EFFICACY OF ULV INSECTICIDES APPLIED BY TRUCK MOUNTED COLD AEROSOL GENERATOR AGAINST HORN FLIES (*HAEMATOBIA IRRITANS*) ON CATTLE

T. W. WALKER,[1] J. L. LANCASTER, JR.,[2] W. L. EBERHARDT,[3] ROBERT W. TURNER,[4] D. C. WILLIAMS[1] AND M. V. MEISCH[2]

Eastern Arkansas beef producers are plagued annually by horn fly *Haematobia irritans* (Linn.) populations which cause irritation, annoyance and bloodloss resulting in reduced weight gain and possible pathogen transmission. Backrubbers, dust bags and insecticide impregnated eartags have been evaluated to control biting flies with little success (J. L. Lancaster, Jr., unpublished data). Kinzer (1970) found that ultralow volume (ULV) ground applications of malathion effectively controlled horn fly populations 1 to 2 days posttreatment (91% and 90% reduction respectively) on unrestrained range cattle in New Mexico. With the utilization of a truck mounted ULV cold aerosol generator, 1 person can treat 500 head of cattle within approximately 2 hr by spraying bunched herds in the pastures. Under Arkansas conditions actual treatment time would be only 2–5 minutes. Savings in time alone compared to other treatments justify the use of this method. During the summers of 1978–79, ULV ground applications of 3 aerosol insecticides were applied to unrestrained range cattle and efficacy evaluated against horn fly populations. This study was conducted at the University of Arkansas Pine Tree Experiment Station at Colt, Arkansas.

The Experiment Station at Colt is a facility of nearly 12,000 acres. It consists of mixed hardwood timber and cultivated or grazed land. There were approximately 500 head of cattle on the station. These were divided into herds ranging from 56 to 125 head using pastures of from 100–300 acres.

METHOD AND MATERIALS

Tests of ULV applied insecticides were conducted in 1978–79 (resmethrin, naled and permethrin). In 2 similar experiments, 3 compounds were evaluated at different dosage rates and in 2 instances at a change in pressure. For both experiments 3 cattle herds were kept in separate pastures prior to treatment; a fourth herd served as an untreated control. Cattle used were crossbred dry brood cows without calves. Hereford, Angus and Charolais bloodlines predominated.

In the first experiment naled (85.0%) 6.0 fl oz/min at 1.5 psi (psi for all other compounds was 3.0) was applied to 79 head; resmethrin (2.5%), 3.0 fl oz/min was applied to 120 head; permethrin (25.0%) 1.0 fl oz/min and (5.0%) 6 fl oz/min were both applied to herds containing 56 head. In the second experiment, resmethrin, (2.5%) 4.6 fl oz/min was administered to 125 head; naled (85.0%), 4.6 fl oz/min was applied to 72 head; and permethrin 25%, 4.6 fl oz/min was administered to 59 head. During both experiments the wind was variable, ca. 2 mph with gusts to ca. 5 mph and temperatures were ca. 75–80°F. Applications were made in the early morning. The ULV aerosol was applied upwind of the animals; however, as the truck circled the herd at approximately 10 mph the aerosol was sprayed on some animals more than once as they moved through the spray pattern. The first test was against a declining late July fly population while the second was against an increasing August population.

During pretreatment and posttreatment, counts of *H. irritans* were done on 10 randomly selected animals from each herd to estimate number of flies per animal. Counts were made by estimating the number of flies on a single side and multiplying the counts by 2. These control counts were made on the afternoon prior to treatment. Posttreatment fly counts were made from 1.5 to 3 hr and thereafter to 13 days posttreatment. (Table 1.)

RESULTS

Against horn flies, all formulations and dosages of permethrin along with naled at 4.6 fl oz/min were significantly more effective than the other compounds at 1.5 to 3 hr posttreatment. However good to fair control was exhibited by the other compounds. At 1 day posttreatment the 25% formulation of permethrin and the 3.0 fl oz/min rate of resmethrin were significantly more effective than the other applications. The data after the 1 day interval are rather difficult to interpret but it would appear that permethrin at 1.0 fl oz/min offered the

[1] Graduate Assistants—University of Arkansas, Entomology Department, Fayetteville, AR 72701

[2] Professors—University of Arkansas, Entomology Department, Fayetteville, AR 72701.

[3] Research Assistant—Pine Tree Station, Colt, AR 72327.

[4] Resident Director—Pine Tree Station, Colt, AR 72326.

