New Jersey Department of Environmental Protection (NJDEP)
Water Resource Management
Bureau of Pesticide Control, Licensing & Registration
Pesticide Evaluation & Monitoring Section

MOSQUITO CONTROL PESTICIDE USE IN NEW JERSEY: 2019 SURVEY

Introduction

The Pesticide Evaluation & Monitoring Section (PEMS) began a series of pesticide use surveys in 1985. These surveys address pesticide use in the state of New Jersey for agriculture, golf courses, termite control, right-of-way, mosquito control, and lawn care. The mosquito control survey is conducted every three years and targets pesticides used for mosquito control purposes. The mosquito control survey includes commercial applications of pesticides for the management and control of adult and larval mosquitoes. Adulticiding and larviciding can occur in populated residential and recreational areas, as well as unpopulated mosquito habitat. This report focuses on the ninth survey completed in the mosquito control series (2019).

All statewide pesticide use surveys are performed under the authority of the New Jersey Pesticide Control Code (NJPCP), N.J.A.C. 7:30-6.8(d) et.seq., requiring licensed applicators to maintain pesticide records for three years and to submit use records to the state when requested. This regulative authority provides a level of response that is difficult to duplicate in a voluntary, nationwide survey.

The information collected from the PEMS pesticide use surveys is used by agencies within the NJ Department of Environmental Protection along with other state agencies to aid in research, exposure management and monitoring efforts in areas such as ground water protection, farm worker protection and education, and residual pesticide sampling.

Survey Methods

The NJDEP Bureau of Pesticide Control, Licensing and Registration's records were used to identify 1,102 licensed commercial applicators holding a category 8B (mosquito control) or 8C (campground applicator) on their license. Survey forms were mailed along with instructional letters and return envelopes asking for only 2019 mosquito control pesticide use. A total of three mailings were sent during the first four months of 2020.

The survey requested information on each pesticide product used, including trade name, EPA registration number, percent active ingredient, amounts applied, and the site of application. The data submitted by the applicators is used to compile the survey results. PEMS relies on the regulated community to provide data that accurately reflects their pesticide applications for the survey year.

Survey information was entered into a database file. This information file was then merged with a second database that linked trade names with chemical names, and a subprogram converted reported amounts of formulated product to amounts of active ingredient (lbs. a.i.).

Results & Discussion

Once all three mailings were completed, 913 out of 1,102 (83%) applicators responded. This response rate is a 3% increase from the 2016 survey. In addition, the number of 8B and 8C licensed applicators increased by just over 300 individuals between 2016 and 2019. Therefore, the 83% response rate represents a larger number of respondents.

Pesticides used by the mosquito control industry in New Jersey for 2019 totaled 66,605 lbs. a.i. This is a 29,810 lbs. a.i. increase from the reported use in 2016. The increase in reported use between 2016 and 2019 could be due, in part, to the additional 300 applicators that responded to the survey in 2019. Table 1 lists all the compounds reported in the 2019 survey and the amounts (lbs. a.i.) applied.

Bacillus thuringiensis (Bt) and mineral oil account for over 50% of the mosquito control products used in New Jersey. Bt and mineral oil are both larvicides. Bt is a naturally occurring bacterium found in soils. Bt spores produce toxins that are lethal to only mosquito larvae. Mineral oil is dispersed as a thin layer over the surface of the water to drown the larvae.

Pollinator protection has become a priority for the Department. Several neonicotinoids and synthetic pyrethroid insecticides have been identified as extremely hazardous to honeybees and other pollinators. Bifenthrin is a synthetic pyrethroid of concern, and its reported use increased by over 4,000 lbs. a.i. between 2016 and 2019. In addition, three noenicitinoid insecticides (imidacloprid, dinotefuran and thiamethoxam) were reported in the 2019 survey. This is the first time neonicotinoid insecticides were reported in a mosquito control use survey.

Table 1. Pesticide amounts (lbs. a.i.) reported in the New Jersey 2019 Mosquito Control Pesticide Use Survey.

*Indicates a compound not reported in the 2016 survey.

