SELECTION RESPONSE AND CROSS SUSCEPTIBILITY OF A MALATHION-RESISTANT STRAIN OF *AEDES TAENIORHYNCHUS* (WIEDEMANN) TO OTHER ADULTICIDES [1]

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ABSTRACT. Selection experiments with a heterogenous strain of *Aedes taeniorhynchus* (Wiedemann) (susceptible laboratory female x resistant native male) indicated that this species of mosquito has the potential to develop a high degree of resistance to malathion. However, resistance (33-fold) to malathion apparently did not cause cross resistance to other mosquito adulticides.

The widespread acceptance of the ground ultralow volume method of mosquito adulticiding has brought about renewed usage of malathion against *Aedes taeniorhynchus* (Wiedemann). We were therefore concerned about the greater degree of resistance to malathion that might develop in *A. taeniorhynchus* and also about the possible development of cross resistance to other adulticides. We indicated previously that research with a colonized strain that is resistant to malathion could yield valuable information on the resistance potential in this species (Mount *et al.*, 1971).

The objectives of the present paper are (1) to report the results of 10 generations of selection of a heterogenous strain (susceptible female x native male) of *A. taeniorhynchus* with malathion and (2) to report the susceptibilities of the selected strain to adulticides other than malathion.

TEST PROCEDURES. Native *A. taeniorhynchus* larvae were collected from Little Talbot Island State Park (Duval County) in December 1971 and brought to the Gainesville laboratory. Then we reared the field-collected larvae to adults and exposed them to contact sprays of malathion in our wind tunnel (Mount *et al.*, 1970). Since the native adult females proved to have a 10-fold resistance to malathion, we established a strain for our selection experiments by crossing the virgin females from our laboratory (malathion-susceptible strain) with the virgin native males. The heterogenous strain was then selected (beginning in the second generation) by exposing virgin females and males (<24 hr old) to contact sprays of malathion in the wind tunnel. This procedure allowed the selection of both sexes, which is not possible when inseminated females are used. The concentrations of malathion that were used for selection usually produced >50% mortality of each generation. (We also exposed adults from each generation to contact sprays of malathion in the wind tunnel to determine the levels of resistance.)

The cross susceptibility tests with nine other adulticides were also conducted with the selected malathion-resistant strain by exposing the adult females from the F_4, F_5, and F_{13} generations to contact sprays of the adulticides in the wind tunnel. Adult females from the malathion-susceptible laboratory strain were included in these tests for comparison.

RESULTS AND DISCUSSION. Table 1 shows that the F_1 and F_2 generations of heterogenous females (unselected) showed a slight increase in resistance to malathion (17- and 13-fold, respectively). However, the F_3 generation (progeny of the 1st selected generation) showed a marked increase (45- and 24-fold, respectively, for females and males). Thereafter, during the next 9 selected generations, the level of resistance to malathion ranged from 30- to 87-

[1] This paper reflects the results of research only. Mention of a pesticide or a commercial or proprietary product in this paper does not constitute a recommendation or an endorsement of this product by the USDA.

TABLE 1. Increase in resistance of a heterogenous strain (susceptible female x native resistant male) of *Aedes taeniorhynchus* selected with contact sprays of malathion.

Generation	LC_{90} reciprocal ratio to susceptible strain [a]		Selection concentration [b] (%)
	Female	Male	
F_1	17	12	(unselected)
F_2	13	3	0.05
F_3	45	24	0.1
F_4	49	42	1
F_5	44	24	1
F_6	30	13	1.5
F_7	58	62	1.5
F_8	87	86	2
F_9	73	66	1.1
F_{10}	43	28	2
F_{11}	87	[c]	2.5
F_{12}	73	65	...

[a] LC_{90}'s for susceptible females and males were 0.037 and 0.031%, respectively; LC_{90}'s are based on two replications of a complete range of discriminating concentrations.

[b] Effect of each selection is indicated for subsequent generation.

[c] Not determined because of shortage of specimens.

fold in females and from 13- to 86-fold in males. Native populations of *A. taeniorhynchus* thus have the potential to develop a high degree of resistance to malathion.

Table 2 indicates that a high degree of resistance to malathion in *A. taeniorhynchus* apparently does not cause cross resistance to other adulticides. The LC_{90}'s for the 9 other chemicals, 6 organophosphates, 1 carbamate, and 2 pyrethroids, showed no substantial differences in susceptibility in the malathion-resistant and susceptible strains.

TABLE 2. Effectiveness of contact sprays of nine adulticides against females from malathion-resistant and susceptible strains of *Aedes taeniorhynchus*.

Adulticide	24 hr LC_{90} for indicated strain	
	Resistant [a]	Susceptible
Naled	0.021	0.026
Fenthion	0.009	0.013
Chlorpyrifos	0.017	0.024
Chlorpyrifos-methyl	0.043	0.022
Montecatini L-561 (ethyl mercaptophenyl acetate *S*-ester with *O,O*-dimethyl phosphorodithioate)	0.033	0.023
Plant Protection PP-511 (*O*-[2 diethyl amino)-6-methyl-4-pyrimidinyl] *O,O*-dimethyl phosphorothioate)	0.024	0.029
Propoxur	0.018	0.014
Resmethrin [b]	0.0025	0.0036
Pyrethrins [b]	0.007	0.006
Malathion	1.2 [c]	0.036

[a] Strain selected with malathion in the laboratory (F_4, F_5, and F_{13} tested); LC_{90}'s are based on four replications of a complete range of discriminating concentrations.

[b] Synergized at a ratio of 1 part adulticide to 5 parts piperonyl butoxide.

[c] 33-fold resistance.

Literature Cited

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