

Field Trials of FourStar® CRG for Pre-Hatch Control of *Coquillettidia perturbans* in Selected Retention Ponds

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ABSTRACT

FourStar® CRG is a relatively novel microbial insecticide formulation of *Bacillus sphaericus* and *Bacillus thuringiensis israelensis*, which may be effective against numerous mosquito species for up to 60 days according to the product label. This granular product can be used as a pre-hatch treatment on a variety of potential mosquito emergence habitats, including those that may become flooded following application. One noted habitat in particular, storm water collection areas, can provide a suitable environment for the development of *Coquillettidia perturbans* larvae. CMMCP sought to evaluate the efficacy of FourStar® CRG as an effective means of reducing the level of *Cq. perturbans* that impact local areas.

INTRODUCTION

The Central Mass. Mosquito Control Project (CMMCP) has been without a viable pre-hatch treatment option since the use of methoxychlor, an organochlorine, ended in the early 1980's. The recent development of extended release microbial insecticides has created the potential for pre-hatch treatments once again for CMMCP. One of these novel products is FourStar® CRG, and is composed of both *Bacillus sphaericus* and *Bacillus thuringiensis israelensis* to combat mosquito larvae. The label notes that this formulation can be effective for up to 60 days following application.

A wide range of habitats can be treated with FourStar® CRG such as freshwater marshes, woodland

pools, catch basins, abandoned swimming pools, cattail marshes, and storm water collection areas. There is also a wide-spectrum of mosquito species that can be impacted by FourStar® CRG, including *Aedes vexans*, *Anopheles quadrimaculatus*, *Culex* spp., and *Coquillettidia perturbans*. *Cq. perturbans* are of particular concern for CMMCP, due largely to their prolific numbers and propensity to feed on mammals. A unique mosquito species, *Cq. perturbans* larvae do not need to surface to breathe but instead attach their siphons to the sub aquatic roots of emergent vegetation to acquire air. Retention ponds, especially those that are unmaintained become ideal development habitats for this mosquito species due to their vegetation types, which include cattails.

Looking for a potential pre-hatch treatment for *Cq. perturbans* in local retention ponds, CMMCP conducted field trials of FourStar® to evaluate its potential for adoption into the CMMCP integrated mosquito management program.

MATERIALS & METHODS

Using four local retention ponds with historical mosquito surveillance, two were chosen as treatment sites, with the other two acting as controls. An application rate of 10 lbs. FourStar® CRG per acre was used at the treatment sites. Following this application all retention ponds were monitored using traditional adult mosquito collection techniques weekly over the duration of the season. These numbers were then compared to the historical figures for the corresponding sites to determine if any degree of control was achieved at the treatment retention ponds.

Results of this trial were inconclusive. There were several possible issues contributing to this outcome. Less than favorable application timing, inadequate coverage, or ineffective product could all be grounds as to why these trials showed little control. It is possible that the applications took place too late into the development of the *Cq. perturbans* larvae to be effective. Once the larvae approach pupation, their feeding slows, and completely stops once they become pupae, negating the microbial insecticide. Although these trials used an application rate of 10 lbs. FourStar® CRG per acre, up to 20

lbs. per acre can be utilized if the conditions indicate the need for higher rates. This specific mosquito species and habitat may have required a higher application rate to achieve proper control. In conversation, a representative for the product did express the potential for issues with the initial manufacture of this novel formulation, which may have negatively impacted the efficacy of this early lot of FourStar®.

CONCLUSION

Results of this FourStar® CRG trial for control of *Cq. perturbans* were inconclusive. A combination of application timing, inadequate coverage, and ineffective product are proposed to be the reasons behind this. FourStar® CRG and similar products will continue to be evaluated in hopes that one will allow pre-hatch treatments for the CMMCP service area.

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