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

MOSQUITO CONTROL PESTICIDE USE IN NEW JERSEY: 2022 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 tenth survey completed in the mosquito control series (2022).

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)., 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 1,062 licensed commercial applicators holding a category 8B (mosquito control) or 8C (campground applicator) on their license. Survey forms were mailed along with instructional letters asking for only 2022 mosquito control pesticide use. A total of three mailings were sent during the first four months of 2023.

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, 778 out of 1,062 (73%) applicators responded. This response rate is a 10% decrease from the 2019 survey. In addition, the number of 8B and 8C licensed applicators decreased by 40 individuals between 2019 and 2022. Therefore, the 73% response rate represents a decrease of 135 responses.

Pesticides used by the mosquito control industry in New Jersey for 2022 totaled 43,347 lbs. a.i. This is a 23,258 lbs. a.i. decrease from the reported use in 2019. The decrease in reported use between 2019 and 2022 could be due, in part, to the 135 fewer applicators that responded to the survey in 2022. Table 1 lists all the compounds reported in the 2022 survey and the amounts (lbs. a.i.) applied.

Table 1. Pesticide amounts (lbs. a.i.) reported in the New Jersey 2022 Mosquito Control Pesticide Use Survey. *Indicates a compound not reported in the 2019 survey.

Chemical	Total (lbs. a.i.)	% of Total Usage
Alpha-cypermethrin	324	1
Bacillus sphaericus	1,312	3
Bacillus thuringiensis	17,270	37
Beauveria Bassiana Gha*	<1	0
Beta-cyfluthrin	1	0
Bifenthrin	6,368	14
BMP 144	115	<1
Boric acid	3	<1
Carbaryl	7	<1
Cyfluthrin	2	<1
Cypermethrin	<1	<1
Deltamethrin	2,305	5
Dinotefuran	26	<1
Esfenvalerate*	19	<1
Etofenprox	444	1
Fluvalinate	11	<1
Gamma-cyhalothrin*	12	<1
Glyphosate*	6	<1
Imidacloprid	5	<1
Isooctadecanol	1	<1

Table 1. **(cont.)** Pesticide amounts (lbs. a.i.) reported in the New Jersey 2022 Mosquito Control Pesticide Use Survey. *Indicates a compound not reported in the 2019 survey.

Chemical	Total (lbs. a.i.)	% of Total Usage
Lambda-cyhalothrin	625	1
Malathion	2,237	5
Mineral oil	10,266	22
Novaluraon	43	<1
PBO	1,908	4
Permethrin	619	1
Phenothrin	116	<1
Prallethrin	34	<1
Pyrethrins	44	<1
Pyriproxyfen	144	<1
S-methoprene	1,616	4
Soap	16	<1
Spinosad	133	<1
Sumithrin	88	<1
Thiamethoxam	<1	<1

Bacillus thuringiensis (Bt) and mineral oil account for 60% 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 only to 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 has been increasing over the last 20 years from no reported use to 6,230 lbs. a.i. in 2022. In addition, two noenicitinoid insecticides (imidacloprid and dinotefuran) were reported in the 2022 survey.

Table 2 shows mosquito control pesticide use by county. In general, the decrease between survey years is seen mainly in Passaic county. Passaic county's reported use decreased from 14,778 lbs. a.i. in 2019 to 106 lbs. a.i. in 2022.

Table 2. Total pesticide amounts (lbs. a.i.) reported in the 2022 Mosquito Control Survey by county.

County	Total (lbs. a.i.)	% of Total Usage
Atlantic	350	1
Bergen	2,284	5
Burlington	3,292	7
Camden	1,139	2
Cape May	6,367	14
Cumberland	188	<1
Essex	2,201	5
Gloucester	1,678	4
Hudson	368	1
Hunterdon	42	<1
Mercer	711	2
Middlesex	2,417	5
Monmouth	6,024	13
Morris	1,335	3
Ocean	6,378	14
Passaic	106	<1
Salen	428	1
Somerset	1,902	4
Sussex	5,019	11
Union	2,907	6
Warren	981	2

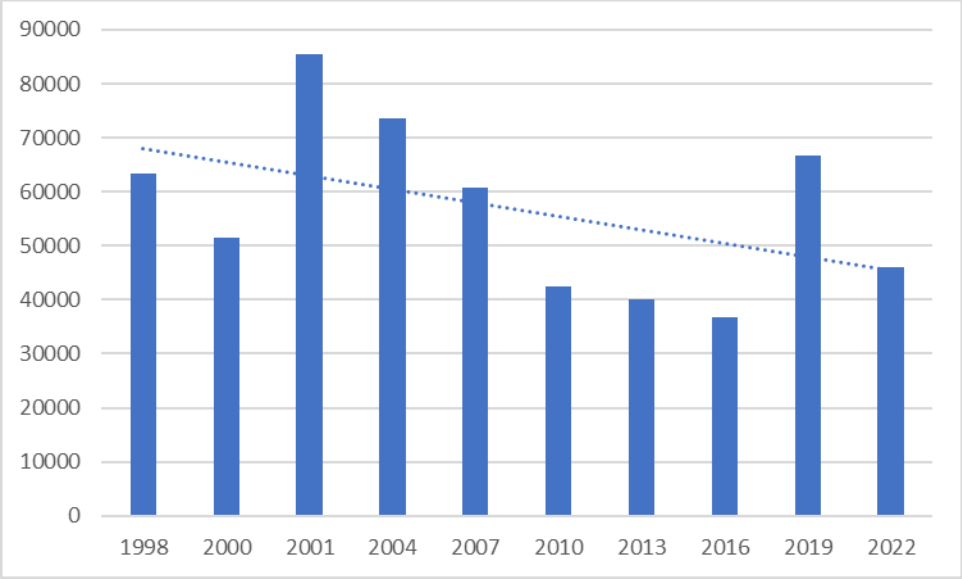
Table 3 lists the amount (lbs. a.i.) of pesticides in the 2022 by application site. Eighty percent of the reported mosquito control in New Jersey occurs in residential or commercial areas and wetlands (coastal and non-coastal). This is consistent with the use reported in the 2019 survey.

Table 3. Pesticide amounts (lbs. a.i.) reported in the 2022 Mosquito Control Use Survey by application site.

Site	Total (lbs. a.i.)	% of Total Usage
Residential, commercial	19,093	41
Non-coastal wetlands	9,225	20
Coastal wetlands	8,774	19
Catch basins, ditches	7,097	15
Other, no code listed	978	2
Park, campground	460	1
Lakes, ponds	489	1
Golf course	3	0

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 (1998-2022.)



Summary & Conclusions

Mosquito control pesticide use decreased by approximately 35% between the 2019 and 2022

surveys. This is consistent with the overall use trend in the last two decades. It should be noted that in 2022, 135 fewer applicators responded to the survey than in 2019. The decrease in the number of respondents is likely the largest contributing factor in the reported mosquito control pesticide use decrease. 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 (59% for 2022.) 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.

Bifenthrin is a synthetic pyrethroid of concern, and its reported use has steadily increased since it first appeared is the 2004 survey (265 lbs. a.i. in 2004 to 6,368 lbs. a.i. in 2022). In addition, two noenicitinoid insecticides (imidacloprid and dinotefuran) were reported in the 2022 survey. These three insecticides are used to control adult mosquitoes, and could negatively impact honeybees and other non-target pollinators. The application sites and application timing are critical in our efforts to reduce negative impacts on honeybees and other pollinators, however our survey data is limited regarding these key pieces of information. PEMS will reach out to mosquito control agencies to discuss the timing and location of adulticide applications to help reduce negative impacts to pollinators.