

# THE EFFECTIVENESS OF ADDITIONAL MONOMOLECULAR ORGANIC SURFACE FILMS AGAINST *ANOPHELES QUADRIMACULATUS* LARVAE<sup>1</sup>

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**ABSTRACT.** The effectiveness of 3 monomolecular surface films was evaluated against 4th instar *Anopheles quadrimaculatus* larvae. At an application rate of 0.04 ml per m<sup>2</sup>

(0.043 gallons/acre), each compound provided at least 90% control in laboratory tests. Two of the three compounds achieved control levels exceeding 96%.

## INTRODUCTION

The adverse effects of certain pesticides upon the environment have stimulated an intense search for alternative methods for controlling mosquito populations. White and Garrett (1977) reported upon a novel approach for mosquito control. They tested 4 monomolecular surface films against selected *Anopheles* and *Aedes* larvae. The promising results they obtained against *Anopheles quadrimaculatus* larvae stimulated a search for additional monomolecular films for use in controlling *Anopheles* mosquitoes. These current studies were undertaken to determine the efficacy of 3 additional monomolecular films as larvicides against *An. quadrimaculatus*.

## METHODS AND MATERIALS

Three monomolecular films were selected for evaluation. These compounds included: lauryl ether containing 4 oxyethylene groups (POE(4)LE); sorbitan monooleate (SMO); and oleyl ether

containing 2 oxyethylene groups (POE(2)OE). Each compound was tested at a surface concentration of 0.04 ml per m<sup>2</sup> (0.043 gal./acre). In each test, 100 4th-stage *An. quadrimaculatus* larvae were placed into each of 5 small enamel pans containing 1 liter of tap water. The required quantity of toxicant was applied to the water surface in each pan using a micro-syringe. Larval mortality was recorded at 24 hr intervals. Accompanying each series of 5 pans was a similar pan containing 100 untreated control larvae. Each complete test was replicated 4 times.

## RESULTS AND DISCUSSION

The results obtained in this current series of tests again demonstrated that certain monomolecular surface films can effectively control *An. quadrimaculatus* larvae. The behavior of the surface films and the initial reaction of the larvae to the films duplicated that previously reported by White and Garrett (1977).

Laboratory results are summarized in Table 1. The data indicate that POE(4)LE provided a level of control exceeding 90%. SMO and POE(2)OE provided levels of control ranging from 96.9% to 99.7%. Although both of the latter monolayers provided excellent control of the test larvae, neither was as rapid in its action as the ISA-2 OE monolayer reported upon by White and Garrett

<sup>1</sup> The opinions and assertions contained herein are those of the authors and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large. Mention of a product in this paper does not constitute a recommendation or an endorsement of the product by the U.S. Navy.

Table 1. Effect of monomolecular films on *Anopheles quadrimaculatus* larvae in laboratory tests, 0.04 Ml per m<sup>2</sup>.

Compound tested	Cumulative mortality after indicated hours of post-treatment exposure <sup>a</sup>		%Cumulative mortality <sup>b</sup>
	Hours	Larval mortality	
POE(4)LE	24	1821	91.1
	48	1824	91.2
	72	1830	91.4
SMO	24	1938	96.9
	48	1945	97.2
	72	1957	97.8
POE(2)OE	24	1977	98.9
	48	1994	99.7

<sup>a</sup> Data reflect results of 4 replicates; 500 larvae/test.

<sup>b</sup> Percent mortality corrected by Abbott's formula.

(1977). Interestingly, when White and Garrett (1977) combined both SMO and POE(4)LE into a single formulation they achieved only 63% control. However, the results of these current experiments indicate that both compounds appear to provide more effective control of *An. quadrimaculatus* larvae when used alone rather than in combination.

The results of these tests again demonstrate that certain monomolecular films appear to provide an acceptable alternative to the insecticides normally used to control certain mosquito larvae. The many favorable characteristics demonstrated by monomolecular films enhance their potential for use as mosquito larvicides (Garrett and White 1977, White

and Garrett 1977). When one considers these characteristics, one is tempted to speculate that monomolecular films will demonstrate their greatest potential when they are used together with biological control agents in an integrated mosquito control program.

#### References Cited

- Garrett, W. D. and S. A. White. 1977. Mosquito control with monomolecular organic surface films: I—Selection of optimum film-forming agents. *Mosquito News* 37(3):344-348.
- White, S. A. and W. D. Garrett. 1977. Mosquito control with monomolecular organic surface films: II—Larvicidal effect on selected *Anopheles* and *Aedes* species. *Mosquito News* 37(3):349-353.