Gartrell, F. E. and A. H. Johnson. 1950. A study to evaluate malaria control projects of Kentucky Reservoir in terms of collateral uses and socio-economic benefits. Jour. Natl. Malaria Soc. 9:259–267.
Gartrell, F. E. and C. C. Kiker. 1948. Experience with use of permanent works for the control of anophelines on impounded water. Journ. Natl. Malaria Soc. 7:No. 1.
Hall, T. F. and G. E. Smith. 1955. Effects of flooding on woody plants, West Sandy Dewatering Project, Kentucky Reservoir. Jour. of Forestry, 53, No. 4.
Hinman, E. H. 1941. Additional cooperative studies of the relation between mosquito control and wildlife conservation. Science 94:44–45.
Moore, J. B. and S. G. Breeland. 1967. Field evaluation of two mosquito larvicides, Abate and Dursban, against *Anopheles quadrimaculatus* and associated *Culex* species. Mosquito News 27:105–111.
Smith, G. E., Eugene Pickard and T. F. Hall. 1969. Tree planting for mosquito control. Mosquito News 29:161–166.
Tennessee Valley Authority and United Public Health Service. 1947. Malaria control on impounded water. U.S. Government Printing Office, Washington, D.C.

DILUTE AQUEOUS EMULSIONS OF FENITROTHION AND MALATHION APPLIED WITH A HUDSON PORTA-PAK® AGAINST *AEDES AEGYPTI*

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ABSTRACT. Reduced quantities of insecticide can be used to achieve cost-effective, household (= intradomiciliary) control of *Aedes aegypti* adults by means of a back pack mist blower applying ULV quantities of diluted aqueous emulsions (ULV/E) of OP compounds.

INTRODUCTION

The use of high concentrate ultra-low-volume (ULV/C) fenitrothion and malathion insecticidal sprays for control of adult *Aedes aegypti* in both household (= intradomiciliary) and aerial applications has been documented for many parts of the world. Dispensing equipment has ranged from aircraft fitted with Micronair® atomizers to hand-held turbines and knapsack misters. Trials with a Hudson portable back pack mist blower in Indonesia applying 180 ml AI malathion and 460 ml AI fenitrothion/ha have been described (WHO Unpublished document 1976).

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Dosage rates have varied from 249 g/ha AI to 1322 g/ha.

Other studies (Giglioli 1979, Giglioli et al. 1979) on air sprays have demonstrated that ULV solutions or emulsions (ULV/S or ULV/E) are more effective than sprays of ULV concentrates (ULV/C) since they approximate more closely the biological optimum size spray (BOSS) droplet spectrum (Himel & Uk 1975) and provide a better target droplet sufficiency (TDS) (Giglioli, unpublished) than technical concentrates (ULV/C).

As an alternative to the use of high concentrations, which are expensive, more likely to have an adverse environmental impact and may affect the aesthetic sensibilities of the homeowner, diluted emulsion concentrates (ULV/E) were tested under household conditions.

METHODS

Fenitrothion (Sumithion® 8E, 81% AI w/w) and malathion (Cythion® 500E, 50% AI w/w) were tested at various dilutions. Each material was serially diluted with water to make 200 g of well mixed emulsion. Each series of tests commenced with the lowest concentration and proceeded with successively higher ones. This sequence avoided the risk of contaminating a lower concentration with the residue of a higher one. At the end of each series of sprays, the spray system was thoroughly rinsed with a mixture of soap, water and kerosene.

The insecticide was applied by means of a Hudson Porta-Pak® ULV sprayer, model 4780, fitted with a 0.020 in. (0.51mm) diameter nozzle. Calibration with water at full speed and tap wide open yielded an emission of 47.9 ml/min (1.6 fl oz/min).

The test insects were laboratory reared *Ae. aegypti* (ICR strain). The cages were constructed of 6 in. (15.2 cm) diameter plastic tubing, 1 in. (2.5 cm) wide and covered with 16 mesh black tulle. Groups of 60 pupae were placed in cages and partially submerged in water allowing the mosquitoes to emerge *in situ*, thus avoiding handling and its attendant mortalities.

As these tests were designed to assess household sprays, a screened, glass-louvered veranda was used. The test area was 9×36×9 ft. (2.7×11.0×2.7m) in size and the louvered windows were kept open at a 45° angle, allowing for ventilation. Two cages (60 mosquitoes each) were used for each test and placed 1½ ft (0.5m) above the floor at either end of the veranda. Ambiental temperatures on the veranda varied from 85° to 98°F.

Control cages were placed in the test area for 10 min before each series of tests began. The control cages were then returned to the insectary and kept at 80°F and 80% RH. All cages were supplied with cotton pads soaked with 10% sucrose.

The Hudson sprayer was started prior to the test run, and was carried into the test room with its engine running at full throttle; the veranda was sprayed for 13.2 sec to deliver 10.4 ml of emulsion. After 10 min, the mosquitoes were returned to the insectary, in the same cages. Observations were made at hourly intervals for 8 hrs or until complete knockdown was noted (see Table 1).

