

Evaluating Mosquito Abundance Using a New Jersey Light Trap Fitted with an LED Light Bulb and BG Lure

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INTRODUCTION

For many decades New Jersey Light Traps (NJLT) that are equipped with an incandescent light bulb have been used for mosquito abundance monitoring programs. However, recently LED lights are being used in many parts of our everyday life, including mosquito traps. Encephalitis virus survey (EVS) traps have been fitted LED lights as secondary mosquito attractants for several years, likely because they draw little power. NJLTs also may benefit from being fitted with a 2.8-watt LED, because it produces 12% more light than the 25-watt incandescent bulb typically used in NJLT and uses up to 89% less electricity. Additionally, LED light bulbs have greater physical shock and shatter resistance. The BG-Lure increases the number of *Aedes aegypti* that are captured in BG sentinel traps and have the potential to increase the number of mosquitoes or diversity of species caught in NJLT. In this two-part study we determined whether substituting an incandescent light with an LED light bulb or adding BG-Lure affected the number of mosquitoes caught in EVS traps that were placed in a coastal habitat of Alameda County (California, USA).

METHODS

NJLTs fitted with an incandescent bulb, LED, or LED with BG-Lure were evaluated in three habitats: 1) tidal salt and freshwater marsh, 2) suburban residential that was adjacent to a creek that flows throughout the year, and 3) wooded suburban residential. At each site, a pair of NJLTs were deployed 25 m from each other, with one fitted with the control (NJLT with 25 watt incandescent bulb) and the other with the treatment (NJLT with LED). A BG-Lure was affixed to the NJLT below the LED and directly above the fan by sliding the BG-Lure into a tube that was constructed of industrial strength plastic mesh (12.5 mm mesh size; see Poster). The NJLT ran continuously with the trap contents collected weekly. The location of the treatment and control was exchanged weekly at each site. The mosquitoes collected were identified to species and enumerated using a dissection microscope. The comparison of NJLT with an incandescent bulb or LED was made from 25 Apr to 12 Sep 2018 (84 trap nights), while the comparison of NJLT fitted with LED with or without BG-Lure was made from 28 Mar to 10 Oct 2018 (105 trap nights). Data from all study sites

were combined and analyzed using Prism software (version 8; GraphPad Software, San Diego CA USA).

RESULTS AND CONCLUSION

NJLT fitted with an incandescent bulb caught slightly more female mosquitoes than one fitted with an LED bulb, but the difference was not significant (unpaired t test, $P = 0.73$; see Poster). Similarly, there was no significant difference in the number of male mosquitoes captured in NJLT fitted with an incandescent or LED light (unpaired t test, $P = 0.95$; see Poster). When NJLTs were outfitted with LEDs, more female mosquitoes were collected with the trap that contained a BG-Lure than with the trap without the BG-Lure, although this difference was not significant (unpaired t test, $P = 0.71$; see Poster). Similarly, there was no significant difference in the number of male mosquitoes collected in LED-fitted NJLT with or without BG-Lure (unpaired t test, $P = 0.82$; see Poster).

The results demonstrated that use of LED in NJLT is a good alternative to an incandescent light attractant. LEDs offered substantial advantages over incandescent light, most notably that the former draws far less power than LED lights, making their use more environmentally friendly relative to incandescent bulbs. Additionally, the life span of a LED far exceeds that of an incandescent bulb, providing additional cost savings. Vector control workers that replace incandescent lights with LED may be able to go a step further and retrofit the NJLT so that it is powered with sunlight (i.e. solar power), thereby eliminating the need for corded power. Doing so would substantially increase the diversity of sites for placing a NJLT (i.e. in the middle of a marsh where the lack of corded power would otherwise prohibit such placement). That there was no significant difference in the number of male and female mosquitoes collected in NJLT outfitted with incandescent or LED demonstrated that use of LED would still allow vector control workers to detect the initial emergence of male mosquitoes that typically precedes female emergence. The addition of a BG-Lure did not impact on the number of mosquitoes collected by the NJLTs, demonstrating that in areas where invasive *Aedes* species have yet to be established (as was the case for Alameda County when the study was conducted), the additional expense of including a BG-Lure attractant on the NJLT is not warranted.