EARLY SPRING TREATMENTS USING NATULAR™ G30 2018 UPDATE

FRANK H. CORNINE III, MPH, Staff Biologist
Central Mass. Mosquito Control Project
111 Otis Street Northborough, MA 01532
(508) 393-3055 • www.cmmcp.org • cmmcp@cmmcp.org

ABSTRACT

Ochlerotatus abserratus and *Ochlerotatus excrucians* are two of the first mosquito species to emerge each spring, causing significant biting pressure for the residents of central Massachusetts. In the past, the Central Massachusetts Mosquito Control Project had utilized larvicidal methoxychlor dust to reduce these species as a pre-hatch treatment, but this option has not been available for many years. In past years we have tried extended release formulations of *Bacillus thuringiensis israelensis* to no avail due to slow feeding habits in early spring. In this continued evaluation CMMCP sought to determine if Natular™ G30 could be applied in a similar fashion as methoxychlor and achieve comparable levels of control. Spinosad, developed from the fermentation of *Saccharopolyspora spinose*, is the active ingredient found in Natular™ G30. This was the fourth season of Natular™ G30 field trials, and once again CMMCP observed successful control for early season mosquito species like *Oc. abserratus* and *Oc. excrucians*. The level of control achieved appears to be very dependent on weather conditions following the applications.

BACKGROUND

Ochlerotatus abserratus and *Ochlerotatus excrucians* represent two of the first mosquito species to emerge each season, having developed in scattered woodland "snow" pools. These species are both persistent mammal biters and may harbor Jamestown Canyon virus (Andreadis 2005). *Oc. abserratus* and *Oc. excrucians* are univoltine species, as they produce a single generation each year. The eggs produced by adult females during the season remain inactive until the following spring. Despite being a potential vector of Jamestown Canyon virus, *Oc. abserratus* and *Oc. excrucians* are not considered important factors in the transmission cycle of West Nile virus and Eastern Equine Encephalitis. Along with *Oc. abserratus* and *Oc. excrucians, Ochlerotatus canadensis* may also develop in these woodland pools. The significant difference between these three species is that *Oc. canadensis* may produce multiple generations a year, in addition to being a potential vector of both West Nile virus and Eastern Equine Encephalitis (Andreadis 2005).

To reduce these "spring brood" species of mosquitoes CMMCP had used methoxychlor, an organochlorine, by applying the dust formulation to the frozen larval habitats in the 1980's. Treating these locations pre-hatch allowed for an expanded larvicide window outside the traditional spring season. The winter applications significantly reduced the number of adult *Oc. abserratus*, *Oc. excrucians*, and *Oc. canadensis* mosquitoes that would later emerge, and as a result lower the number of service requests from the residents of CMMCP member communities. During this time period, methoxychlor was used not only against mosquitoes but many other pest control insects by other applicators. It was also

used against insects in the agricultural, horticultural and veterinary fields (Extension Toxicology Network 1996). Since CMMCP discontinued using methoxychlor in the mid-1980s, it has not found a suitable alternative.

The majority of current mosquito larvicide options involve strains of *Bacillus thuringiensis israelensis* and/or *Bacillus sphaericus*, insect growth regulators, or surfactant oils. But the development of spinosad based products adds another alternative. Created from the fermentation of the soil bacteria *Saccharopolyspora spinosa*, spinosad has been shown to control developing mosquito larvae. Natular™ G30 is a currently available, slow release, commercial formulation of spinosad. Another benefit of Natular™ G30 is that the Environmental Protection Agency has identified it (spinosad) as a "Reduced Risk" pesticide (CMMCP 2018). Natular™ G30 is also listed in the OMRI Products List, available at the OMRI website www.omri.org. Clarke Mosquito Control Products, Inc., the manufacturer of Natular™ G30, has formulated the granules to provide larval control for up to 30 days, as implied by the product name. CMMCP sought to determine if this product could be applied before the traditional larvicide season, and provide proper control of immature mosquito larvae. If successful, Natular™ G30 would allow for an increased amount of targeted *Oc. abserratus*, *Oc. excrucians*, and *Oc. canadensis* larviciding, reducing the number of adulticide service requests from residents in the CMMCP service area.

