F_{17}SO_2N(H)CH(CH_3)_2$	8	88	100				
10713	$C_8F_{17}SO_2N(H)C(CH_3)_3$	0	0	0	0	0	0	5
10714	$C_8F_{17}SO_2N(H)C_6H_5$ (mixed isomers)	75	82	82	90	90	92	93
10715	$n\text{-}C_8F_{17}SO_2N(H)C_6H_5$ (recrystallized linear isomers)	68	82	85	92	92	92	100
10716	$C_8F_{17}SO_2N(H)C_6H_5$ (branched isomers)	52	63	63	77	83	88	90
10717	$C_8F_{17}SO_2N(CH_3)CH{=}CH_2$	23	87	98	100			
10718	$C_8F_{17}SO_2N(CH_2CH{=}CH_2)(CH_2CH(OH)CH_2Cl)$	0	2	3	3	3	5	12
10719		2	5	7	7	7	7	7
10720		0	0	0	3	7	12	32
10721	$C_8H_{17}SO_2NH_2$	5	7	8	12	12	12	12
10722	$C_8H_{17}SO_2N(H)C_{12}H_{25}$	0	0	0	2	3	3	3

TABLE I-continued

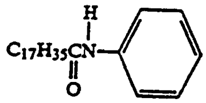
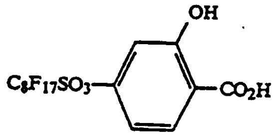
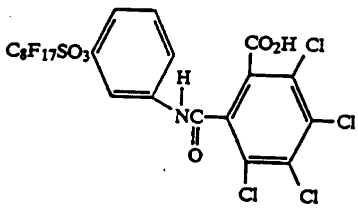
Number	Structure	Mortality at Specified Days % 1	2	3	6	8	10	14
10723		2	2	2	5	5	7	8
10724	$C_8F_{17}SO_2N(C_2H_5)CH_2CO_2H$	0	0	0	2	2	2	3
10725		0	0	0	0	7	18	52
10726		0	0	0	0	0	0	0
10727	$C_8F_{17}SO_3H$	0	3	3	12	12	22	22
10728	$C_6F_{13}SO_3H$	0	0	0	3	7	7	8
10729	$C_8F_{17}SO_2N(C_2H_5)CH_2CO_2CH_3$	0	0	0	7	13	25	50
10730	$C_8F_{17}SO_2N(C_3H_7)C_2H_4OH$	0	2	2	3	20	30	62
10731	$C_8F_{17}SO_2N(C_2H_4OH)_2$	0	0	0	2	5	10	35
10732	$C_8F_{17}SO_2N(CH_3)CH_2CH(OH)-CH_2(OH)$	0	0	0	2	2	2	5
10733	$C_8F_{17}SO_2N(C_2H_5)C_2H_4Cl$	5	50	70	93	97	98	100
10734	$C_8F_{17}SO_2N(CH_3)C_4H_8SH$	2	3	5	5	8	20	57
10735	$C_8F_{17}C_2H_4SH$	3	3	3	3	3	5	5
10736	$[CF_2CF_2SO_2NH_2]_2$	0	2	2	3	3	3	5
10737	$\underline{n}$-$C_3F_7C(=O)NH_2$	0	3	3	10	10	10	25
10738	$C_5F_{11}C(=O)NH_2$	3	3	3	5	5	5	5
10739	$C_7F_{15}C(=O)NH_2$	0	0	0	2	2	2	2
10740	$C_7F_{15}C(=O)N(H)CH_2C_6H_5$	0	0	0	0	0	3	3