RESULTS

Aqueous emulsion sprays of fenitrothion gave 100% knockdown in 13 hrs at a dosage concentration of 0.22%; (0.0106 g AI/ 10 m^2), however, a more practical dosage would be 1.0% (0.049 g AI/ 10 m^2) as 0.87% (0.043 g AI/ 10 m^2) provided 100% KD in 6 hrs. Aqueous emulsion

Table 1. Dosages, application rates and knock down times.

AI	% AI	Wt. of AI emitted during spray (g)	Wt. of AI applied (g/10 m^2)	Time for 100% knock down (hours)	% knock down of controls at +24 hours
Fenitrothion	0.11	0.017	0.0053	*	0
	0.22	0.033	0.0106	13	0.2
	0.44	0.066	0.0213	13	0.2
	0.87	0.132	0.0427	6	0.5
	2.18	0.331	0.1067	4	0
Malathion	0.25	0.038	0.0122	*	0.8
	0.50	0.076	0.0245	4	1.0
	1.00	0.152	0.0490	2½	0
	2.50	0.380	0.1225	1¼	0
	5.00	0.760	0.2451	1	0

* 100% KD not achieved.

sprays of malathion require a dosage of 0.5% (0.025 g AI/ 10 m^2) to give a 100% KD in 4 hrs, however a dosage of 1.0% (0.049 g AI/10 m^2) will provide 100% KD in 2.5 hrs. Low control mortality negated the need for applying Abbott's formula to make corrections.

The above figures correlate well with the dosages used in aerial sprays, i.e. malathion at 41.6 g AI/ ha ULV/S for *Ae. taeniorhynchus* (Giglioli and Lesieur, unpublished) vs 49 g AI/ ha household for *Ae. aegypti*. This is in contrast to the traditional dosage of 240 g AI/ ha with aircraft and from 924 to 1472 g AI/ ha used in houses (WHO, Unpublished document).

CONCLUSIONS

Household spraying of dilute aqueous emulsions (1.0% AI ULV/E) of fenitrothion and malathion, applied by means of a Hudson Porta-Pak® sprayer, with 0.020 in orifice, wide open at full revs. for ca. 4.5 sec in a 108 sq ft (10 m^2) room provide 100% KD in 2.5–6 hrs.

In view of the small dosages required by this method of treatment, we predict that it would 1) result in fewer refusals by householders who object to possible staining and odors, 2) be more environmentally acceptable and, 3) be much more economical than current methods.

References Cited

Giglioli, M. E. C. 1979. *Aedes aegypti* programs in the Caribbean and emergency measures against the dengue pandemic of 1977–1978: a critical review. Pan-Am. Hlth. Org. 375:133–152.

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. and Uk, S. 1975. The biological optimum spray droplet size. Proc. Vth Int. Agri. Aviat. Congr. (England). pp. 234–242.

EDITORIAL NOTES

ABBREVIATIONS FOR NAMES OF GENERA

Mosquito News is beginning to follow the lead of *Mosquito Systematics* in adopting abbreviations for names of genera and subgenera as recommended by J. F. Reinert, 1975, *Mosquito Systematics* 7(2):105–110. The first time a generic or subgeneric name appears in an article it should be spelled out. Thereafter the appropriate abbreviation proposed by Reinert should be used. Recognition is given to Alan Stone who originated many of the abbreviations. The use of standardized abbreviations prevents confusion and reduces the amount of printing, especially in tables and lists. In *Mosquito News* subgeneric names are rarely repeated, so these abbreviations are not listed here. There follows Reinert's list of:

ABBREVIATIONS OF GENERA OF CULICIDAE

Aedeomyia	=*Ad*	*Malaya*	=*Ml*
Aedes	=*Ae*	*Mansonia*	=*Ma*
Anopheles	=*An*	*Maorigoeldia*	=*Mg*
Armigeres	=*Ar*	*Mimomyia*	=*Mi*
Bironella	=*Bi*	*Opifex*	=*Op*
Chagasia	=*Ch*	*Orthopodomyia*	=*Or*
Coquillettidia	=*Cq*	*Phoniomyia*	=*Ph*
Culex	=*Cx*	*Psorophora*	=*Ps*
Culiseta	=*Cs*	*Sabethes*	=*Sa*
Deinocerites	=*De*	*Topomyia*	=*To*
Eretmapodites	=*Er*	*Toxorhynchites*	=*Tx*
Ficalbia	=*Fi*	*Trichoprosopon*	=*Tr*
Galindomyia	=*Ga*	*Tripteroides*	=*Tp*
Haemagogus	=*Hg*	*Udaya*	=*Ud*
Heizmannia	=*Hz*	*Uranotaenia*	=*Ur*
Hodgesia	=*Ho*	*Wyeomyia*	=*Wy*
Limatus	=*Li*	*Zeugnomyia*	=*Ze*