

DEVICE FOR KILLING ARTHROPODS

BACKGROUND OF THE INVENTION

This invention concerns a device for killing arthropods especially flying insects and most especially flies. For the sake of brevity, the description provided hereafter will refer to the device primarily in its capacity to kill flies.

Certain 2-(nitromethylene)-1,3-thiazines and derivatives thereof are disclosed in U.S. Pats. 3,993,648 and 4,065,560 as having useful insecticidal activity against the house fly (*Musca domestica*). The insecticidal activity of tetrahydro-2-(nitromethylene)-2H-1,3-thiazine (TNMT) and other nitromethylene heterocycles are disclosed in Pesticides and Venom Neurotoxicity, Shankland et al., pages 153 to 169 (1978). The physical, chemical and insecticidal properties of these compounds are further disclosed in Advances in Pesticide Science, Part 2, Geissbuhler et al., pages 206 to 217, Symposia Papers from Fourth International Congress of Pesticide Chemistry, July, 1978.

There are myriad patent disclosures of fly traps going back at least to the mid-1800's. One of the more recent patents on this subject matter is U.S. 4,310,985 which discloses one embodiment of insect trap comprising:

(a) a target area of porous material comprising a sloped surface containing a dosage of tetrahydro-2-(nitromethylene)-2H-1,3-thiazine insecticide lethal to flies;

(b) a closely fitting or flush grill covering said target area but allowing contact by the flies thereon;

(c) a sloped supporting member for said target area comprising a solid sheet of rigid impermeable material shaped to conform with the shape of the target area and having its upper surface affixed to the target area so as to support and define the configuration of the target area;

(d) a hollow base section having a bottom and side or sides surrounding the bottom and perimeter of said sloped target area supporting member, the side or sides of said base section extending up a sufficient distance to form a cavity between the side or sides of the base and the target area supporting member, said cavity being of sufficient size for the containment and concealment of intoxicated flies; the base section being attached to the sloped supporting member such that a refillable reservoir for fluid storage or containment is formed in the hollow base section, said reservoir being defined on its top by the sloped supporting member and on its bottom by the bottom of the base section; and

(e) a means of establishing fluid contact between the target area and refillable reservoir. The subject matter of the instant invention represents an improvement over the device disclosed in U.S. 4,310,985.

SUMMARY OF THE INVENTION

This invention concerns an improved device comprising a sloped and porous target area containing an effective dose of a 2-(nitromethylene)-1,3-thiazine toxicant, wherein the improvement comprises:

- (i) the target area is fluid-permeable, self-supporting, and effective for killing arthropods,
- (ii) the device contains an optional base section, one having no arthropod-containment cavity, the base section cooperating with the target area to continuously shed dead arthropods thereby preventing occlusion of the target area.

The device of this invention is particularly effective in killing flies in areas experiencing very high levels of fly populations, such as dairy barns, chicken houses or other confined animal quarters. Individual devices have been found effective in killing in excess of 25,000 flies per day.

The device may also contain an insect lure which is at least partially water-soluble or soluble in a water-miscible solvent. Other optional features comprise: a flush (preferred) or close-fitting grill over the target area; a refillable aqueous liquid-containing reservoir; an insect pheromone or other attractant; and an insect food. Additional details concerning TNMT physical and chemical properties, pheromones, and other attractants are provided after the Example.

Preferred features of this device comprise a self-supporting target area of about 100 cm² or greater whose surface has a downward slope of at least about 30°; use of an insect sex lure, which can be muscalure or other pheromone, releasable upon contact with water; and, finally, any fluid in the optional base reservoir is in contact with a material that wicks it to the surface target area. This invention also concerns a method for controlling insect infestations employing the devices of this invention.

Representative of the arthropods against which the devices of this invention have been found most effective are flies of the family Musca, including the house fly (*Musca domestica*) and the bush fly (*Musca vertustissima*), as well as flies of other families, such as the blow fly (*Calliphora vomitoria*), the fruit fly (*Drosophila melanogaster*), the stable fly (*Stromoxys calcitrans*) and the little house fly (*Fannia spp.*).

The house fly is believed to activate its feeding mechanism after receiving appropriate stimuli via chemoreceptors believed to exist on its tarsi or feet. The feeding mechanism then involves a process wherein the fly lowers its proboscis to the surface upon which it has landed, expels saliva through the proboscis and finally sucks back whatever solution results. This process is believed to be virtually automatic when the fly lands on an appropriate surface. By this mechanism, a fly landing on the target area of the device described herein will ingest a lethal dose of toxicant and roll off the sloped target area leaving room for subsequent victims.

The preferred toxicant is tetrahydro-2-(nitromethylene)-2H-1,3-thiazine (TNMT) and agriculturally suitable salts thereof. Additional details on preparation of toxicants can be found in U.S. Pats. 3,993,648 and 4,065,560. The high water solubility of TNMT at room temperature promotes the fast takeup of a lethal dose by the flies when feeding and facilitates operation of the trap. The compound is nonvolatile in ordinary use, thereby releasing no harmful vapors to the atmosphere. Flies are readily attracted to feed on the device, since TNMT has little or no repellancy toward the insects. When the toxicant is used as described in the present invention, the devices are effective for several months so long as they are not exposed to inordinate amounts of direct sunlight. Finally, while TNMT is highly active against arthropods, it is much less so toward higher animal forms such as rats, rabbits and other mammals. This low mammalian toxicity contributes to utility of the device and its suitability for widespread use without undue danger to people or animals.