TABLE I-continued

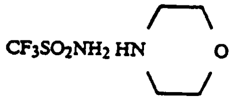
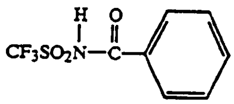
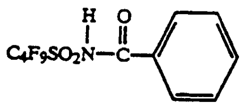
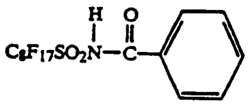
Number	Structure	Mortality at Specified Days % 1	2	3	6	8	10	14
10741	$CF_3SO_2N(H)CH_3$	3	3	3	32	35	38	48
10742	$CF_3SO_2N(CH_3)_2$	82	82	82	82	82	82	90
10743		0	0	0	12	13	15	20
10744	$C_2F_5SO_2NH_2$	3	17	22	35	40	45	50
10745	$C_4F_9SO_2NH_2$	0	0	0	3	3	3	5
10746		0	5	8	13	15	17	23
10747		0	0	0	32	48	53	73
10748		3	13	17	37	42	47	85
10749	$C_8F_{17}SO_2N(C_2H_5)—(C_2H_4O)_7CH_3$	2	5	5	38	57	80	88
10750	$C_8F_{17}SO_3{}^{\ominus}{}^{\oplus}N(C_2H_5)_4$	0	0	0	3	3	3	7
10751	$C_6F_{10}(CH_2OH)_2$ (Cyclic)	2	5	5	23	28	32	58
10752	$FCH_2SO_2NH_2$	0	0	2	30	33	43	53
10753	$HCF_2SO_2NH_2$	0	2	2	13	18	20	30
10754	$CF_3CH_2SO_2NH_2$	0	0	0	2	3	5	13
	Standard	0	12	97	100			
	SBO	0	0	0	5	8	9	13

TABLE 2

Number	Structure	Conc. %	Percent Mortality at Specified Days 1	2	3	6	8	10	14	17	21
29753	$C_8F_{17}SO_2N(C_2H_5)(C_2H_4O)_3H$	0.01	0	0	0	0	3	7	7	13	20
		0.1	0	0	0	0	0	0	3	7	27
		1.0	0	0	2	52	87	98	99	100	
29754	$C_8F_{17}SO_2N(C_4H_9)C_2H_4OH$	0.01	0	0	0	0	0	0	0	0	2
		0.1	0	2	2	3	3	3	25	48	78
		1.0	0	0	0	0	0	40	92	98	100
29755	$C_6F_{13}SO_2N(C_2H_5)C_2H_4OH$	0.01	0	0	0	5	7	12	15	22	28
		0.1	0	0	0	2	2	7	10	23	40
		1.0	0	0	0	12	45	80	95	98	98
29756	$C_8F_{17}SO_2N(CH_3)C_4H_8OH$	0.01	0	0	2	5	8	8	8	10	13
		0.1	0	0	0	2	5	30	75	85	92
		1.0	0	2	10	83	85	95	100		
29757	$C_8F_{17}SO_2N(H)C_2H_5$	0.01	0	0	0	0	2	2	10	22	50
		0.1	0	0	2	80	97	97	98	98	100
		1.0	25	100							
29758	$C_8F_{17}SO_2N(H)CH_3$	0.01	0	0	2	3	7	7	7	23	40
		0.1	0	0	7	88	97	98	100		
		1.0	17	93	100						
29759	$C_8F_{17}SO_2NH_2$	0.01	0	0	0	3	7	7	10	20	23
		0.1	0	0	0	2	33	77	92	95	98