Chemical	Total (lbs. a.i.)	% of Total Usage
Alpha-cypermethrin*	1,709	3
Bacillus spaericus	6,145	9
Bacillus thuringensis	28,578	42
Beta-cyfluthrin*	94	<1
Bifenthrin	5,409	8

Table 1 (cont.). Pesticide amounts (lbs. a.i.) reported in the New Jersey 2019 Mosquito Control Pesticide Use Survey.

*Indicates a compound not reported in the 2016 survey.

Chemical	Total (lbs. a.i.)	% of Total Usage
Boric acid*	2	<1
Carbaryl*	6	<1
Cyfluthrin	4	<1
Deltamethrin	180	<1
Dinotefuran*	135	<1
Etofenprox	575	1
Fluvalinate	4	<1
Imidacloprid*	200	<1
Isooctadecanol	2	<1
Lambda-cyhalothrin	471	1
Malathion	5,217	8
Mineral oil	12,397	19
Novaluron*	19	<1
Permethrin	256	<1
Phenothrin	119	<1
Piperonyl butoxide (PBO)	2,045	3
Prallethrin	32	<1
Pyriproxyfen	92	<1
Pyrethrins*	30	<1
Resmethrin	185	<1
S-methoprene*	1,920	3
Soap*	1	<1
Spinosad	364	1
Sumithrin*	58	<1
Temephos	351	1
Thiamethoxam*	4	<1
Zeta-cypermethrin*	1	<1
Total:	**66,605**	

Table 2 shows mosquito control pesticide use by county. In general, the 29,810 lbs. a.i. increase seen between survey years is distributed across the 21 New Jersey counties. However, Passaic County reported over a 14,000 lbs. a.i. (98%) increase between survey years. This increase can be attributed to one larvicide product, containing both Bt and Bs active ingredients.

Table 2. Total pesticide amounts (lbs. a.i.) reported in the 2019 Mosquito Control Survey by county.

County	Total (lbs. a.i.)	% of Total Usage
Atlantic	5,059	8
Bergen	2,636	4
Burlington	3,016	5
Camden	2,218	3
Cape May	5,937	9
Cumberland	120	<1
Essex	2,856	4
Gloucester	2,038	3
Hudson	227	<1
Hunterdon	251	<1
Mercer	965	1
Middlesex	4,342	7
Monmouth	5,977	9
Morris	4,001	6
Ocean	5,802	9
Passaic	14,778	22
Salem	846	1
Somerset	2,463	4
Sussex	1,093	2
Union	923	1
Warren	1,051	2

Table 3 lists the amount (lbs. a.i.) of pesticides in the 2019 by application site. Over 80% of the reported mosquito control in New Jersey occurs in residential or commercial areas and wetlands (coastal and non-coastal). In 2019, the reported use in non-coastal wetlands and residential and commercial areas both increased by more than 50% from 2016. The increase in the non-coastal wetlands use can be attributed mainly to the over 14,000 lbs. a.i. of Bt and Bs larvicide applied in Passaic County. However, the increase in residential and commercial areas can be seen across

