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# NEW JERSEY LIGHT TRAP MODIFICATION TO EXTEND BULB LIFE

H. W. WEST AND D. L. CASHMAN

Princess Anne Mosquito Control Commission, 1848 Pleasant Ridge Rd., Virginia Beach, VA 23457

For the past several seasons while using the New Jersey light trap for monitoring of adult mosquito populations, it was noticed that the light bulbs used had a high failure rate. During the 1983 season our commission replaced 32 bulbs in the 12 traps used.

We felt that the best solution to the problem was to convert the traps to operate the bulbs on DC voltage instead of AC. One method of achieving this is to install the little discs that are inserted into the bulb socket and replacing the bulb over the disc. These have been advertised in various magazines and they work quite well. The main objection to these was the price of $2.08 each. For around $0.18 per trap the same conversion can be made.

From an electronic hobby or supply store, buy some axial lead diodes rated at 1000 PIV (peak inverse voltage) at 1 amp. They come in packages of various quantities and prices, usually priced at $0.18 to $0.30 each. There is a band at one end of the diode to determine polarity. In this application it makes no difference which way the diode is installed.

First, disconnect one of the wires attached to the bulb socket and attach one lead of the diode to this point. Then, solder the other lead of the diode to the wire that was just removed. It is advisable to use some type of heat sink while soldering to prevent damage to the diode. Alligator clips or hemostats work fine. Finally, tape the exposed lead to prevent any possible shorts to the light trap body. The diode must be installed in this manner (Fig. 1) and cannot be placed in the main line cord because the fan motor requires AC to run.

With this conversion the bulbs burn dimmer than normal. If 15 or 25 watt bulbs were used before, it is necessary to use 60 watt bulbs to achieve approximately the same illumination. To determine what was happening, the following measurements were made.

With a 15 watt bulb connected directly to 120 volts AC without the diode installed, it would be expected from Ohm's law ($I=P/E=15/120$) that the bulb would draw 0.125 amps. When actually measured, however, the bulb drew 0.108 amps and, by the same formula, this yields 12.9 watts. This is within 20% which is an acceptable tolerance.

With the diode installed, the voltage measured across the bulb was 54 volts DC part of which was caused by the forward resistance of the diode. The measured current in this circuit was 0.056 amps and, again using the above formula, this yields 3 watts. Since the bulb, which was rated at 15 watts was only drawing 3 watts and operating on half of the AC cycle, the brightness was greatly diminished. Hence the reason for using a 60 watt bulb to achieve ap-

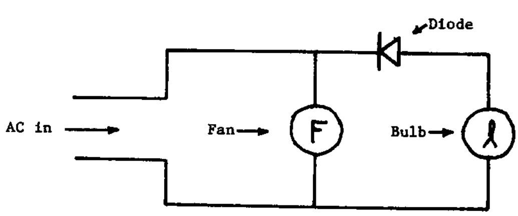


Fig. 1. Schematic diagram showing placement of diode.

proximately the same illumination as the unrectified 15 watt bulb.

We installed diodes in our traps (it takes about 15 minutes per trap) in the summer of 1984 and had to replace only two bulbs the entire season. The only drawback that we could see to this modification is the possibility of close lightning shorting the diode. In that case, the bulb would burn at full brightness, but would not go out.

## A COMPARISON OF THREE TRAPS FOR ADULT *CULICOIDES VARIIPENNIS* (CERATOPOGONIDAE)[1]

F. R. HOLBROOK

Arthropod-borne Animal Diseases Research Laboratory, USDA-ARS, P. O. Box 25327, Denver Federal Center, Denver, CO 80225

*Culicoides variipennis* (Coquillett) is the only proven vector of bluetongue virus (BTV) throughout most of the United States (Jones and Foster 1978). Field research into the adult behavior of *C. variipennis* is currently being conducted at the Arthropod-borne Animal Diseases Research Laboratory (USDA-ARS), Denver, CO, in support of an effort to develop an integrated system for the management of BTV disease in ruminant livestock. This system will require the development of survey tools designed to provide information on population trends, gonotrophic state, and vector capacity or virus activity.

Methods and trap designs for collecting mosquitoes and other biting flies have been reviewed by Service (1976), and Blanton and Wirth (1979) reviewed those that have been used to collect *Culicoides*. Lillie et al. (1979), during studies on *C. variipennis* in Colorado, used a trap comprised of a funnel and baffles of sheet aluminum with a light source, a power source and a collecting bottle. They reported that a trap with a light source of either two 25 milliamp, 6 volt bulbs or one 40 milliamp, 6 volt bulb and with $CO_2$ (dry ice) caught about 13 times as many flies as similar traps without dry ice. The following presents results of comparisons of baffle traps with a light source only, and CDC traps with and without dry ice.

The baffle trap designed by Lillie et al. (1979) has been made more durable by substituting galvanized steel for the sheet aluminum; the light source has been increased by using a 50W, 30V bulb operated at 24 volts DC; the rubber strap for holding the collecting jar has been replaced with a screw-top lid affixed at the bottom of the funnel; and the optional trap cover has been made a permanent part of the trap. The CDC traps (Model 512, John W. Hock Co., Gainesville, FL 32604) were operated at 12 volts DC using a CM-47 bulb as a light source with power supplied by gelled-electrolyte rechargeable batteries. The $CO_2$ source was ca 200 gm dry ice double wrapped in paper and placed above the trap cover in a closed paint can with holes in the bottom to allow the escape of the $CO_2$.

This study was conducted at 3 sites in the western drainage of the South Platte River northeast of Denver which is in an enzootic area of BTV where *C. variipennis* is commonly collected. Study Site 1, an idle cattle feed lot, was approximately 1.25 km ENE of a small reservoir where *C. variipennis* larvae were commonly collected from gently sloping, muddy banks where cattle had access. Larvae were also occasionally found at the site in a muddy area around a leaking watering tank in one of the pens. Study Site 2 was located 3.5 km ENE of the same reservoir, and larvae were found intermittently around a stock watering tank in a pen. Study Site 3 was located about 9 km SSE of the others, with no larval sites found within a 2.5 km radius. Three traps (one of each type) were used at each site on 3 sides of a building, so that the traps would sample the same population but not compete directly with each other. Trap locations at Site 1 faced west, south and east; at Site 2 west, north and east; and at Site 3 south, east and north. From June 23 to September 15, 1983, traps were operated from sunset to sunrise on 3 nights per period during six 8-day periods. The traps were rotated so that each type was at each position once per 8-day period.

Collections were preserved in 70% ethanol. After initial sorting of male and female *C. variipennis*, female parity (the reproductive status of a fly in relation to whether she has laid eggs) was determined as per Potter and Akey (1978).

The CDC traps without $CO_2$ caught ca 17 times fewer *C. variipennis* (Table 1) than either of the other 2 trap types. The baffle and CDC traps with $CO_2$ were almost equal in catches of female flies, but the baffle traps caught nearly 7 times more males and were more effective in catching blood-fed females (Table 2).

The parity of the females caught in the 3 trap types differed (Table 2), although the catches in

[1] This paper reports the results of research only. Mention of a commercial or proprietary product does not constitute a recommendation or an endorsement of this product by the U.S. Department of Agriculture.