TABLE 2-continued

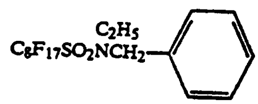
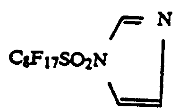
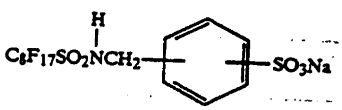
Number	Structure	Conc. %	Percent Mortality at Specified Days 1	2	3	6	8	10	14	17	21
		1.0	43	85	98	100					
29765	$C_8F_{17}SO_2N(C_{12}H_{25})C_2H_4OH$	0.01	0	0	0	0	0	0	0	0	0
		0.1	0	0	0	0	0	0	2	3	15
		1.0	0	0	0	0	2	32	77	88	100
29767		0.01	0	0	0	0	0	3	3	3	3
		0.1	0	0	0	2	2	3	8	18	42
		1.0	0	0	0	2	42	83	100		
29769	$C_8F_{17}SO_2N(C_2H_5)(C_2H_4O)_{17}CH_3$	0.01	0	0	0	3	7	7	10	13	17
		0.1	0	0	0	2	3	5	10	25	48
		1.0	0	0	32	100					
29770	$C_6F_{13}SO_2N(H)C_2H_5$	0.01	2	2	3	5	7	8	10	13	15
		0.1	0	2	2	5	7	17	48	58	70
		1.0	47	98	98	100					
29771	$C_8F_{17}SO_2N(C_2H_5)C_2H_4OC(=O)C_{17}H_{35}$	0.01	0	0	0	0	0	8	10	13	18
		0.1	2	2	2	7	10	17	20	32	58
		1.0	0	0	2	87	98	98	98	98	98
29772	$C_8F_{17}SO_2N(C_4H_9)C_2H_4O(C_3H_6O)_8H$	0.01	0	0	2	2	2	2	2	2	2
		0.1	0	0	0	0	0	3	3	15	45
		1.0	0	2	2	2	2	40	87	97	100
29773	$C_8F_{17}SO_2N(C_2H_5)C_2H_4O(C_3H_6O)_8H$	0.01	0	0	0	0	0	0	0	0	0
		0.1	0	0	0	0	0	0	0	3	17
		1.0	0	0	0	3	5	23	37	45	60
29776	$C_8F_{17}SO_2N(H)C_3H_6N(CH_3)_2$	0.01	0	0	0	0	2	2	2	2	2
		0.1	0	0	0	2	2	2	2	2	3
		1.0	0	0	0	0	0	0	0	7	35
29777	$C_8F_{17}SO_2N(H)C_{12}H_{25}$	0.01	0	0	0	5	5	5	7	13	17
		0.1	0	0	0	0	2	2	20	50	80
		1.0	0	2	3	78	97	100			
29778		0.01	2	3	3	8	8	8	13	15	18
		0.1	0	2	3	10	10	52	67	80	88
		1.0	0	2	17	92	100				
29779	$C_2F_5C_6F_{10}SO_3K$	0.01	0	0	0	2	2	2	2	2	2
		0.1	0	0	0	0	2	3	3	3	3
		1.0	0	0	0	0	2	2	5	5	7
29781		0.01	0	0	0	2	2	5	5	7	7
		0.1	0	0	0	3	3	5	8	12	23
		1.0	0	0	0	77	93	95	100		
29782	$C_8F_{17}SO_2N(C_2H_5)C_2H_4OH$	0.01	0	0	2	2	2	2	2	2	3
		0.1	0	0	0	0	2	2	8	40	60
		1.0	0	0	0	45	67	88	98	100	
10700	$C_8F_{17}SO_2N(H)Na$	0.01	2	3	3	7	7	7	8	12	15
		0.1	2	3	3	8	12	40	70	82	95
		1.0	0	2	10	75	88	93	98	100	
10701	$C_8F_{17}SO_2N(CH_3)Na$	0.01	0	0	0	0	0	0	0	2	7
		0.1	0	0	0	18	65	83	95	97	98
		1.0	23	87	100						
10702	$C_6F_{13}SO_2NH_2$	0.01	0	0	0	2	2	2	2	5	12
		0.1	3	7	7	7	7	17	63	77	92
		1.0	0	3	30	67	75	87	95	98	100
10703	$CF_3SO_2NH_2$	0.01	0	0	0	3	3	5	7	8	17
		0.1	3	3	3	5	5	5	17	27	58
		1.0	2	8	18	33	42	50	67	73	82
10704	$C_4F_9SO_2N(H)CH_3$	0.01	0	2	3	7	7	8	8	15	27
		0.1	2	2	2	3	3	3	3	3	10
		1.0	87	98	98	98	98	100			
10707	$C_8F_{17}SO_2N(C_2H_5)_2$	0.01	0	0	0	2	5	10	20	50	60

