

## **GOLF COURSE PESTICIDE USE IN NEW JERSEY – 2011 SURVEY**

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The New Jersey Pesticide Control Program (NJPCP) began a series of golf course pesticide use surveys in 1990. The specific purpose of this project is to identify what chemicals and how much of each are being used in on golf courses for trends analysis. A more general purpose of the survey is to supplement data gathered from previous pesticide use surveys for addressing the impact of pesticide use statewide. The survey is conducted every three years. This report focuses on the 2011 survey.

All statewide pesticide use surveys are performed under the authority of the New Jersey Pesticide Control Code, N.J.A.C. 7:30-1 et.seq., requiring applicators to maintain pesticide records for two 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. In fact, these New Jersey surveys almost represent a pesticide usage census rather than a probabilistic survey.

For 2011 data, surveys were mailed to all New Jersey golf courses at the end of 2010. Survey forms, along with instructional letters and a return envelope, were mailed to the superintendent or responsible applicator asking for their 2011 pesticide use. A list of these golf courses was kept in the office and marked off as surveys were returned. Second and third mailings, the third being certified, were made to non-respondents indicating that the previously mailed survey had not been received.

Each survey form received by the PCP was entered into a database. When the data entry was completed the database was reviewed for any duplication of entries. Subroutines in the database identified active ingredients and calculated pounds of active ingredients from the information supplied by the applicators.

Once all three mailings were completed, 264 out of 288 (92%) surveys were received.

Table 1 lists the chemicals and their respective amounts appearing in the survey. Fungicides dominate golf course pesticide use.

Table 2 selects out the highest use compounds. Chlorothalonil was by far the most commonly used pesticide in 2011 on golf courses.

Table 3 shows pesticide use by site. Applications are relatively equal between Green/Tee and Fairway areas, despite the greater square acreage of the fairways.

Table 4 lists pesticide use on golf courses by county and the number of golf courses surveyed in each county.

In reporting and evaluating pesticide use, it is important to consider the many, diverse influences on pesticide use. No single factor, or even set of factors, can completely account for fluctuations in the amounts of pesticide active ingredients used from survey to survey. Weather conditions such as temperature and rainfall, in terms of duration, timing and amounts or degrees, influence pest pressure and the associated response. In agricultural settings, issues such as cropping patterns and the associated pest impacts vary from year to year. Economic factors play a significant role, ranging from crop demand to golf course playability to product and/or service cost. Another factor is the adoption of IPM (Integrated Pest Management). Short term, some pest control situations may require increased pesticide applications beyond the alternative means contained in an IPM program. Long term, however, IPM should result in overall pesticide use reduction. This may be confounded by the increased use of reduced-risk alternatives that may have higher application rates than the materials they replace.

**Table 1.** Pesticide amounts (lbs active ingredient) reported in the New Jersey 2011 Golf Course Pesticide Use Survey.

**HERBICIDES:**

2,4-D	2125
2,4-DP	111
2,4-DT	165
Alachlor	13
Aminocyclopyrachlor	70
Benfluralin	20
Bensulide	1814
Bentazon	1
Bispyribac-sodium	<1
Carfentrazone	148
Chlorsulfuron	<1
Chlorthal-dimethyl	29
Clopyralid	275
Dicamba	965
Dimethenamid	194
Diquat	<1
Dithiopyr	3230
Diuron	14
DSMA,MSMA	275
Ethofumesate	85
Fenoxaprop-ethyl	68
Fluazifop-butyl	1
Flumiclorac-pentyl	98
Flumioxazin	<1
Fluridone	<1
Fluroxypyr-meptyl	13
Glufosinate-ammonium	8
Glyphosate	350
Halosulfuron	36
Imazapyr	2
Isoxaben	84
Lactofen	348
MCPA	318
Mecoprop	583
Mefenoxam	344
Mesotrione	41
Metalochlor	15
Metsulfuron	13
Oryzalin	38
Oxadiazon	383

Pelargonic acid	7
Pendimethalin	910
Prodiamine	1108
Quinclorac	537
Sethoxydim	214
Siduron	172
Sulfentrazone	88
Sulfosulfuron	<1
Triclopyr	440
Trifloxysulfuron	14
Trifluralin	10
<b>TOTAL HERBICIDES:</b>	<b>15777</b>

