

ARTICLES

LARGE SCALE FIELD TESTS AND ENVIRONMENTAL ASSESSMENTS OF SUMITHION® (FENITROTHION) AGAINST ADULT BITING MIDGES IN GRAND CAYMAN, WEST INDIES

M. E. C. GIGLIOLI

Mosquito Research and Control Unit, P. O. Box 486, Grand Cayman, West Indies

EUGENE J. GERBERG

Insect Control and Research, Inc., 1330 Dillon Heights Ave., Baltimore, MD 21228,

R. G. TODD

Currently with Insect Control and Research, Inc.

ABSTRACT. Fenitrothion was tested against dense populations of biting midges (Ceratopogonidae) by means of aerial ULV application of aqueous solutions. At a dosage of 191.5 gm/ha A.I. near perfect control was

observed. This is one of the few recent records of successful application of an insecticide for the control of dense populations of biting midges.

INTRODUCTION

The results reported herein are part of the continuing longitudinal studies conducted by the Mosquito Research and Control Unit in Grand Cayman. Reports on the effects on salt marsh mosquitoes have been reported by Giglioli *et al.* 1979.

METHODS AND TEST AREAS. See Giglioli *et al.* 1979 for details on methods and test areas.

ASSESSMENTS

Biting midge populations and the impact of airsprays on their densities are difficult to assess. Modified light traps can be used, but sorting the collection is time consuming.

The "Sandfly Bat" (Giglioli & Davies, unpubl.) provides a simple and effective technique for estimating densities attracted to the batter, furthermore, collections are composed only of biting midges and thus no time is wasted sorting miscellaneous insects.

The "Sandfly Bat" is formed of a 40 cm. long wooden handle (dowell) with a "Bulldog" spring clip fixed to one end with a Jubilee screw clip. Plastic or metal

mosquito netting is cut into 75 mm. diameter circles which are then lightly covered with diluted car grease or petroleum jelly. The greased grid is held in the "Bulldog" clip and the grid is then changed for a new one, and the used grid transferred to a labelled envelope in which it can be stored or transported. The biting midges attracted by the batter impact on the greased surface and remain stuck there, later they are removed by immersing the grid in kerosene, and if not sorted immediately, can be stored in it.

Batting is done during the period of crepuscular activity, starting just before sunset for *Culicoides furens* and *C. barbosai*; it is continued under Cayman conditions for ca. 1 hr, i.e., 12 grids (Figs. 1-3, average collections given). Owing to the differential host attraction, 2 batters are used in both the sprayed and the control areas, and the same individuals undertake the complete test in their area. Repellents cannot be used by batters, and animals are inferior to humans; suction devices are less efficient than a batter with a strong downstroke and musky body odor.

We have noted that less than 5 biting

midges per 5 min period is equal to complete shirtless comfort; over 20 remove the tourists from the beaches; ca. 40 cause discomfort to entomologists; and the record of 5000 in 5 minutes was unbearable.

RESULTS

In evaluating airsprays against mos-

quitoes *in situ* on the night after spraying a marked reduction in biting midges was noted, and it was concluded that aqueous airsprays were yielding a "BOSS droplet" (Himel & Uk 1975) sufficiently small to impact on flying biting midges as well as mosquitoes. The following tests which also form a part of a larger study on this target insect were carried out.