Table 1. Efficacy of various insecticides applied by ULV cold aerosol against adult *Haematobia irritans* on cattle at the Pine Tree Experiment Station, Colt, Arkansas, 1978 and 1979.[1]

Insecticide and dosage rate	Pretreatment count Flies/Head	Percent reduction posttreatment								
		1.5–3 hr	8 hr	1 day	2 days	3 days	4 days	5 days	7 days	13 days
Permethrin (25%) 4.6 fl oz/min	760	100a	100a	100a	—	—	—	55ab	—	—
Permethrin (25.0%) 1.0 fl oz/min	530	97a	—	83ab	—	—	84a	—	73b	62a
Permethrin (5.0%)[4] 1979 6 fl oz/min	280	93a	—	66bc	57b	25b	41b	78a	—	—
Naled (85.0%) 4.6 fl oz/min	700	100a	100a	44dc	—	—	—	56ab	—	—
Naled (85.0%)[2,4] 1979 6 fl oz/min	250	77b	—	71bc	39b	75a	66a	40b	93a	0b
Resmethrin (2.5%) 3 fl oz/min	700	87ab	—	73abc	—	—	74a	—	60c	42a
Resmethrin (2.5%)[4] 1979 4.6 fl oz/min	350	76b	76b	60c	41b	11b	76a	51b	—	—
		Avg. no. of flies per animal								
Control	252	294	—	322	5[3]	443	245	107		

[1] Means followed by the same common letter are not significantly different at P = 0.05.
[2] All compounds were applied at 3 psi. except naled 6 fl oz/min which was applied at 1.5 psi.
[3] The control herd was penned and treated with coumaphos (25% WP), the first day of the test.
[4] Compounds were applied in 1979, all others applied in 1978.

best control. These data, although preliminary, indicate promising results and would appear to warrant more extensive investigation.

Reference Cited

Kinzer, H. G. 1970. Ground application of ultra-low-volume malathion and fenthion for horn fly control in New Mexico. J. Econ. Entomol. 63:736–739.

EXPERIMENTAL INFECTIONS OF *ASCOGREGARINA LANYUENSIS* (APICOMPLEXA, LECUDINIDAE) IN *AEDES (STEGOMYIA)* SP. MOSQUITOES[1]

PATRICIA A. JACQUES AND JOHN C. BEIER[2]

Parasites of the genus *Ascogregarina* (formerly *Lankesteria*, then *Ascocystis;* Ward et al. 1982) naturally infect container-breeding mosquitoes. Mosquito larvae become infected by ingesting oocysts that are deposited into larval development sites by fecal contamination of infected adults, or disintegration of infected adults on the water surface. The parasite matures through several stages as the mosquito develops, and adults emerge with oocysts in the Malpighian tubules. Gregarine parasites usually do not have a significant effect on their natural mosquito hosts (McCray et al. 1970, Beier 1982). However, in cross-infection experiments using a range of culicid hosts, Walsh and Olson (1976) demonstrated that *Ascogregarina culicis* (Ross) caused extensive pathology and high larval mortality. *Ascogregarina lanyuensis* was recently described from *Aedes alcasidi* Huang in Taiwan along with 2 other new species of gregarines from mosquitoes (Lien and Levine 1980). This study examines the host susceptibility of 10 *Aedes (Stegomyia)* sp. mosquitoes for *A. lanyuensis*. Efforts were made to determine if the parasite can complete its life cycle in these experimental hosts, and to determine if any larval mortality resulted from gregarine infections.

Mosquitoes used in experiments were from laboratory colonies maintained at the Vector Biology Laboratory, University of Notre Dame. The *A. lanyuensis* parasites were from a laboratory stock maintained by mosquito passage, and originally derived from material used in the species description by Lien and Levine (1980). For each species, 5 groups of 100 first instar larvae were placed in 3-liter enameled pans with 1 liter of deionized water. Three of the 5 groups received 200,000 oocysts of *A. lanyuensis*, while the other 2 groups served as controls. A check on the viability of each batch of oocysts was made by exposing larval *Ae. alcasidi*, the natural host, to test doses and determining the incidence of infection. All groups of larvae were reared in an insectary at 27°C, 80% RH, and a photoperiod of 18L:6D. Larval nutrition was standardized by adding the same concentration of liver powder solution to each group.

Host susceptibility was determined by dissecting 50 fourth instar larvae in dilute methylene blue stain and microscopically examining the midgut for gamonts at 40× as described by Beier (1982). The degree of infection was rated on a relative scale from 1–5, according to the number of gamonts: 1, ≤10; 2, 10–50; 3, 50–100; 4, 100–200; and 5, > 200.

Larval mortality was determined for the remaining control and infected groups by counting pupae. To test for completion of the parasite life cycle, i.e. production of oocysts in adults, pupae were placed in 200 ml screened cups with 100 ml water, and allowed to emerge and die on the water surface. Dead adults were ground using a blender, and the solution was filtered to isolate oocysts as described by Beier (1982). To test for the presence and viability of oocysts, the filtrate was added to a pan of 100 first-instar *Ae. alcasidi*. Fourth instar larvae were dissected and examined for gamonts as described above.

Infections of *A. lanyuensis* were detected in every *Aedes* sp. tested (Table 1). Infection rates of 100% were found in the natural host, *Ae. alcasidi*, 2 other species in the Scutellaris Subgroup, and the 2 species tested in the Aegypti subgroup. The median degree of infection as determined by the number of gamonts/larva, was heaviest in the Scutellaris and Aegypti subgroups. The degree of susceptibility and intensity of infection was lower in the Albopictus and Annandalei subgroups. Also, sus-

[1] This work was supported by NIH Research Fellowship No. AI-06497-NIAID, NIH Research Grant No. AI-02753-NIAID, and NIH Training Grant No. AI-07030-NIAID.

[2] Vector Biology Laboratory, Department of Biology, University of Notre Dame, Notre Dame, IN 46556.