

ULV ADULTICIDE EFFICACY TRIALS USING CDC AND NOVEL BG-COUNTER TRAPS

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ABSTRACT

To examine the effectiveness of ground ultra-low volume (ULV) applications, the Central Massachusetts Mosquito Control Project (CMMCP) staff conducted three separate ULV efficacy trials during the 2022 season. Traditional CDC-light traps baited with CO₂ were used, along with novel BG-Counter traps also baited with CO₂. The overall efficacy of the ULV applications was observed as well as any potential differences between the two trap types. An age-grading survey was also conducted on the *Coquilleltidia perturbans* specimens collected to help determine the level of control achieved and potential influence of new mosquito emergence. Zenivex® E4 was the adulticide product used in these trials. It is also what is currently used in the CMMCP adulticide program.

BACKGROUND

Once the majority of spring brood mosquito larvae have emerged from local wetlands, CMMCP field staff shifts efforts from larviciding these areas to treating catch basin systems, and targeted evening adulticiding. Over the years, CMMCP has conducted mosquito surveillance around spray events to gauge the control achieved through these applications. One potential issue observed during previous trials is new adult mosquito emergence following adulticiding (Mount 1998). As the control products utilized are non-residual, any active mosquito that does not come in direct contact with active ingredient during the application will not be knocked down. This includes mosquitoes that develop into adults following the event. These migrated or new adult mosquitoes can skew the observed control achieved at the time of adulticiding. Performing trials during periods of low emergence,

as well as age-grading collected mosquitoes, may be options to better assess the control produced from these events. Additionally, using caged mosquitoes during a trial could also help gauge the efficacy of ULV applications (Mount 1998).

Besides traditional CDC-light traps baited with CO₂, novel BG-Counter traps can also be used with CO₂ to collect adult mosquitoes. These BG-Counter traps also have the ability to assess collections in real-time. Using infrared sensors, this trap “counts” mosquitoes as they enter the collection area. The data is then transmitted over a cellular network, and can be accessed through a web application. The BG-Counter traps can also be programed remotely through this online portal as well (Biogents 2022).

The primary adulticide product used by CMMCP during the 2022 season was Zenivex® E4 (Wellmark International, Schaumburg, IL) (EPA Reg No. 2724-

807), a synthetic pyrethroid that utilizes the active ingredient etofenprox. Prior to using this product CMMCP had used another synthetic pyrethroid, ANVIL® 10+10 (Clarke Mosquito Control Products, Inc., Roselle, IL) (EPA Reg. No. 1021-1688-8329). Unlike Zenivex® E4, ANVIL® 10+10 uses the active ingredient sumithrin along with the synergist piperonyl butoxide (PBO). The absence of PBO in Zenivex® E4 is one of its advantages over ANVIL® 10+10 (CMMCP 2022).

MATERIALS & METHODS

To assess the control achieved from CMMCP ULV spray events, a treatment location first needed to be selected. After talking to property owners familiar with CMMCP, a large semi-wooded site was chosen. This particular site would be available for routine surveillance and potential treatments. This parcel also included a road network which would help facilitate a proper ULV application. At this location two model 512 CDC miniature light traps baited with CO₂ (500ml/min) and two BG-Counter traps baited with CO₂ were used concurrently to collect specimens before and after Zenivex® E4 applications. More specifically, collections would be made one night prior to spray events, and for two consecutive trap nights following the application event. No active trapping took place on the evening of spraying.

Three separate rounds of this surveillance and treatment occurred, with a week in-between each. The first trial period occurred 7/18-7/22, the second 8/1-8/5, and third 8/15-8/19, with the applications taking place on 7/19, 8/2,

and 8/16 respectively. All three ULV applications of Zenivex® E4 were conducted at flow rates of 4.5oz/min, 0.75oz/acre, and 0.00175lbs etofenprox/acre. This is on the lower end of the established application rate spectrum for this product. Mosquitoes collected at each trap location and trap night were counted and identified by species. *Coquillettidia perturbans* specimens were also saved and included in an age-grading survey. A KestrelMet™ 6000 mobile weather station was deployed to document any significant temperature swings or precipitation that may have occurred during surveillance periods.

RESULTS & DISCUSSION

For each of the three trial sets, mosquito collections were reduced following the spray event, and remained depressed for the duration of the surveillance period. Overall collection numbers also decreased with each consecutive trial. All trap types and locations successfully collected specimens, but the differences between trap types were varied between the three trials (Figures 1-3). Preliminary results from the age-grading survey of *Coquillettidia perturbans* collected indicate that older mosquitoes present prior to the spray events were successfully reduced, with post-treatment collections having a larger percentage of younger mosquitoes. These fresh mosquito specimens following the ULV events would have migrated into the area and/or been newly emerged from around the application site.