TABLE 2-continued

Number	Structure	Conc. %	Percent Mortality at Specified Days 1	2	3	6	8	10	14	17	21
		0.1	0	7	13	78	92	98	100		
		1.0	30	100							
10709	C_2H_5 $C_8F_{17}SO_2NCH_2C{\equiv}CH$	0.01	5	5	5	5	5	5	15	15	30
		0.1	2	2	2	2	3	5	43	73	87
		1.0	0	0	0	2	45	60	90	93	100
10710	H n-$C_8F_{17}SO_2NCH_2CH{=}CH_2$	0.01	2	2	2	2	2	2	12	37	75
		0.1	3	3	3	48	60	78	93	98	100
		1.0	13	53	80	100					
10711	H $C_8F_{17}SO_2NCH_2CH{=}CH_2$	0.01	2	2	2	3	5	5	5	7	28
		0.1	3	3	3	18	42	85	97	98	100
		1.0	23	57	72	88	100				
10712	H $C_8F_{17}SO_2NCH(CH_3)_2$	0.01	2	2	2	2	2	3	5	27	65
		0.1	0	0	10	75	93	98	100		
		1.0	83	97	100						
10714	H $C_8F_{17}SO_2NC_6H_5$ (mixed isomers)	0.01	0	0	0	2	3	3	7	17	27
		0.1	0	2	2	8	53	70	93	95	98
		1.0	83	87	88	95	97	97	100		
10715	H n-$C_8F_{17}SO_2NC_6H_5$ (recrystalized linear isomer)	0.01	2	2	2	2	2	2	3	12	27
		0.1	0	0	0	18	63	87	90	95	98
		1.0	88	92	93	97	98	98	98	98	100
10716	H $C_8F_{17}SO_2NC_6H_5$ (branched isomer)	0.01	2	5	5	8	8	8	8	13	27
		0.1	0	3	3	12	40	70	93	97	97
		1.0	78	83	87	100					
10717	CH_3 $C_8F_{17}SO_2NCH{=}CH_2$	0.01	0	0	0	8	8	13	25	37	57
		0.1	0	7	33	77	90	92	100		
		1.0	100								
10733	C_2H_5 $C_8F_{17}SO_2NC_2H_4Cl$	0.01	0	0	0	0	3	3	5	23	47
		0.1	0	0	2	22	83	95	97	100	
		1.0	57	87	98	100					
10742	$CF_3SO_2N(CH_3)_2$	0.01	0	0	0	0	0	3	12	13	30
		0.1	0	0	3	3	5	8	17	35	53
		1.0	88	90	90	97	98	98	98	98	100
10749	C_2H_5 $C_8F_{17}SO_2N(C_2H_4O)_7CH_3$	0.01	2	3	3	3	3	5	8		
		0.1	5	5	8	15	20	23	40		
		1.0	2	5	5	38	57	80	88		
—	Copolymer of 30% C_4H_9 O H $C_8F_{17}SO_2NC_2H_4OC{-}C{=}CH_2$ O 70% $CH_2{=}CHCO(C_2H_4O)_{10}{-}$ $(C_3H_6O)_{22}(C_2H_4O)_{10}{-}$ O $OCH{=}CH_2$	0.01	—	—	—	—	—	—	—	—	—
		0.1	0	8	10	18	18	20	52	—	87
		1.0	3	3	7	13	15	22	47	—	73
—	50% Copolymer of C_2H_5 30% $C_8F_{17}SO_2NC_2H_4{-}$ O CH_3 $OC{-}C{=}CH_2$	0.01	—	—	—	—	—	—	—		—
		0.1	2	3	5	10	12	13	30	—	80
		1.0	5	7	7	15	22	25	58	—	78

TABLE 2-continued

Number	Structure	Conc. %	Percent Mortality at Specified Days								
			1	2	3	6	8	10	14	17	21
	70% $CH_3O(C_2H_4O)_{16}$ $\overset{O}{\overset{\|}{C}}-\overset{H}{\overset{\|}{C}}=CH_2$ 50% $C_2H_5O\overset{O}{\overset{\|}{C}}CH_3$										
Standard		0.01	0	0	0	0	12	37	48	62	83
		0.1	3	5	20	88	97	100			
		1.0	2	75	100						
SBO			0	1	1	3	6	11	13	19	22