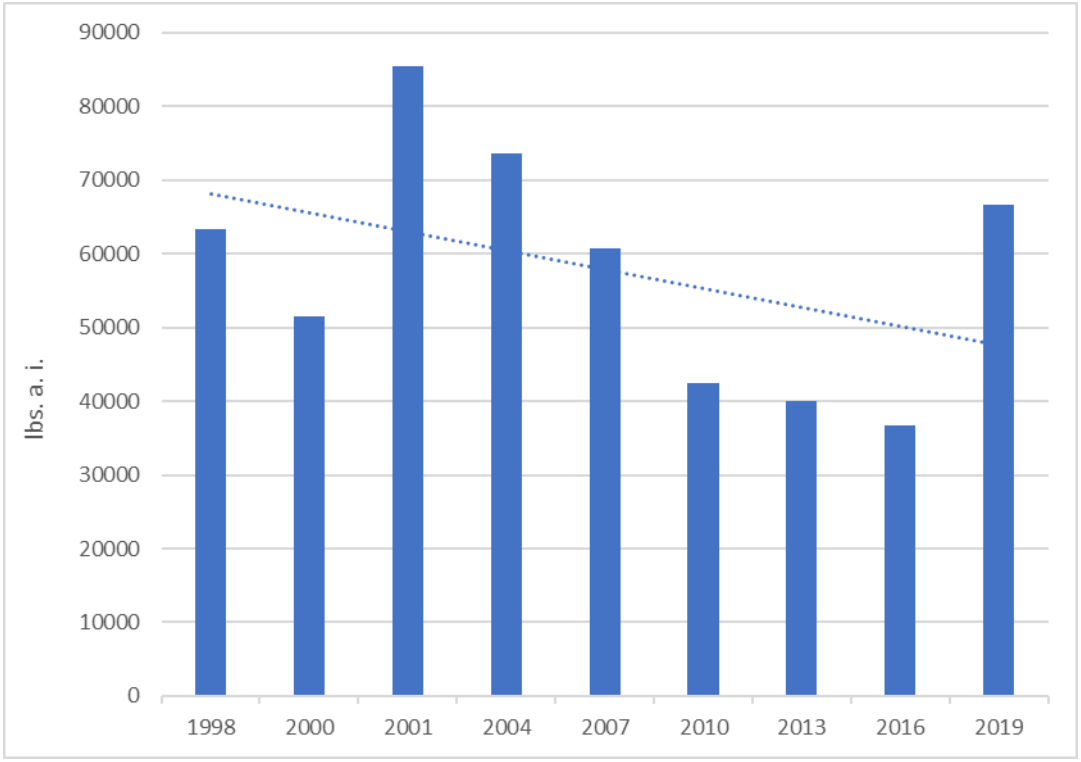
several counties (i.e., Somerset, Morris, Camden, Atlantic, Salem, Monmouth) and includes both adulticides and larvicides.

Table 3. Pesticide amounts (lbs. a.i.) reported in the 2019 Mosquito Control Use Survey by application site.

Site	Total (lbs. a.i.)	% of Total Usage
Residential, commercial	20,044	30
Parks, campgrounds	2,662	4
Golf courses	12	<1
Catch basins, ditches	7,406	11
Coastal wetlands	11,370	17
Non-coastal wetlands	23,929	36
Lakes, ponds	52	<1
Other, no code listed	1,132	2

Figure 1 shows the total lbs. a.i. used in New Jersey for each mosquito control survey conducted. Since 1998, the trend line shows a general decrease in mosquito control use over the two decades of data collection.

Figure 1. Total lbs. a.i. used in New Jersey for each mosquito control survey conducted (1998-2019.)



Summary & Conclusions

Mosquito control pesticide use increased by approximately 45% between the 2016 and 2019 surveys. While the overall use trend in the last two decades is a decrease in mosquito control pesticide use, there were an additional 300 survey respondents in 2019. This is a 43% increase in the number of respondents between the 2016 and 2019 surveys (637 in 2016 and 913 in 2019). The increase in the number of respondents is likely the largest contributing factor in the mosquito control pesticide increase. Pest pressures, weather, municipal budgets and the prevalence of mosquito borne pathogens (Zika virus, for instance) could also be contributing factors.

Bacillus thuringiensis (Bt) and mineral oil continue to account for over 50% of the mosquito control products used in New Jersey. Both of these products are larvicides. The goal of mosquito control in New Jersey is to eliminate larvae before they become nuisance, biting pests, that typically require airborne chemical control in populated areas. Eliminating the larvae by making applications to their breeding habitat is more effective to control mosquito populations and less hazardous to humans.

Due to increasing concern over pollinator protection, PEMS will further research the increase in bifenthrin use and the first reported use of neonicotinoids for mosquito control in the 2019 survey. Bifenthrin is a synthetic pyrethroid of concern, and its reported use increased by over 4,000 lbs. a.i. between 2016 and 2019. In addition, three noenicitinoid insecticides (imidacloprid, dinotefuran and thiamethoxam) were reported in the 2019 survey. All of these are insecticides that would be used to control adult mosquitoes. The application sites and application timing are critical in our efforts to reduce negative impacts on honeybees and pollinators. Our survey data is limited regarding these key pieces of information, and PEMS will reach out to county mosquito control agencies to obtain more details.