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INSECT CONTROL

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1

This invention deals with a new insect control composition of great utility and is particularly concerned with substances suitable for use in household sprays, which substances are repellent or toxic, or both.

Among the best known and most useful insecticides at present are pyrethrum and rotenone. These are both derived from plants grown primarily in foreign countries and are therefore expensive and not always obtainable in the desired quantities.

It is an object of the present invention to provide an insecticide which can be manufactured from readily available and inexpensive domestic materials. It is a further object of this invention to provide an insecticide which, although not fast-acting, is repellent and toxic. A special object is to provide an insecticide of unusual effectiveness in the control of the larvae of moths. Other and further objects will appear as the description proceeds.

It has now been found that unsaturated alkyl nitriles having 14 to 30 carbon atoms are effective as insecticides. Unsaturated nitriles having 16 to 20 carbon atoms are more effective as insecticides than those with 14 or 30. The unsaturated alkyl radicals may be straight, branched or alicarbocyclic, such as cetenylic, oleic, eicosenoic, lauryl cyclohexenylic, cetyl cyclohexenylic, cetenyl cyclohexylic, cetenyl cyclohexenylic, hexenyl dicyclohexylic, etc., radicals. If desired, the alkyl radical may contain additional toxic radicals, such as chlorine, sulfide, amino, keto, hydroxyl, nitro, cyanate, etc., radicals. Thus ricinoleic nitrile is among the compounds of this invention. A single nitrile or mixtures of several may be used for the purpose of the invention. Preferred nitriles are the straight-chain aliphatic nitriles having a single olefinic double bond, e. g., cetenylic, oleic, erucic, etc., nitriles.

Although it will be understood that the nitriles of the instant invention have wide application in the control of various insects, the examples set out in the table to follow are confined to the control of clothes moths.

The method of testing used in evaluating the instant compounds as mothproof agents is known as the "whole circle test" and is fully described in Industrial and Engineering Chemistry, Analytical Edition, vol. 2, No. 4, page 365, under the title "Methods of testing mothproofing compounds." The method consists of placing a two-inch square of woolen material, treated with the mothproofing agent being tested, in a petri dish with ten black carpet beetle larvae (*Attagenus*

2

piceus, Oliv.) and observing the damage done to the fabric. In the set of tests shown in the table, the woolen squares were observed four weeks after addition of the larvae to the dishes. The woolen squares were treated by spraying either one-half or one cubic centimeter of the insecticide onto the squares from a distance of 14 inches, immediately hanging the squares up to dry, and aging them by hanging in a screened cage in the insecticide laboratory until used for testing. The efficacy of the treatment is determined by the observed damage to the woolen square and the amount of frass and lint produced, the latter being a quantitative measure of the feeding done by the larvae.

The results shown in the table following show a comparison between oleic nitrile and four mothproofing insecticides of commerce:

Sample number	Mothproofing agent	Amount sprayed	Wt. (mg.) of frass and lint produced	Observed damage to wool test piece
		C.c.		
1	A	½	20	Slight.
2	A	1	9	Moderate.
3	B	½	20	Much.
4	B	1	16	Do.
5	C	½	19	Do.
6	C	1	23	Do.
7	D	½	26	Do.
8	D	1	25	Do.
9	Oleic nitrile 5% (small). Mineral spirits 95% (small).	½	4	Slight.
10	do	1	4	None.
11	Mineral spirits	1	47	Very much.

The repellent action of the nitriles is indicated by the results in the following table which show that the larvae of the Black Carpet Beetle were deterred from feeding rather than eating and becoming poisoned. Testing was done in the same manner as described before and the sample tested consisted of 5% oleic nitriles, 95% mineral spirits. Results were as follows:

Quantity of material applied	Number larvae dead	Number alive	Amount of feeding	Amount of frass
Cc.				*Mg.*
0.5	6	2 (1 missing)	Slight	4.3
1.0	3	7	None observed	4.5
.5	2	8	Moderate	10.3
1.0	3	4 (3 missing)	Little	6.2

Besides being useful in themselves as a toxicant or repellent, the unsaturated nitriles of the instant invention are useful in conjunction with

well-known insecticides and fungicides. Thus the nitriles may be used in combination with pyrethrum, rotenone, lead arsenate, nicotine, thiocyanates, isothiocyanates, copper naphthenate, or the like.

The unsaturated nitriles may be applied to plants and animals in a variety of ways. For use as household insecticides, the nitriles may be dissolved in a light hydrocarbon oil such as kerosene or kerosene distillate with or without the addition of other insecticides and sprayed. Ordinarily, from about 1% to 25% of the unsaturated nitriles are used in such spray oils. For use on plants, the nitriles may be dissolved in plant spray oils and emulsified in water to produce sprayable emulsions. The common emulsifying agents such as glycerol mono-oleate, amine salts, sulfated and sulfonated fatty and mineral oils, soaps, and the like, may be used in combination with such sprays. In the same manner, the nitriles themselves, without the addition of oil, may be emulsified and used in plant spray insecticides. The nitriles may also be adsorbed by finely divided solid materials, such as wood flour, talc, clay, sulfur or carbon black, and used as dusting insecticides.

I claim as my invention:

1. An insect control composition comprising a predominant amount of mineral spirits and containing from 1% to 25% of an unsaturated aliphatic nitrile having from 16 to 20 carbon atoms.

2. A method of mothproofing wool comprising applying to it a small amount of a composition containing as the active ingredient an unsaturated aliphatic nitrile having from 16 to 20 carbon atoms.

3. A method of mothproofing wool comprising applying to it a small amount of a composition comprising a major proportion of mineral spirits and containing from 1% to 25% of oleic nitrile.

4. A method of repelling insects from an area comprising treating the area with a composition containing oleonitrile as an active essential ingredient.

5. A method of combating insects from an area comprising treating the area with a composition containing as an active insecticidal ingredient an unsaturated aliphatic nitrile having from 16 to 20 carbon atoms.

6. A method of combating insects from an area comprising treating the area with a composition containing as an active insecticidal ingredient an unsaturated straight chain aliphatic nitrile having from 16 to 20 carbon atoms.

7. A method of combating insects from an area comprising treating the area with a composition containing as an active insecticidal ingredient an unsaturated branched-chain aliphatic nitrile having from 16 to 20 carbon atoms.

8. A method of combating insects from an area comprising treating the area with a composition containing as an active insecticidal ingredient an unsaturated alicarbocyclic nitrile having from 16 to 20 carbon atoms.

9. A method of combating insects from an area comprising treating the area with a composition containing as an active insecticidal ingredient a mono-olefinic aliphatic nitrile having from 16 to 20 carbon atoms.

10. A method of combating insects from an area comprising treating the area with a composition containing as an active insecticidal ingredient a mono-olefinic straight-chain aliphatic nitrile having from 16 to 20 carbon atoms.

11. An insect control composition comprising a predominant amount of mineral spirits and a minor amount of an unsaturated aliphatic nitrile having from 16 to 20 carbon atoms.

12. An insect control composition comprising a predominant amount of mineral spirits and a minor amount of oleic nitrile, sufficient in amount to render said composition toxic to insect life.

13. An insect control composition comprising a vehicle and dispersed therein a minor amount of oleic nitrile, sufficient in amount to render said composition toxic to insect life.

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