TABLE 3

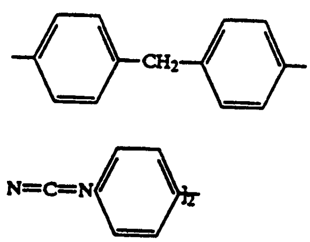
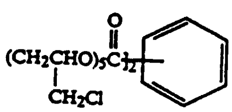
Numbers	Structure	Conc. %	PERCENT MORTALITY AT SPECIFIED DAYS						
			1	2	3	6	8	10	14
50950	$C_8F_{17}SO_3K$	1.0	2	2	23	87	100		
10700	$C_8F_{17}SO_2\overset{H}{\overset{\|}{N}}Na$	1.0	2	37	73	98	100		
10701	$C_8F_{17}SO_2\overset{CH_3}{\overset{\|}{N}}Na$	1.0	62	97	100				
10705	$C_8F_{17}SO_2\overset{CH_3}{\overset{\|}{N}}CH_2CH\overset{O}{—}CH_2$	1.0	0	0	0	0	0	8	42
10706	$C_8F_{17}SO_2\overset{CH_3}{\overset{\|}{N}}C_2H_4\overset{O}{\overset{\|}{C}}NH_2$	1.0	0	0	2	2	2	7	62
10708	$C_8F_{17}SO_2\overset{CH_3}{\overset{\|}{N}}(CH_2)_{10}\overset{CH_3}{\overset{\|}{N}}SO_2C_8F_{17}$	1.0	0	0	0	0	0	0	35
10710	n-$C_8F_{17}SO_2\overset{H}{\overset{\|}{N}}CH_2CH=CH_2$	1.0	0	12	55	97	97	98	100
10712	$C_8F_{17}SO_2\overset{H}{\overset{\|}{N}}CH(CH_3)_2$	1.0	23	100					
10719	$[C_8F_{17}SO_2\overset{C_2H_5}{\overset{\|}{N}}C_2H_4O\overset{O}{\overset{\|}{C}}NH-$ 	1.0	0	0	3	10	33	55	85
10720	$[C_8F_{17}SO_2\overset{CH_3}{\overset{\|}{N}}C_2H_4O-$ 	1.0	10	22	33	33	33	35	43

TABLE 3-continued

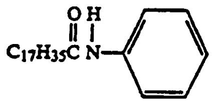
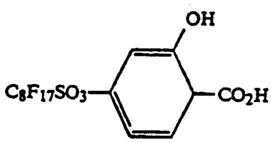
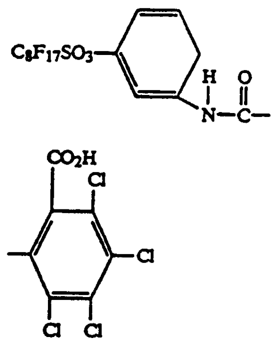
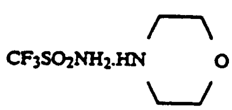
Numbers	Structure	Conc. %	PERCENT MORTALITY AT SPECIFIED DAYS 1	2	3	6	8	10	14
10722	$C_8H_{17}SO_2N(H)C_{12}H_{25}$	1.0	0	0	0	0	2	3	5
10723		1.0	0	0	0	0	0	0	0
10724	$C_8F_{17}SO_2N(C_2H_5)CH_2CO_2H$	1.0	0	0	2	7	7	10	12
10725		1.0	0	0	2	2	3	5	8
10726		1.0	0	0	0	0	0	2	5
10727	$C_8F_{17}SO_3H$	1.0	0	37	62	95	100		
10728	$C_6F_{13}SO_3H$	1.0	15	77	95	100			
10729	$C_8F_{17}SO_2N(C_2H_5)CH_2CO_2CH_3$	1.0	0	0	0	22	40	58	90
10730	$C_8F_{17}SO_2N(C_3H_7)C_2H_4OH$	1.0	0	0	0	0	2	12	77
10731	$C_8F_{17}SO_2N(C_2H_4OH)_2$	1.0	0	0	0	0	0	25	57
10732	$C_8F_{17}SO_2N(CH_3)CH_2CH(OH)-CH_2(OH)$	1.0	0	0	0	0	0	0	2
10734	$C_8F_{17}SO_2N(CH_3)C_4H_8SH$	1.0	0	0	0	2	2	2	5
10738	$C_5F_{11}C(=O)NH_2$	1.0	0	0	2	2	2	7	10
10739	$C_7F_{15}C(=O)NH_2$	1.0	0	0	0	2	3	17	35
10740	$C_7F_{15}C(=O)N(H)CH_2C_6H_5$	1.0	0	0	0	0	2	2	2
10743		1.0	0	2	2	15	27	42	57