C. furens 68 %
C. barbosa 32 %

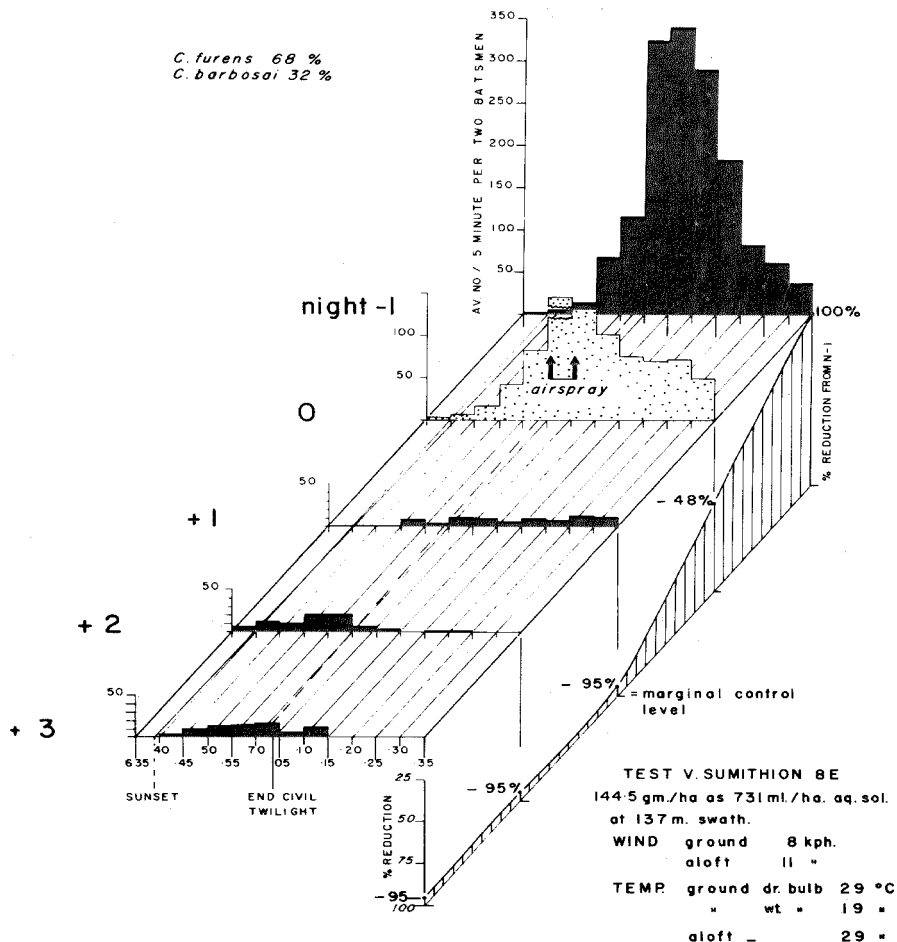


Fig. 1. Test V against sand flies.

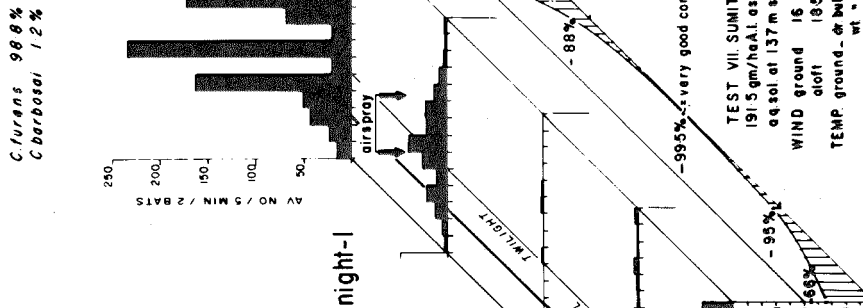
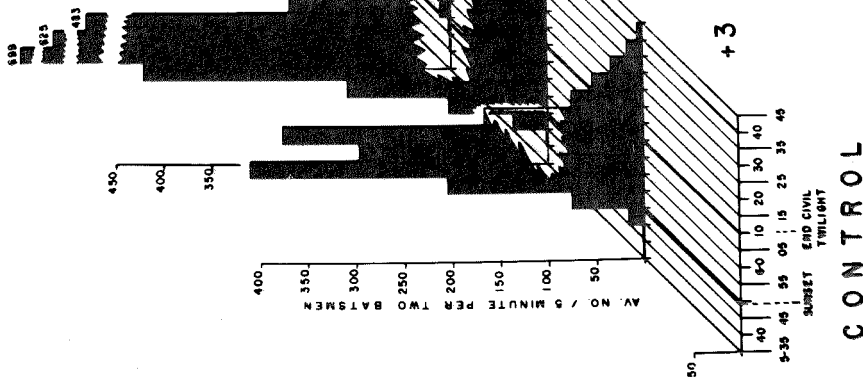


Fig. 3. Test VII against sand flies.