To reiterate, all three trials experienced lower specimen collections following the spray events. Age-grading of collected specimens indicate that a larger percentage of post-spray mosquitoes were younger, and potentially newly emerged compared to the pre-spray specimens. This novel technique of age grading will allow for efficacy trials earlier in the season, where new emergence is common. It is anticipated that these trials will continue and be potentially expanded in the 2023 season. The Central Massachusetts Mosquito Control Project will continue to evaluate the products and practices it utilizes to ensure effective and efficient mosquito control in central Massachusetts.

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Figure 1: Zenivex® E4 Efficacy Trial #1

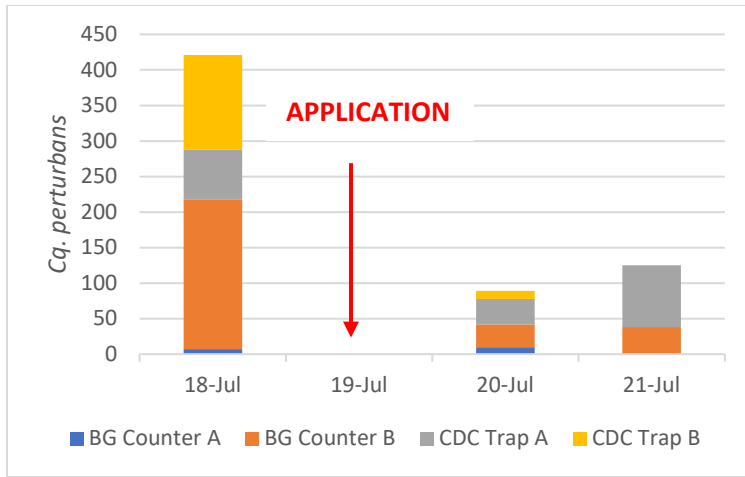


Figure 2: Zenivex® E4 Efficacy Trial #2

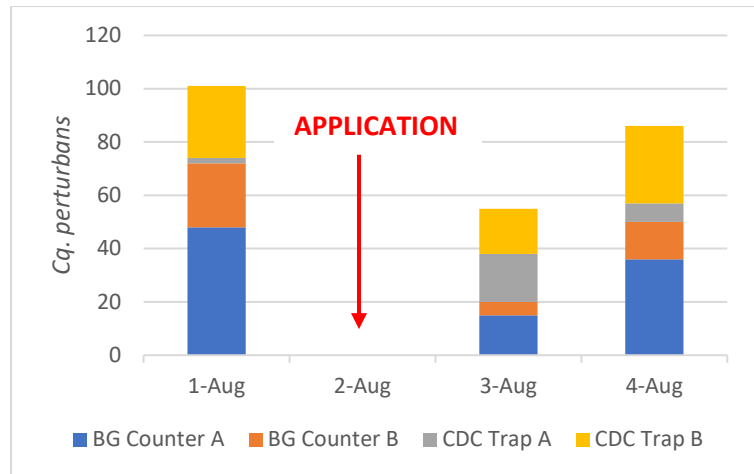
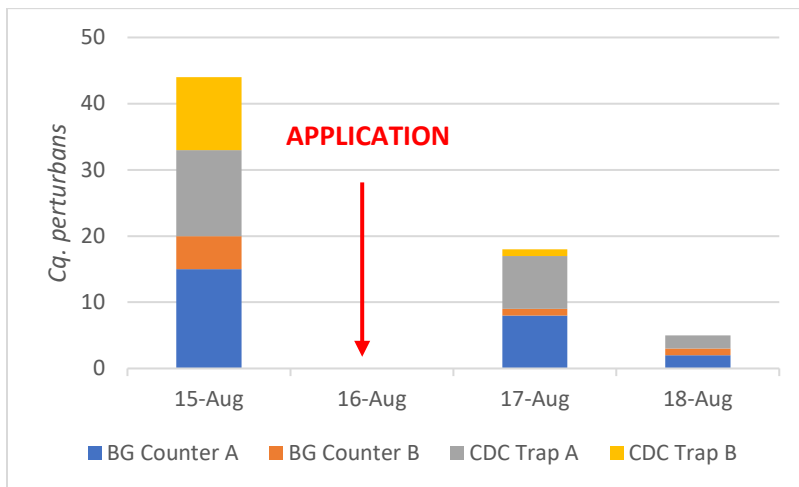


Figure 3: Zenivex® E4 Efficacy Trial #3





CDC light trap



BG-Counter trap



BG-Counter trap setup with enclosure, solar panel, weather station and technician Dave Segal