TABLE 3-continued

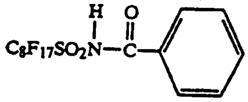
Numbers	Structure	Conc. %	PERCENT MORTALITY AT SPECIFIED DAYS 1	2	3	6	8	10	14	
10748		1.0	0	0	0	2	3	13	63	
10750	$C_8F_{17}SO_3^{\ominus}\ {}^{\oplus}N(C_2H_5)_4$	1.0	10	47	95	100				
10752	$FCH_2SO_2NH_2$	1.0	0	0	0	2	5	17	45	
10754	$CF_3CH_2SO_2NH_2$	1.0	0	0	0	0	0	2	18	
—	Copolymer of 30% $C_8F_{17}SO_2N(C_4H_9)C_2H_4-OC(=O)-C(H)=CH_2$ 70% $CH_2=CHC(=O)O(C_2H_4O)_{10}-(C_3H_6O)_{22}(C_2H_4O)_{10}-C(=O)-C(H)=CH_2$	1.0	0	7	12	20	20	25	52	62
—	50% of Copolymer 30% $C_8F_{17}SO_2N(C_2H_5)C_2H_4-OC(=O)-C(CH_3)=CH_2$ 70% $CH_3O(C_2H_4O)_{16}C(=O)-C(H)=CH_2$ 50% $C_2H_4OC(=O)CH_3$	1.0	0	2	2	10	13	18	40	73
	Standard	1.0	0	100						
	Honey:Water		0	0	0	0	0	1	1	

TABLE 4

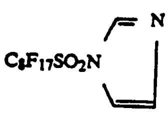
Number	Structure	Percent worker mortality after following days of initial exposure to bait 2	10	14	16	23	26
29757	$C_8F_{17}SO_2N(H)C_2H_5$	40	87	95 QD			
29757		10	50	75	92 QD		
29758	$C_8F_{17}SO_2N(H)CH_3$	10	30	50	75	90	92 QD
29758		5	28	35 QD			
29759	$C_8F_{17}SO_2NH_2$	15	50	65 QD			
29759		8	25	30	30	50 QD	
29778		0	10	35	50 QD		
29778		0	15 QD				
Control		0	1	2	2	2	2 CN

TABLE 4-continued

Number	Structure	Percent worker mortality after following days of initial exposure to bait					
		2	10	14	16	23	26
Control		0	2	3	3	5	5 CN

TABLE 5

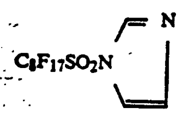
Number	Structure	% Mortality After 3 Days
29756	$C_8F_{17}SO_2\overset{CH_3}{\overset{\vert}{N}}C_4H_8OH$	0
29757	$C_8F_{17}SO_2\overset{H}{\overset{\vert}{N}}C_2H_5$	0
29758	$C_8F_{17}SO_2\overset{H}{\overset{\vert}{N}}CH_3$	0
29759	$C_8F_{17}SO_2NH_2$	80
29778		60
Untreated Fly Food		0

TABLE 6

Treatment	Conc. %	POPULATION INDEX Pre-treatment	6 weeks	% Reduction
Untreated		305	305	0
		130	155	0
		105	185	0
Standard	1	120	19	84
		140	0	100
		255	15	94
29758	1	170	0	100
		190	7	96
		170	0	100
29757	1	150	0	100
		160	48	70
		160	32	80
29759	2.5	195	2	99
		180	0	100
		175	25	96
29759	1	165	0	100
		195	25	87
		180	81	55

TABLE 7

Treatment	Percent Mortality After Indicated Days 1	2	3	7	10
29756	0	0	0	60	100
	0	0	20	100	
29757	0	10	30	90	100
	0	40	40	100	
29758	0	30	40	80	100
	0	20	30	90	100
29759	20	50	90	100	
	30	80	90	100	
29778	0	20	40	100	
	0	50	80	100	
Standard	100				
	100				
Cornmeal-Powdered Sugar Mixture	0	0	0	0	0
	0	0	0	0	0

TABLE 8

Treatment	Percent Mortality After Indicated Days 1	2	3	7	10
29756	44	88	100		
	56	100			
	68	88	96	100	
	68	88	100		
29757	88	100			
	92	96	100		
	92	92	100		
	88	96	96	100	
29758	84	84	92	100	
	80	92	100		
	76	88	96	100	
	88	92	96	100	
29759	84	92	100		
	96	96	100		
	100				
	96	100			
29778	100				
	92	96	100		
	96	96	100		
	96	100			
Standard	100				
	92	96	96	96	100
	100				
	100				
Cornmeal-powdered Sugar Mixture	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0

