

EVALUATION OF TWO MOSQUITO LARVICIDES, ALTOSID® WSP AND FOURSTAR® 45, IN CATCH BASIN SYSTEMS

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ABSTRACT

A significant mosquito control function of the Central Massachusetts Mosquito Control Project is the larvicidal treatment of catch basin systems, conducted primarily to reduce levels of *Culex* mosquitoes. Several *Culex* species are known to harbor and transmit West Nile virus among other mosquito-borne diseases, which is why these treatments are so vital to public health. There are several different products available for use in storm drains with two, Altosid® WSP and FourStar® 45 being evaluated in this project. Both of these products are currently utilized by CMMCP in the catch basin larvicide program. Over the course of this field trial for Altosid® WSP and FourStar® 45 compared to untreated storm drains, it was found that both products provided significant control, although Altosid® WSP provided a higher level of control than the FourStar® 45 briquets.

BACKGROUND

Culex mosquitoes, long known to develop in storm water systems, are of significant public health importance because of their role in the transmission of West Nile virus (WNV) in the United States. More specifically, *Cx. pipiens* and *Cx. restuans* have been identified as abundant species in the Northeast United States that WNV has been detected in (Anderson 2011; Butler 2006). Fortunately for public health officials, there are several mosquito control options for these species while they develop in catch basins. Two of these particular larvicides currently utilized by CMMCP staff include Altosid® WSP and FourStar® 45.

Altosid® WSP (EPA Reg. No. 2724-448) are water soluble pouches that contain the active ingredient methoprene. A juvenile hormone mimic, growth

regulator, methoprene acts by preventing the adult mosquitoes from successfully emerging. Studies have been conducted using this formulation in the laboratory setting as well as observations from the field (Butler 2006; Harbison 2018). FourStar® 45 (EPA Reg. No. 83362-3) briquets are a slow release combination of *Bacillus thuringiensis israelensis* (*Bti*) and *Bacillus sphaericus* (*Bs*). These two bacteria produce crystalline toxins that kill mosquito larvae when ingested. Various formulations of these two bacteria have been developed and their success against mosquitoes, including *Culex*, is well documented (Anderson 2011).

MATERIALS & METHODS

With the two products selected for evaluation, Altosid® WSP and FourStar® 45, local neighborhoods with extensive basin systems were designated for each

treatment type, as well as an untreated (control) area. Although only a few storm drains would be monitored in each system, all basins were treated (or left untreated) within a network to ensure the same conditions were present in that particular neighborhood. All treatments were conducted according to the current product labels.

Differences in control mechanisms between the two products required variations in basin surveillance. To gauge the effectiveness of the storm basin larvicide products weekly inspections occurred within the specific treatment storm drain networks. Four basins treated with FourStar® 45 were selected for repeated inspection, as well as three treated with Altosid® WSP, and three left untreated as controls. The untreated (control) storm drains and those treated with FourStar® 45 were monitored visually with a high-powered light. If mosquito larvae were observed within the storm drain, it was considered positive for mosquito larvae. Due to methoprene allowing mosquito larvae to progress towards the pupal stage, those basins treated with Altosid® WSP were sampled using a modified dipper to collect surface water in the basin. These water samples were transferred to emergence containers and larvae were monitored to determine if they would successfully emerge as adults or be impacted from the methoprene and not emerge as fully developed adult mosquitoes. Only if mature adult mosquitoes emerged, would the Altosid® WSP treatment and inspection be considered a failure.

RESULTS

The untreated, control set of basins produced an overall positive check percentage of 96.97%, with individual sites ranging from 90.91% positive to 100.0%. The basins treated with FourStar® 45 briquets experienced an overall 34.09% positive larval presence, ranging from 0.00% to 36.36% in individual storm drains. Finally, the basins treated with Altosid® WSP produced an overall positive larval check percentage of 15.15%, with individual sites ranging from 0.00% to 36.36% (Table 1). Although the Altosid® WSP basins contained mosquito larvae for 15.15% of the field checks, the larvae collected did not eventually emerge as adults, indicating successful treatment.

DISCUSSION

With catch basin larvicide treatments being a significant component of mosquito control programs, the field evaluation of any storm drain product used is essential. As shown in the untreated catch basin inspections, these habitats can and will produce significant amounts of *Culex* larvae, which have the potential to amplify and transmit West Nile virus among other mosquito-borne diseases. The results of this initial trial have reinforced the need to monitor the efficacy of these products in the field and not simply in the laboratory setting. At this time Altosid® WSP and FourStar® 45 both provide suitable control of mosquito larvae in catch basin systems for CMMCP. Evaluation of these products should continue and potentially be expanded to include more storm drain networks and additional larvicide products.

Table 1: Inspection Results of Catch Basin Treatment Types

Treatment Type	Site #	% Positive	Overall % Positive
Nontreatment	1	90.91%	96.97%
	2	100.00%	
	3	100.00%	
Altosid® WSP	1	0.00%	15.15%*
	2	9.09%	
	3	36.36%	
FourStar® 45	1	81.82%	34.09%
	2	18.18%	
	3	36.36%	
	4	0.00%	
* No collected larvae successfully emerged as adults			

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