MATERIALS & METHODS

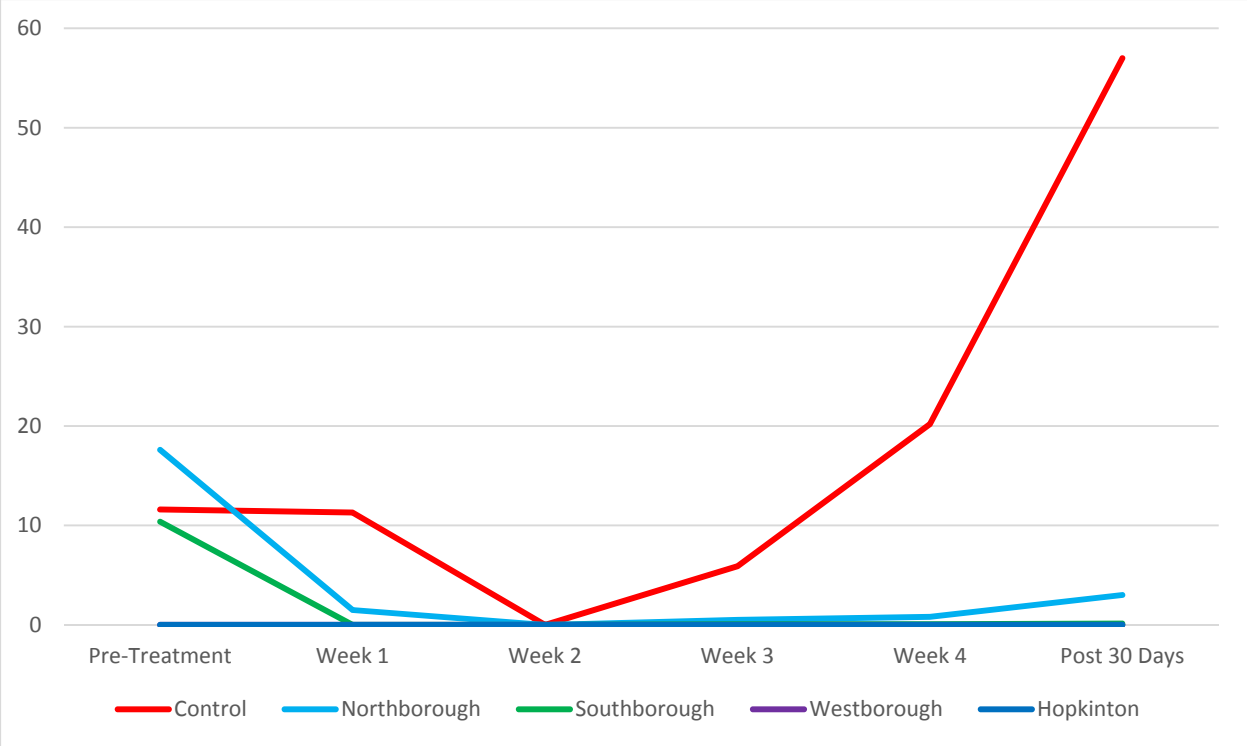
Four CMMCP member communities were involved in this evaluation of Natular™ G30, Hopkinton, Northborough, Southborough and Westborough. These were the same towns that were included in the 2017 trials. A total of thirty-four trial sites were used to monitor Natular™ G30 efficacy. Site selection was based on historical larvae data from CMMCP field inspections, although many of the locations were involved in the Natular™ G30 field trials of previous seasons. In order to ensure consistent surveillance during the trials, recoverable dip stations (RDS) were first created at every site, both treated and untreated. Four RDS per site were flagged and at these specific points are where larval densities, water temperatures, and general observations took place throughout the course of the project. The Natular™ G30 applications at the treatment sites took place in early March, immediately following initial pretreatment larval observations, at a rate of 10lbs/acre. Larval surveillance took place twice a week, with several additional observations taking place beyond the proposed control range of 30 days. Following the conclusion of field surveillance, the data was compiled and evaluated to measure the level of larval control at treatment sites, as well as what natural fluctuations transpired at the untreated control sites.

2018 RESULTS

At the conclusion of field work, data collected from the treatment sites was grouped by town, with the records from all untreated control sites grouped together for analysis. It was shown that after the applications of Natular™ G30, the amount of larvae present at the

designated treatment sites significantly decreased, or remained at zero. During this time period, the level of observed mosquito larvae at the untreated control sites remained constant, until the second week when temperatures dropped in the region, resulting in frozen sites. A similar experience occurred during the 2017 Natular™ G30 evaluations. Larvae were once again observed at the control sites during the third week, once thawed. Larvae present at the treatment sites remained low for the duration of the trials, unlike the untreated control sites, which experienced a significant increase over the last three weeks (Figure 1).

Figure 1: Larval Averages during Natular™ G30 Evaluation



DISCUSSION

This season another field trial of Natular™ G30 was conducted to gauge its potential as a pre-hatch, early season larvicide on frozen woodland pools. As in past seasons, Natular™ G30 showed promise, with all treated sites experiencing sustained decreases in larvae throughout the evaluation. Conversely, the untreated control sites had constant and/or increasing levels of larvae during the trial period. The absence of significant larvae at the treated sites continued past the 30 day proposed window of control. The temperature drop and subsequent larval habitat freeze during the second week of the field trial did not appear to have any continuing impact on the results of the project.

The 2018 Natular™ G30 field trials reinforce the importance of application timing and subsequent weather as the most significant factors regarding the successful control of local mosquito larvae. Relatively soon after an application, larvae must be actively feeding to ingest enough of the larvicide

particles for proper control. An application too far in advance will result in inadequate results with the *Ochlerotatus* eggs not completely hatching out and larvae not feeding enough before the window of active Natular™ G30 control is closed. If a spinosad product could be formulated to release control particles beyond the current scope of Natular™ G30, it would greatly help the potential for this type of product as a pre-hatch option. It is anticipated that Natular™ G30 will be incorporated into the CMMCP larvicide program in 2019, at least on a limited basis. A selection of these applications will be monitored as part of the greater 2019 Natular™ G30 field evaluations.

ACKNOWELDGEMENTS

The author would like thank those CMMCP staff members who helped identify, treat and monitor the sites used in this project.

REFERENCES

Andreadis TG, Thomas MC, Shepard JJ. 2005. Identification guide to the mosquitoes of Connecticut. Bulletin of the Connecticut Agricultural Experiment Station 966:1–173.

CMMCP [Central Massachusetts Mosquito Control Project]. 2018. Spinosad (Saccharopolyspora spinosa) [Internet]. Available from the Central Massachusetts Mosquito Control Project, Northborough, MA [accessed January 9, 2019]. https://www.cmmcp.org/pesticide-information/pages/spinosad-saccharopolyspora-spinosa

Extension Toxicology Network. 1996. *Methoxychlor*. Extoxnet. Available from: http://extoxnet.orst.edu/pips/methoxyc.htm