TABLE 9

Chemical Code No.	Lethal Concentration (ppm) LC-50	LC-90
29756	0.0167	0.0486
29757	.0054	.0200
29758	.0067	.0274
29759	.0029	.0081
29778	.0209	.0374
Control	.0016	.0069

TABLE 10

Chemical Code No.	% Mortality After 24 hrs., Conc. (ppm) 10	1.0	0.1	0.01	0.001
29756	100	96	0		
29757	100	96	34		
29758	100	82	78		
29759	100	16	0		
29778	44	22	0		
Control				98	38

We claim:

1. A method for the control of a population of a selected species of arthropods comprising the steps of:

(a) providing to said selected species of arthropods a bait formulation comprising:

(1) an effective amount of a toxicant substance or mixture of substances having the structural formula:

$$CF_3(CF_2)_x—SO_2—OR$$

wherein x=0 to 19; R is selected from the group consisting of H, alkaline earth metal, alkali metal, organic amine cation containing not more than 20 carbon atoms and ammonium cation; and

(2) an attractant bait component for said selected species of arthropods, said attractant bait being in an amount and of a type which when combined with said toxicant substance entices said selected species of arthropods to ingest said toxicant substance and said bait formulation is not substantially odor repellent or taste repellent to said arthropods, said bait formulation being transportable by foraging member of said selected species of arthropods from a location external to said arthropod's nest or harborage back to said population off arthropods, said toxicant substance having delayed action sufficient to permit said foraging arthropods to transport said substance back to their nest or harborage before said foraging arthropods are killed by said toxicant substance; and

(b) permitting said selected species of arthropods to ingest said bait formulation such that said selected species of arthropods are killed by the delayed effect of said ingested toxicant substance and said toxicant substance is distributed to other members of said population of selected species of arthropods.

2. The method of claim 1, wherein R is hydrogen.

3. The method of claim 1, wherein R is potassium.

4. The method of claim 1, wherein R is $+N(C_2H_5)_4$.

5. The method of claim 1, wherein x=7 and R is potassium.

6. The method of claim 1, wherein R is selected from the group consisting of lithium, sodium, and potassium.

7. The method of claim 1, wherein R is selected from the group consisting of barium, calcium, and magnesium.

8. The method of claim 1, wherein x=4 to 19.

9. The method of claim 1, wherein said attractant bait is selected from the group consisting of edible oils, edible fats, vegetable seed meals, meat by-products, blood, fish meal, syrups, honey, sucrose, sugars, peanut butter, and cereals.

10. The method of claim 1, wherein said toxicant substance is $C_8F_{17}SO_3K$ and said attractant bait is an edible oil.

11. A method for the control of a population of a selected species of arthropods comprising the steps of:

(a) providing to said selected species of arthropods a bait formulation comprising:

(1) an effective amount of a toxicant substance or mixture of substances having the structural formula:

$$CF_3(CF_2)_x—SO_2—OR$$

wherein x=0 to 19; R is selected from the group consisting of H, alkaline earth metal, alkali metal, organic mine cation containing not more than 20 carbon atoms and ammonium cation:

(2) an attractant bait component for said selected species of arthropods; and

(3) a carder for said attractant bait and toxicant substance; said attractant bait being in an amount and of a type which when combined with said toxicant substance entices said selected species of arthropods to ingest said toxicant substance and said bait formulation is not substantially odor repellent or taste repellent to said selected species of arthropods, said bait formulation being transportable by foraging member of said selected species of arthropods from a location external to said selected species of arthropod's nest or harborage back to said population of selected species of arthropods, said toxicant substance having delayed action sufficient to permit said foraging members of said selected species of arthropods to transport said substance back to their nest or harborage before said foraging members of said selected species of arthropods are killed by said toxicant substance; and

(b) permitting members of said population of selected species of arthropods in said nest to ingest said bait formulation such that said selected species of arthropods are killed by the delayed effect of said ingested toxicant substance and said toxicant substance is distributed to other members of said population of selected species of arthropods.

12. The method of claim 11, wherein said toxicant substance is $C_8F_{17}SO_3K$ and said attractant bait is an edible oil.

13. The method of claim 11, wherein said carrier is selected from the group consisting of corn cob grits, pregel and defatted corn grits.

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