COMPARISON OF NEW JERSEY LIGHT TRAPS FOR COLLECTION OF ADULT *CULICOIDES VARIIPENNIS* (DIPTERA: CERATOPOGONIDAE)[1]

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ABSTRACT. Comparisons between standard incandescent New Jersey and modified ultraviolet New Jersey light traps were made. Both trap types collected the same proportions of males, nulliparous, parous empty, gravid and blood engorged female *Culicoides variipennis*. Although both traps were highly attractive to females that had taken at least one blood meal, the black light trap collected ca. 10-fold more parous empty and gravid flies than the incandescent and would therefore be recommended for use in trapping *C. variipennis* for virus assay.

Culicoides variipennis (Coquillett) is a known vector of bluetongue virus (Price and Hardy 1954, Jones et al. 1981) and *Onchocerca cervicalis* (Foil et al. 1984) in the United States. Because this insect is an important biological vector, it is necessary to develop an efficient method for trapping adult *C. variipennis*. The World Health Organization/Food and Agriculture Organization (WHO/FAO) working team (Holbrook et al. 1985) recommended the use of the highest intensity light source to catch the largest percentage of parous flies for virus isolation attempts. Thus the New Jersey light trap is used to collect *C. variipennis* for virus isolation studies when alternating current electrical sources are available.

Rowley and Jorgensen (1967) reported that a black light modified trap collects 11 times more *C. variipennis* than the standard New Jersey light trap with a 110-V, 40-W incandescent bulb. However, the authors did not specify the gonotrophic status of the trapped population. The primary objective of this study was to determine if a black light New Jersey trap, similar to that of Rowley and Jorgensen (1967), would be appropriate for collecting parous *C. variipennis*.

This study was conducted at 2 sites (ca. 3 km apart) on the Louisiana State University Agricultural Experiment Station. Site 1 was at the Dairy Improvement Center, and site 2 was located at Ben Hur Research farms.

The standard New Jersey trap (110-V, 40-W incandescent bulb) and a black light modification (110-V, 15-W U-shaped UV fluorescent tube) were compared following the experimental design of Holbrook (1985). The 2 types of traps were placed at diagonally opposite corners of a building in each site. Traps were run on 2 consecutive nights; trap position was alternated nightly to negate position effects. Ten collections were made from May 7 to July 29, 1989, on a weekly schedule unless climatic conditions were unfavorable.

Insects were collected and preserved in 70% ethanol. Adult *C. variipennis* were sorted by sex. Females were classified into 4 gonotrophic categories: nulliparous, parous empty, gravid and engorged. The parity status was determined based on abdominal pigmentation (Dyce 1969, Potter and Akey 1978, Akey and Potter 1979).

Data were analyzed by ANOVA with the SAS GLM procedure (SAS Institute 1985) and tested for significant differences in numbers of males, nulliparous, parous empty, gravid and engorged females in each trap. The dependent variable in each analysis was log (n+1) transformed. Proportions of each sex and parity level between the 2 trap types were compared with a Student's t-test (alpha = 0.05) using arc sine transformations of the data (Snedecor and Cochran 1980).

The black light traps attracted significantly (ca. 9 times; 5,846/668) more *C. variipennis* than the incandescent trap ($F = 91.114$; df = 1,9; $P < 0.0001$) during the entire study. The black light trap collected significantly more males (ca. 8 times; 570/72) than the incandescent ($F = 46.597$; df = 1,9; $P < 0.0001$). However, the proportion of males collected in each trap type was not significantly different ($t = 0.547$, df = 18, $P > 0.05$). The black light trap collected significantly more females than the incandescent trap in each of the 4 parity levels (Table 1). However, the proportion of nulliparous, parous empty, engorged and gravid females collected by each trap type was not significantly different (Student's t-test, alpha = 0.05; Table 1). Recently, Anderson and Linhares (1989) described a battery operated black light trap that could be used when alternating current is unavailable and also found the black light preferable to incandescent for obtaining parous flies.

The black light traps used in this study were highly attractive to other insects, which in-

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Table 1. The number and gonotrophic status of female *Culicoides variipennis* collected by 2 New Jersey trap types: 40W incandescent (IC) and 15W black light (BL).

	Gonotrophic status							
	Nulliparous		Parous Empty		Engorged		Gravid	
Period	IC	BL	IC	BL	IC	BL	IC	BL
1	7	81	6	114	0	33	12	69
2	33	71	38	189	0	28	102	824
3	1	21	4	125	2	37	6	122
4	7	31	6	75	2	51	5	26
5	8	24	28	109	25	82	14	148
6	5	8	6	103	5	40	24	112
7	1	6	45	89	41	62	5	29
8	1	53	30	228	6	35	8	134
9	8	89	4	103	24	49	0	72
10	12	303	33	1,094	19	265	13	142
Total[1]	83[a]	687[b]	200[a]	2,229[b]	124[a]	682[b]	189[a]	1,678[b]
%[2]	13.93[a]	13.02[a]	33.56[a]	42.24[a]	20.81[a]	12.93[a]	31.71[a]	31.80[a]

[1] For each gonotrophic state, trap catches followed with the same letter are similar (Student's *t*-test alpha = 0.05).

[2] Percentage of flies in each gonotrophic state collected from each trap type. For each gonotrophic state, percentages followed with the same letter are similar (Student's *t*-test alpha = 0.05).

creased sorting time by ca. 1.5-fold. However, the 10-fold increase in the number of flies appropriate for virus isolation (parous empty and gravid females; Table 1) would negate any increased sorting time. Therefore, the modification of the standard incandescent New Jersey trap to a black light source can be recommended for collecting *C. variipennis* for virus isolation studies from sites with available alternating current sources.

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