EARLY SPRING TREATMENTS USING NATULAR™ G30
2017 UPDATE

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ABSTRACT

After developing in woodland pools, the mosquito species *Ochlerotatus abserratus* and *Ochlerotatus excrucians* emerge in late spring, causing significant issue for the residents of central Massachusetts. Historically, the Central Massachusetts Mosquito Control Project had employed larvicidal methoxychlor dust to reduce these species pre-hatch, but this option has not been available for many years. CMMCP sought to determine if Natular™ G30 could be deployed in a similar fashion as methoxychlor and achieve similar levels of control. Derived from the fermentation of *Saccharopolyspora spinose*, spinosad is the active ingredient found in Natular™ G30. This was the third 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 degree of control however, appears to be very dependent on weather conditions following the applications.

INTRODUCTION

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. 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. It was also used against insects in the agricultural, horticultural

and veterinary fields (Extension Toxicology Network 1996). Since CMMCP discontinued using methoxychlor in the 1980s, it has not found a comparable 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 recent development of spinosad based products adds another possibility. 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 one of only two Group 5 insecticides, and also as a "Reduced Risk" pesticide. 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 2017). 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

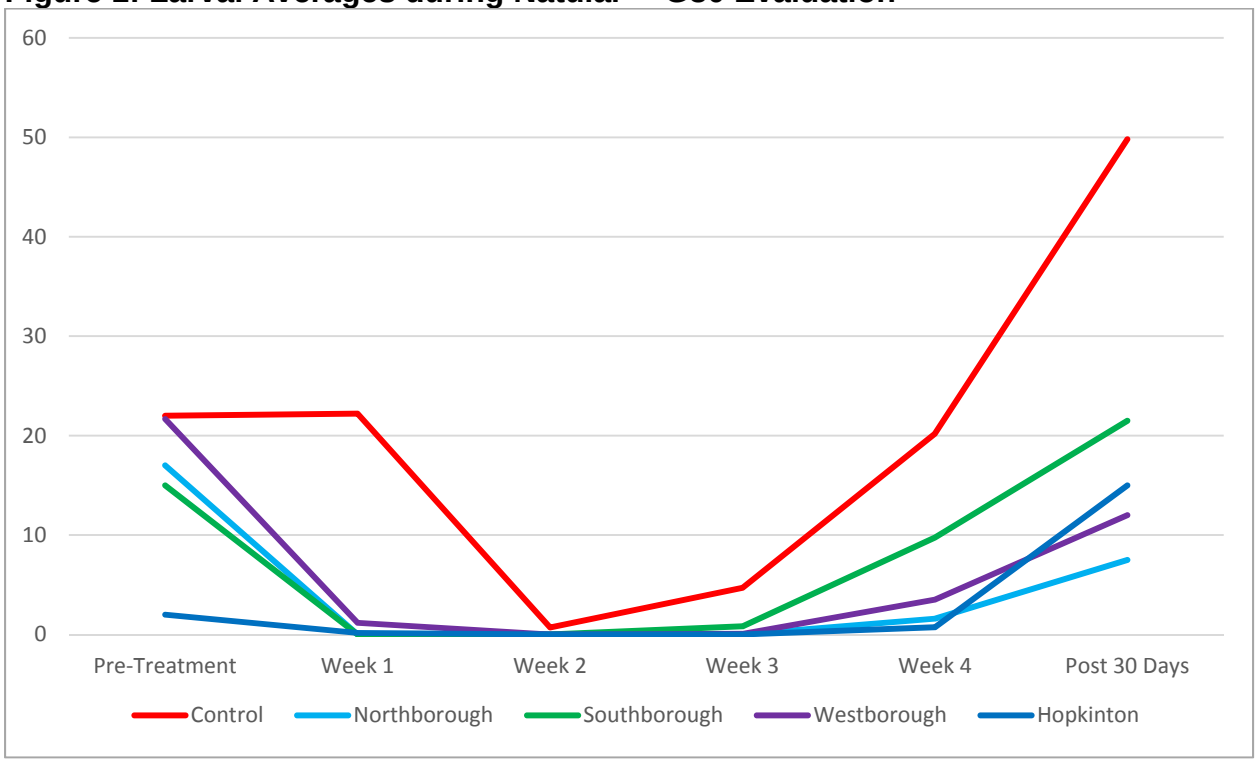
Hopkinton, Northborough, Southborough and Westborough were the four CMMCP member communities that were involved in this evaluation of Natular™ G30. These were the same towns that were included in the 2016 trials, although the number of treatment sites were expanded. A total of thirty-two treatment sites were used to monitor Natular™ G30 efficacy along with five untreated control sites. 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 the 2015 and 2016 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 2017, 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.

RESULTS

Following the field portion of the project, data collected from the treatment sites was grouped by town, with the records from all five 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. During this same time period, the level of observed mosquito larvae at the untreated control sites remained relatively constant. However, the region then experienced a prolonged deep freeze during the second week of the trials, which resulted in frozen RDS and very few recorded observations of larvae from any sites, treated or untreated. These field conditions and low larvae samples continued for several surveillance events. During the 4th week of the field observations, the number of larvae present at the RDS began to increase for all towns and the untreated control sites. This increase would continue in the final surveillance events conducted after the 30 day post-treatment mark for all sites (Figure 1).

Figure 1: Larval Averages during Natular™ G30 Evaluation



DISCUSSION

This was the third season of Natular™ G30 field evaluations to measure the potential for this product to serve as a pre-hatch, early season larvicide on frozen woodland pools. It once again showed promise, but because of the sustained period of sub-freezing temperatures during the middle of the project, the results are not as conclusive as in past years. By the time the region returned to average temperatures for late-March and early April and the habitats unfroze, the 30 day window of control for the Natular™ G30 granules was essentially over. In addition to the return of seasonal temperatures, heavy rains flooded the sites well beyond the original scope during the Natular™ G30 applications. These factors led to an additional hatch of mosquito larvae as early stage specimens began to be observed at many of the sites.

Through these 2017 field trials, it is apparent once again that the timing of the Natular™ G30 treatments and the subsequent weather are the most important factors regarding the successful control of local mosquito larvae. Conditions must exist for actively feeding larvae to ingest enough of the larvicide particles for mortality. An application too early will result in inadequate control through the dormant eggs not completely hatching out, and larvae not feeding enough before the product is exhausted. A formulation of Natular™ G30 that could release spinosad particles beyond the current scope 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 next season, at least on a limited basis. A selection of these applications will be monitored as part of the greater 2018 Natular™ G30 field trials.

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