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



GOLF COURSE PESTICIDE USE IN NEW JERSEY: 2020 SURVEY

Introduction

The Pesticide Evaluation & Monitoring Section (PEMS) began a series of pesticide use surveys in 1985. These surveys address pesticide use by licensed applicators in the state of New Jersey for agriculture, golf courses, termite control, right-of-way, mosquito control, and lawn care. The golf course survey is conducted every three years and targets pesticides used for golf course maintenance. This report focuses on the eleventh survey completed in the golf course series (2020).

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 an accuracy and 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 programs 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

A list of all the golf courses in New Jersey has been maintained by PEMS since the first golf course survey in 1990. The list is updated before each survey mailing. Survey forms were mailed to each golf course, along with instructional letters and return envelopes asking for 2020 golf course pesticide use. A total of three mailings were sent during the first three months of 2021.

The survey requested information on each pesticide product used, including trade name, EPA registration number, percent active ingredient, amounts applied, and sites of application.

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, 249 out of 309 golf courses (81%) had responded. This is an 8% decrease in response rate from the 2017 survey. A survey will be returned to PEMS if the address has changed or the course has shut down. PEMS also forwarded a list of non-responders to the Bureau of Pesticide Control, Licensing and Registrations unit for follow-up.

Pesticides used by the golf course industry in New Jersey for 2020 totaled 330,555 lbs. a.i. This is a 6,480 lbs. a.i. decrease from 2017.

Table 1 lists all the compounds reported in the 2020 survey and the amounts (lbs. a.i.) applied. Fungicides comprise 80% of the total pesticide use reported in the New Jersey golf course industry. Herbicides (9%), insecticides (8%), growth regulators (2%), and miscellaneous compounds (<1%) account for the rest.

Table 1. Pesticide amounts (lbs. a.i.) reported in the New Jersey 2020 Golf Course Pesticide Use Survey. *Indicates a compound not reported in the 2017 survey. ^Miscellaneous compounds include synthetic alternatives (naturally occurring elements/compounds), synergists, and disinfectants.

HERBICIDES	lbs. a.i.	HERBICIDES (cont.)	lbs. a.i.
2,4-D	4,709	Methiozolin*	24
2,4-DP	10	Metolachlor	3
Acetic acid*	2	MSMA	58
Aminopyralid*	7	Oryzalin	2
Bensulide	1,178	Oxadiazon	781
Carfentrazone-ethyl	52	Pelargonic acid	99
Chlorimuron-ethyl	12	Pendimethalin	2,269
Clomazone*	3	Penoxsulam	2
Clopyralid	678	Prodiamine	2,642
Dicamba	3,119	Quinclorac	365
Dimethenamid	46	Sethoxydim	138
Dithiopyr	10,837	Siduron	429
Ethofumesate	54	Sulfentrazone	64
Fenoxaprop-ethyl	58	Thifensulfuron-methyl*	4
Fluazifop-butyl	53	Topramezone	25
Florasulam	35	Triclopyr	751
Fluroxypyr-meptyl	34	Trifluralin	1
Glufosinate-ammonium	6	Total:	31,920
Glyphosate	966		
Halosulfuron	39	GROWTH REGULATORS	lbs. a.i.
Imazosulfuron	239	Ethephon	3,958
Indaziflam	7	Flurprimidol	539
Isoxaben	164	Mefluidide	4
MCPA	512	Paclobutrazol	857
Mecoprop	663	Primo	5
Mefenoxam	731	Prohexadione calcium	382
Mesotrione	49	Trinexapac-ethyl	3,772
		Total:	9,517

Table 1. (cont.) Pesticide amounts (lbs. a.i.) reported in the New Jersey 2020 Golf Course Pesticide Use Survey. *Indicates a compound not reported in the 2017 survey. ^Miscellaneous compounds include synthetic alternatives (naturally occurring elements/compounds), synergists, and disinfectants.

