THE ASIAN TIGER MOSQUITO, *AEDES ALBOPICTUS*, IN KENTUCKY

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Larvae and adults of the Asian tiger mosquito, *Aedes albopictus* (Skuse), were collected from the wells of industrial construction tires in Fayette Co., Kentucky, on July 27, 1987. This is the first record of this mosquito in the state.

The tires were located at a facility that dealt entirely with the sale and distribution of new tires for the heavy construction industry. Approximately 100 tires were on the premises at the time of the 1987 collection and were stored outdoors with no protection. These tires measured approximately 2.4 m high × 0.5 m deep × 0.3 m wide. As far as we were able to determine ca. 75% of these tires had been received from Savannah and Atlanta, Georgia, with the remainder from Chicago, Illinois; Houston, Texas; Portland, Oregon and New Jersey. The tires were not shipped in containers to Fayette County. Although these tires were manufactured in Japan, they could have become infested with *Ae. albopictus* eggs at any point during their subsequent distribution once inside the United States.

Larvae collected from these tires were transferred to the laboratory and reared to adults. Of the 94 adults that emerged the following species composition was noted: 27.7% *Ae. albopictus*; 36.2% *Ae. atropalpus* (Coquillett); 23.4% *Ae. triseriatus* (Say); 4% *Culex pipens* complex; 5.3% *Cx. salinarius* Coquillett and 1% *Anopheles punctipennis* (Say). C. G. Moore (Division of Vector-Borne Viral Diseases, Centers for Disease Control, Ft. Collins, CO) confirmed the identification of *Ae. albopictus*.

Because of unconfirmed reports that there was malathion resistance in the Houston and New Orleans *Ae. albopictus* strains (G. B. Craig, University of Notre Dame, personal communication), the Kentucky strain was tested for susceptibility to malathion (95% AI, American Cyanamid, Princeton, NJ). In addition, this strain was tested for its susceptibility to permethrin (95.2% AI, Burroughs Wellcome, Research Triangle Park, NC) and *Bacillus thuringensis* var. *israelensis (B.t.i.)* (5,500 IU/mg, Abbott Laboratories, North Chicago, IL).

For the susceptibility study, F_1 larvae were reared from eggs of the *Ae. albopictus* Kentucky strain as described by Munstermann and Wasmuth (1985) and were compared with the Oahu laboratory strain. Malathion and permethrin were dissolved in acetone, and *B.t.i.* was mixed in dechlorinated water. A 1% stock solution (w/v) was prepared for each insecticide and serial dilutions were made to obtain the appropriate range of concentrations for testing. Prior to the introduction of 25 late 3rd instar larvae, 2 ml of insecticide from each dilution was added to 200 ml of dechlorinated water in 250 ml glass beakers to give the final desired concentrations. Two hundred ml of dechlorinated water with and without 2 ml of acetone served as controls. Each strain was tested for susceptibility to each insecticide. At least 5 concentrations were used, and each concentration was replicated 3 times.

Larval mortality was recorded at 24 hr posttreatment. Larvae were considered dead if they did not move when the side of the beaker was tapped with a stirring rod. Determination of the LC_{50} and LC_{90} levels, regression slopes and associated 95% fiducial limits were determined using PROC: PROBIT (SAS Institute 1985).

The results of *Ae. albopictus* susceptibility to each insecticide are presented in Table 1. The Kentucky strain was determined to be as susceptible to malathion and 1.7- and 1.6-fold more tolerant to permethrin and *B.t.i.*, respectively, than the Oahu strain. Comparison of the regression slopes showed that each strain responded differently to each insecticide. Although we had determined that larvae of the Kentucky strain were susceptible to malathion, we did not have sufficient numbers of adults to test for resistance. However, Khoo et al. (1988) recently reported resistance to topically applied malathion in laboratory colonized and field collected *Ae. albopictus* adults from Harris County, Texas.

Approximately 2½ weeks after its discovery, attempts were made to eradicate this species from the tire facility, which was situated in a relatively isolated urban industrial location. At that time, an adult daytime landing rate of >20 adults/min was recorded. Adulticiding was carried out at night with a truck mounted ULV LECO® unit using a Scourge® (resmethrin-piperonyl butoxide) mineral oil mixture (1:10). This was applied at the rate of 29.6 ml (1 oz)/min and was followed by larviciding the tires the next day with a 1:1 mixture of Vectobac®-12AS (*B.t.i.*) and water. Approximately 80 ml of this mixture was applied to each tire well by use of a pressurized hand sprayer. Approximately 3 ml of Arosurf® MSF was also applied to each tire

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Table 1. Comparative toxicity of malathion, permethrin and *Bacillus thuringiensis* var. *israelensis* to third instar larvae of 2 strains of *Aedes albopictus*

Insecticide	Strain	N	Slope ± SE	LC_{50} (ppm)	95% Fiducial limits	LC_{90} (ppm)	95% Fiducial limits	R/S[a]
Malathion	Oahu	450	5.07 ± 0.45	0.1972	(0.1833–0.2128)	0.3529	(0.3143–0.4123)	–
	Kentucky	375	3.59 ± 0.30	0.1975	(0.1757–0.2218)	0.3841	(0.3335–0.5489)	1.0
Permethrin	Oahu	525	4.86 ± 0.34	0.0015	(0.0014–0.0016)	0.0028	(0.0026–0.0032)	–
	Kentucky	375	5.96 ± 0.49	0.0026	(0.0025–0.0028)	0.0043	(0.0039–0.0048)	1.7
Bacillus thuringensis var. *israelensis*	Oahu	450	5.37 ± 0.37	0.0192	(0.0179–0.0205)	0.0332	(0.0304–0.0370)	–
	Kentucky	375	8.02 ± 1.79	0.0311	(0.0223–0.0374)	0.0449	(0.0373–0.0983)	1.6

[a] $R/S = \frac{LC_{50} \text{ Kentucky strain}}{LC_{50} \text{ Oahu strain}}$

well using a hand pump sprayer. The Arosurf and *B.t.i.* mixture was used because it had been reported as being effective in killing the aquatic stages of several species of mosquitoes, as well as resting adults on the water's surface (Levy et al. 1984). Although only one *Ae. albopictus* adult was encountered while applying the larvicide, another ULV application of Scourge was applied 3 nights later to the same area to insure complete kill of any additional adults. After this date, no further larvae or adults were found in this area. However, *Ae. albopictus* larvae were found 1 month later in a site ca. 300 m beyond the tire facility. These larvae were primarily found in old automobile tires but some were also found in an old boat, in buckets and in 55-gallon steel drums. Upon discovery of this additional infestation ULV applications of Scourge were applied to this new area for 3 successive evenings during September. Larviciding of these containers was also carried out in the same manner as mentioned earlier. No additional *Ae. albopictus* larvae or adults were found after that date.

During 1988, the health department participated in a Centers for Disease Control ovitrap survey for *Ae. albopictus* from May through September in this same area. No *Ae. albopictus* eggs were found in these traps, and no adults were found in the area. Our control efforts the previous year, coupled with drought conditions during 1988, may have been responsible for the disappearance of the Asian tiger mosquito from Fayette County. Surveys of other areas within the state, in 1988, did not reveal any additional collections of this species.

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