LETHAL MOSQUITO BREEDING CONTAINER

This application is a Divisional of U.S. Ser. No. 09/391,044, filed on Sep. 7, 1999, now U.S. Pat. No. 6,185,861, which is a Continuation-in-Part of U.S. Ser. No. 08/965,518, filed on Nov. 6, 1997, now U.S. Pat. No. 5,983,557 the complete disclosure of which is incorporated herein by reference.

FIELD OF THE INVENTION

The present invention relates to a breeding container which is lethal to container breeding mosquitoes. The present invention also relates to an environmentally sound, simple, cost-effective method for controlling the population of Aedes species of mosquito, primarily Aedes aegypti and Aedes albopictus.

BACKGROUND OF THE INVENTION

With approximately 20 million dengue cases a year and 100 countries affected, the World Health Organization considers dengue the most important mosquito-borne viral disease. A vaccine is not currently available and mosquito control is a critical element of dengue disease prevention. There are reports that conventional ground and aerial application of insecticides are not providing adequate control of the mosquitoes that transmit dengue. Dengue is primarily transmitted by the Aedes species of mosquito. The Aedes mosquito is a container breeder and, therefore, the female Aedes mosquito will only lay eggs in a container holding water.

Chemical mosquito control has relied on area treatment of the mosquitoes' habitat. For example, large outdoor areas or the space within a home are treated with an insecticidal fog or spray in an attempt to deposit a lethal dose of insecticide on individual mosquitoes. The water used as mosquito breeding habitats has also been treated with insecticide which is designed to kill the developing larva. Adult resting places have been treated with an insecticide deposit designed to kill adult mosquitoes as they stand on the resting places.

The oviposition trap (hereinafter "ovitrap") has been used as a surveillance tool for Aedes mosquitoes. The ovitrap consists of a pint sized water container, filled with water to within 1 inch of the top, with a wooden or velour paper paddle projecting above the water surface. Aedes females are attracted to the ovitrap and deposit eggs on the paddle. The number of eggs deposited provides an indication of the Aedes mosquito population.

A variation of the ovitrap in described in U.S. Pat. No. 5,123,201. This patent describes a sensor-triggered suction trap for collecting live gravid mosquitoes. When a mosquito interrupts an infrared beam a fan is activated which blows the mosquito into a container for collection. Such a device is complicated and expensive. Furthermore, this device does not kill mosquitoes or mosquito larvae.

Chan, K. L., et. al., "An autocidal ovitrap for the control and possible eradication of Aedes aegypti", Southeast Asian Journal of Tropical Medicine and Public Health, 8(1), pages 56–62 (1977), discloses a modified ovitrap in which any eggs that hatched would be unable to emerge as adults because of a mechanical barrier. By slowly trapping and killing progeny of Aedes aegypti there was a gradual reduction of the population.

U.S. Pat. No. 4,328,636 describes a foraminous barrier which prevents hatched mosquitoes from escaping a body of water. Such a trap, which allows adult females to escape, does not directly interrupt the dengue transmission cycle since adult females can leave the trap after depositing their eggs and take another blood meal, possibly transmitting dengue.

Ikeshoji, T., et. al., "Surfactants for a mosquito ovitrap", Jap. J. Sanit. Zool., 28(4), pages 451–452 (1977), relates to the use of surfactants to drown adult mosquitoes as they attempted to lay eggs. This method is a research tool and not a control method.

Obaldia, G. Davila de, et. al., "Aedes aegyti resting preference on untreated and deltamethrin-treated crepe paper and plastic foam surfaces", J. Am. Mosq. Control Assoc. 12(3), pages 467–68 (1996), investigated the use of resting boxes having insecticide impregnated surfaces. Shortcomings of such a control method are that there are many resting stations to compete with and females would be able to lay eggs prior to entering the resting box, ensuring a next generation.

There is a need for an environmentally sound, simple, cost-effective apparatus and method for controlling populations of the Aedes species of mosquito, primarily Aedes aegypti and Aedes albopictus.

SUMMARY OF THE INVENTION

An objective of the present invention is to provide an environmentally sound, simple, cost-effective apparatus and method for controlling the population of container breeding mosquitoes, such as the Aedes species of mosquito.

The above objective and other objectives are surprisingly obtained by the following. The present invention provides a novel breeding container which is adapted to be lethal to container breeding mosquitoes comprising:

- a walled structure defining an internal volume, the walled structure being constructed and arranged to contain an aqueous liquid within at least a portion of the internal volume;
- at least one opening in the walled structure disposed so as to allow mosquitoes to enter the walled structure;
- mosquito egg laying structure in the internal volume constructed and arranged such that female mosquitoes contact a surface of the mosquito egg laying structure; and
- an insecticide that is lethal to mosquitoes present in an amount sufficient to kill the female mosquitoes in contact with the surface.

The present invention also provides a novel kit for making the breeding container.

The present invention further provides a novel method of controlling the population of container breeding mosquitoes.

The novel lethal mosquito breeding container and method according to the present invention provide the following advantages over conventional methods of controlling the population of container breeding mosquitoes. By killing adult female container breeding mosquitoes according to the present invention, the population of biting mosquitoes is substantially reduced, thus reducing both the potential for disease transmission and the breeding stock for the next generation. This approach is superior to simply trapping and removing eggs laid by female container breeding mosquitoes, which may then go on to lay additional eggs in a natural site which allows complete development of the larvae to adults.

Since a portion of the insecticide can leach into the water, any mosquito larvae which hatch may not survive because