FUNGICIDES	lbs. a.i.	FUNGICIDES (cont.)	lbs. a.i.
Acibenzolar	261	Tebuconazole	9,339
Azoxystrobin	2,170	Tetrachloroisophthalonitrile*	3,608
Benzovindiflupyr	6	Thiophanate-methyl	19,514
Boscalid	1,561	Thiram	1,401
Chlorothalonil	119,036	Triadimefon	4,412
Cyazofamid	2,256	Trifloxystrobin	1,109
Difenoconazole	140	Triticonazole	362
Etridiazole	261	Vinclozolin	287
Fluazinam	7,239	Total:	261,840
Fludioxonil	638		
Fluopicolide*	14	INSECTICIDES	lbs. a.i.
Fluopyram	171	Abamectin	36
Fluoxastrobin	115	Acephate	282
Flutolanil	616	Beta-cyfluthrin	1
Flutriafol*	60	Bifenthrin	1312
Fluxapyroxad	992	Burkholderia spp.	55
Fosetyl-al	22,089	Carbaryl	1,175
Iprodione	29,611	Chlorantraniliprole	407
Isofetamid	76	Chlorpyrifos	6,170
Mancozeb	7,617	Clothianidin	336
Mandestrobin*	305	Cyantraniliprole	394
Mefentrifluconazole	1,672	Diazinon*	64
Metalaxyl	263	Diquat	27
Metconazole	574	Imidacloprid	4,467
Myclobutanil	83	Indoxacarb	574
Penthiopyrad	617	Lambda-cyhalothrin	135
PCNB*	1,240	Oil	9,278
Phosphorous acids salts	2,930	Spinosad	420
Polyoxin D	83	Thiamethoxam	78
Potassium phosphite	1,140	Zeta-cypermethrin*	241
Propamacarb HCl	7,858	Trichlorfon	1,724
Propiconazole	7,092	Total:	27,176
Pseudomonas chlororaphis	0		
strain	8		
Pydiflumetoten*	133		
Pyraclostrobin	2,868		
QST 713 bacillus subtilis	13		

Table 1. (cont.) Pesticide amounts (lbs. a.i.) reported in the New Jersey 2020 Golf Course Pesticide Use Survey. *Indicates a compound not reported in the 2017 survey. ^Miscellaneous compounds include synthetic alternatives (naturally occurring elements/compounds), synergists, and disinfectants.

MISCELLANEOUS^	lbs. a.i.
Ammonium chlorides*	3
Hydrogen peroxide	92
Peroxyacetic acid	7
Total:	102

Table 2 lists the highest use compounds in the three main golf course pesticide categories (lbs. a.i.) as listed in Table 1. The most highly reported pesticide used on golf courses was chlorothalonil (fungicide). Chlorothalonil accounted for approximately 45% of the fungicides used on New Jersey golf courses in 2020, and 36% of the total pesticides used on golf courses overall. Chlorothalonil is a broad spectrum, non-systemic fungicide used to control a variety of turf diseases on golf courses. Chlorothalonil formulations can be applied as a dust, dry or water-soluble grains, a wettable powder, a liquid spray, a fog, and a dip.

Table 2. Highest use compounds in the New Jersey 2020 Golf Course Pesticide Use Survey from the main pesticide categories.

	Total	% of	% of Total
Compound	(lbs. a.i.)	Category	Usage
FUNGICIDES			
Chlorothalonil	119,036	45	36
Iprodione	29,611	11	9
Fosetyl-al	22,089	8	7
Triadimefon	22,012	8	7
Thiophanate-methyl	19,514	7	6
HERBICIDES			
Dithiopyr	10,837	34	3
2,4-D	4,709	15	1
Dicamba	3,119	10	1
Prodiamine	2,642	8	1
Pendimethalin	2,269	7	1
INSECTICIDES			
Mineral oil	9,278	34	3
Chlorpyrifos	6,170	23	2
Imidacloprid	4,467	16	1
Trichlorfon	1,724	6	1
Bifenthrin	1,312	5	<1

Table 3 shows golf course pesticide use by county. Monmouth county had the highest use overall, with a decrease from 54,478 lbs. a.i. in 2017 to 53,548 lbs. a.i. in 2020. Monmouth county accounted for 16% of the total golf course pesticide use in New Jersey. Six counties (Atlantic, Bergen, Burlington, Essex, Middlesex, Morris and Somerset) all reported at least 20,000 lbs. a.i. each. The remaining 12 counties only accounted for 31% of the total reported use. Between 2017 and 2020, some counties opened new courses while other counties closed courses. Overall, the net change was a gain of 23 courses over the three years between the survey periods.

Table 3. Total pesticide amounts (lbs. a.i.) reported by county in the New Jersey 2020 Golf Course Pesticide Use Survey.

County	# of Courses	Amount lbs. a.i.	% of Total
*			
Atlantic	23	28,529	9
Bergen	22	26,361	8
Burlington	19	20,947	6
Camden	10	6,712	2
Cape May	13	11,122	3
Essex	18	20,886	6
Gloucester	10	3,361	1
Hudson	3	4,839	1
Hunterdon	7	9,560	3
Mercer	14	8,265	3
Middlesex	18	21,814	7
Monmouth	36	53,548	16
Morris	23	26,003	8
Ocean	20	17,866	5
Passaic	8	15,612	5
Salem	6	3,540	1
Somerset	21	25,596	8
Sussex	17	9,717	3
Union	12	11,317	3
Warren	7	4,957	1

Figure 1 shows the total lbs. a.i. used in New Jersey for each golf course survey conducted. The reported pesticide usage for golf courses has been consistent over the last five surveys conducted. An overall increase of approximately 150,000 lbs. a.i. has been reported since the first survey in 1990.



Figure 1. Total lbs. a.i. used in New Jersey for each golf course survey conducted (1990-2020).