**INSECTICIDES:**

Acephate	<1
Bacillus (biological)	14
Bendiocarb	5
Bifenazate	<1
Bifenthrin	957
Carbaryl	4662
Chlorantraniliprole	235
Chlorpyrifos	3728
Clothianidin	484
Cyfluthrin	102
Cyhalothrin	109
Deltamethrin	1
Halofenozide	93
Imidacloprid	1900
Indoxacarb	341
Isofenphos	4
Oil	8610
Permethrin	33
Sincocin	<1
Spinosad	69
Thiamethoxam	171
Trichlorfon	4569
<b>TOTAL INSECTICIDES:</b>	<b>26087</b>

**FUNGICIDES:**

Azoxystrobin	928
Boscalid	1180
Chloroneb	4
Chlorothalonil	156462
Copper	13
Cyazofamid	229
Etridiazole	615
Fenarimol	37
Fludioxonil	426
Fluoxastrobin	260
Flutolanil	1129
Fosetyl-al	27721
Iprodione	23814
Mancozeb	8260
Metalaxyl	900
Metconazole	673
Myclobutanil	129
Polyoxin D	251
Potassium phosphite	3323
Propamocarb HCl	9059
Propiconazole	6445
Pyraclostrobin	995
Quintozene	3281
Tebuconazole	3841
Thiophanate-methyl	14943
Thiram	4511
Triadimefon	5664
Trifloxystrobin	931
Triforine	<1
Triticonazole	1251
Vinclozolin	10411
<b>TOTAL FUNGICIDES:</b>	<b>287686</b>

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**GROWTH REGULATORS:**

Ethephon	3517
Flurprimidol	802
Mefluidide	43
Paclobutrazol	837
Trinexapac-ethyl	2528
<b>TOTAL GROWTH REG:</b>	<b>7727</b>

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**BIRD REPELLENTS**

Anthraquinone	31
<b>TOTAL REPELLENTS:</b>	<b>31</b>

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**MISCELLANEOUS**

Ammonium chloride	58
Hydrogen peroxide	170
Phosphoric acid	104
<b>TOTAL MISC:</b>	<b>332</b>

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**TOTAL PESTICIDE USE: 337639**

Herbicides:	5 %
Insecticides:	8 %
Fungicides:	85 %
Growth Reg:	2 %
Bird Repellents:	<1 %
Miscellaneous	<1%

**Table 2.** Highest use compounds from the main pesticide categories; 2011 golf course survey. Shown are compounds  $\geq 5\%$  of class.

Compound	Lbs active ingredient	% of class	% of total use
<b>HERBICIDES:</b>			
Dithiopyr	3230	20 %	1 %
2,4-D	2125	13 %	<1 %
Bensulide	1814	11 %	<1 %
Prodiamine	1108	7 %	<1 %
Dicamba	965	6 %	<1 %
Pendimethalin	910	6 %	<1 %
<b>INSECTICIDES:</b>			
Oil	8610	33 %	2 %
Carbaryl	4662	18 %	1 %
Trichlorfon	4569	17 %	1 %
Chlorpyrifos	3728	14 %	1 %
Imidacloprid	1900	7 %	<1 %
<b>FUNGICIDES:</b>			
Chlorothalonil	156462	54 %	46 %
Fosetyl-al	27721	10 %	8 %
Iprodione	23814	8 %	7 %
Thiophanate-methyl	14943	5 %	4 %
<b>GROWTH REGULATORS:</b>			
Ethephon	3517	45 %	1 %
Trinexapac-ethyl	2528	33 %	<1 %
Paclobutrazol	837	11 %	<1 %
Flurprimidol	802	10 %	<1 %

**Table 3.** Total pesticide amounts (in pounds active ingredient) applied to the various sites; 2011 golf course survey.

<u>SITE</u>	<u>AMOUNT</u>	<u>% Total</u>
Greens/Tees	158578	47 %
Fairways	151353	45 %
Rough	27707	8 %

**Table 4.** Total pesticide amounts (in pounds active ingredient) by county; 2011 golf course survey.

<u>COUNTY</u>	<u># of Courses</u>	<u>Amount lbs ai</u>	<u>% of Total</u>
Atlantic	21	25945	8 %
Bergen	19	30041	9 %
Burlington	14	22708	7 %
Camden	8	10345	3 %
Cape May	7	7112	2 %
Cumberland	2	593	<1 %
Essex	15	26859	8 %
Gloucester	9	7081	2 %
Hudson	2	3407	1 %
Hunterdon	7	15316	5 %
Mercer	10	11182	3 %
Middlesex	13	19449	6 %
Monmouth	29	35490	10 %
Morris	18	21724	6 %
Ocean	23	15804	5 %
Passaic	6	13266	4 %
Salem	5	3378	1 %
Somerset	21	38216	11 %
Sussex	14	6949	2 %
Union	10	18292	5 %
Warren	7	4483	1 %