TEST V. Sumithion 8E was applied at 731 ml/ha aqueous solution on 137 m. wide swath to deliver 144.5 gm/ha A.I.

This treatment was made over Salt Creek (364 ha) on August 29 between 7 and 7.06 p.m. (Fig. 1). No other area had suitable densities to serve as a control area, and although this is unfortunate it is not critical to anyone experienced in biting midge populations. The collections (two "sandfly batters") and the airspray were started earlier than those against mosquitoes, as the activity pattern of *Culicoides furens* is earlier, tending to be between sunset and the end of civil twilight. Figure 1 shows the resultant 95% reduction on the night after spraying; although this was dramatic, the comfort level was marginal and the "shirtless" condition could not be enjoyed on night+1.

TEST VI. Sumithion 8E was applied at 1,463 ml/ha aqueous solution on 137 m. wide swath to deliver the same 144.5 ml/ha A.I. as Test V. In this test the aqueous carrier was doubled in an attempt to improve the numerical BOSS spectrum. The treatment was carried out over North Sound Estates (1619 ha) on October 28 between 5.59 and 6.17 p.m. Wind was extremely calm (under 1 kph), and the increased delivery from the atomizers (1463 ml/ha) led to poor coverage with streaking across the swath. The densities on night-1 were relatively low, and therefore the shirtless comfort level of one observer (M.E.C.G.) achieved by a 94.5% reduction in densities on night+1 (Fig.2) were regarded as operationally adequate, though marginal.

TEST VII. Sumithion 8E was applied at 731 ml/ha aqueous solution on 137 m. wide swath to deliver 191.5 gm/ha A.I. This treatment was made over the Salt Creek area (364 ha.) on December 3 between 6.05 and 6.22 pm. Figure 3 shows the results of this test which were judged extremely satisfactory by any standard. The night after spraying showed a 99.5% reduction from night-1, with a maximum recovery of 2 biting midges per 5 minutes of "batting."

ENVIRONMENTAL ASSESSMENT

Exposures of non-target animals were made with the following treatment: Sumithion 8E in water at 191.5 gm/ha A.I. Although wind conditions were near the upper limits for airspraying, the results demonstrated that the material landed effectively in the target area. Notonectids showed a high mortality (up to 100%), but jellyfish were not affected, and gambusid minnows showed a dubious 1-2% mortality.

DISCUSSIONS AND CONCLUSIONS

Under tropical conditions of wind and temperature at and just after sunset, ULV aqueous solutions of fenitrothion resulted in effective control of adult ceratopogonid biting midges. In terms of dosage, even with high densities of midges, 191.5 gm/ha A.I. gave a near perfect measure of control. The environmental effects did not appear to be adverse, except to some non-target insects (Giglioli et al. 1979).

ACKNOWLEDGMENTS

We are indebted to Sumitomo Chemical America Inc., and Stauffer Chemical Co. for supporting this study with generous supplies of Sumithion® (Fenitrothion) insecticide.

We wish to thank the staff of the M.R.C.U., in particular Mr. J. F. Lesieur, the pilot, and Mrs. J. Giglioli for editorial assistance.

References Cited

- Giglioli, M. E. C., Gerberg, E. J. and Todd, R. G. 1979. Large scale field tests and environmental assessments of Sumithion® (Fenitrothion) against adult mosquitoes in Grand Cayman, West Indies. Mosq. News 39:781-792.
- Himel, C. M. & Uk. S. 1975. The biological optimum spray droplet size. Proc. Vth Int. Agri. Aviat. Congr. (England):234-242.