

## **AGRICULTURAL PESTICIDE USE IN NEW JERSEY: 2006 SURVEY**

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### Introduction

The New Jersey Pesticide Control Program (NJPCP) 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 agricultural use survey is conducted every three years and targets agricultural, nursery, and greenhouse use of general and restricted pesticides. This report focuses on the seventh survey completed in this series (2006).

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.

The information collected from the NJPCP 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. The survey data are also entered into state and federal geographical information systems for geographical distribution.

### Methods

The NJPCP's registration records were used to identify all 1710 private applicators licensed as of December 2006. "Private applicators" (persons using pesticides on agricultural commodities) include farmers, ranchers, sod farmers, Christmas tree growers, and nursery and greenhouse operators. A survey form was sent to each applicator, but since two or three applicators can work on the same agricultural establishment, the accompanying cover letter requested that only one form be returned for each agricultural establishment to avoid duplication of response. A total of three mailings were sent during the first seven months of 2007.

The survey requested information on each pesticide product used. This included trade name, EPA registration number, percent active ingredient, amount applied, number of acres treated, and type of crop treated.

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

## Results

Overall, 86% (1470 of 1710) of the applicators responded to the survey. The list of non-respondents was turned over to the Bureau of Pesticide Compliance section for follow-up. Table I lists the chemicals and their amounts reported in the 2006 survey. Total New Jersey agricultural pesticide use for 2006 according to the survey was 929770 pounds active ingredient.

Table II lists the most frequently used compounds by pesticide category and overall. The single most used compound in 2006 was the fumigant metam-sodium which made up 10% of the state's total agricultural pesticide use. Glyphosate and agricultural oil were second with 9% of the state's total use each.

Table III lists the amounts and percentages of agricultural pesticide use on each crop type. Peaches received the highest percentage (almost 14%) of the total reported pesticide use. Blueberries were second with almost 11%.

Table IV lists by county the amounts and percentages of the state's total pesticide use. The southern half of New Jersey makes up most of the state's agricultural production. Atlantic, Burlington, Cumberland, Gloucester and Salem counties, all located in the south, showed the highest pesticide use. Monmouth, located in central New Jersey, showed a moderate amount of pesticide use. Warren, the strongest agricultural county in the north, also displayed a moderate use. The heavily industrialized northern counties such as Bergen, Essex, Hudson and Union showed an expected small usage.

## Discussion

Any review or discussion of the data collected in the 2006 agricultural pesticide use survey must focus on the uniqueness of New Jersey's agriculture. A primary point to consider is the absence of a particular major crop. Due to New Jersey's geographical location, climatic conditions allow the production of a tremendous selection of vegetables and fruits, and the state incorporates a vast collection of what are termed "truck farms", where a variety of small crops are grown on the same farm. Therefore, although individual pesticides may dominate use on a particular crop, there is no group of pesticides that dominate use in the state. This is in contrast to many mid-western states, where corn herbicides represent the predominant use.

There are a few high yield crops within New Jersey. The main fruit and berry crops produced in the state are peaches, blueberries and cranberries. The main vegetable crop grown in New Jersey is sweet corn and the main field crops are hay and soybeans. Despite its relatively small size, New Jersey was the nation's second largest producer of blueberries, third largest producer of cranberries

and bell peppers, and fourth largest producer of peaches and head lettuce in 2006 (NJDOA, 2006).

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. The changing face of land use also plays a part. While agricultural acreage has been declining, new home building starts and the associated lawns around those new homes have been increasing.

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.

### References

New Jersey Department of Agricultural, 2006 Annual Report/Statistics. NJ Department of Agriculture, Trenton; 2006.

TABLE I. Pesticide amounts (lbs active ingredient) reported in the New Jersey 2006 Agricultural Pesticide Use Survey.

<b>HERBICIDES:</b>			
2,4-D	18765	Fomesafen	19
2,4-DB	53	Glufosinate-ammonium	219
2,4-DP	25	Glyphosate	92253
2,4-DT	144	Halosulfuron-methyl	36
Acetochlor	5424	Hexazinone	312
Alachlor	3459	Imazamox	5
Aminopyralid	43	Imazapic	3
Atrazine	38002	Imazaquin	34
Benfluralin	53	Imazethapyr	154
Bensulide	11390	Isoxaben	918
Bentazon	1012	Lactofen	407
Bromacil	39	Linuron	4135
Bromoxynil	6	MCPA	237
Chloridazon-ethyl	7	Mecoprop	1125
Chlorimuron-ethyl	87	Mesosulfuron-methyl	1
Chloroxuron	1	Mesotrione	877
Chlorpropham	150	Metolachlor	23828
Chlorthal-dimethyl	7467	Metolachlor-S	18603
Clethodim	400	Metribuzin	2120
Clomazone	973	Metsulfuron-methyl	4
Clopyralid	308	Napropamide	3867
Cloransulam-methyl	77	Naptalam	47
Cyanazine	4	Nicosulfuron	39
Cycloate	823	Norflurazon	11798
Dicamba	3025	Oryzalin	5096
Dichlobenil	2368	Oxadiazon	309
Diethatyl ethyl	3	Oxyfluorfen	2059
Diflufenzopyr	74	Paraquat	10558
Dimethenamid	2630	Pebulate	16
Diquat	447	Pelargonic acid	127
Dithiopyr	201	Pendimethalin	13385
Diuron	7317	Phenmedipham	671
DSMA, MSMA	13	Picloram	<1
EPTC	587	Primisulfuron	5
Ethalfuralin	1307	Prodiamine	1122
Fenoxaprop-ethyl	13	Prometon	48
Fluazifop-butyl	27	Pronamide	1759
Flumetsulam	9	Prosulfuron	1
Flumiclorac-pentyl	148	Quinclorac	126
Flumioxazin	370	Rimsulfuron	93
Fluridone	<1	Sethoxydim	399
		Siduron	1908

Simazine	5697
Sulfentrazone	274
Terbacil	2999
Thifensulfuron	137
Tribenuron-methyl	57
Triclopyr	125
Trifluralin	1335
<b>TOTAL HERBICIDES:</b>	<b>316598</b>

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**INSECTICIDES:**

Abamectin	6
Acephate	6829
Acetamiprid	169
Avermectin	6
Azadirachtin (Neem)	8
Azinphos-methyl	4036
Bendiocarb	<1
Bifenazate	154
Bifenthrin	536
Borate	102
Bt, Microbials	713
Carbaryl	12793
Carbofuran	1997
Chlorfenapyr	2
Chlorpyrifos	7547
Clofentezine	6
Cyfluthrin	179
Cyhalothrin	829
Cypermethrin	230
Diazinon	7550
Dichlorvos	1
Dicofol	130
Dienochlor	<1
Dimethoate	3029
Dinotefuran	147
Disulfoton	1
Emamectin	5
Endosulfan	4029
Esfenvalerate	<1
Etoxazole	4
Fenbutatin oxide	102
Fenpropathrin	203
Fenpyroximate	<1
Fenvalerate	533

Fipronil	71
Flonicamid	<1
Fluvalinate	9
Formetanate HCL	83
Halofenozide	261
Hexakis	<1
Hexythiazox	44
Imidacloprid	1439
Indoxacarb	189
Lindane	54
Malathion	1481
Methamidophos	<1
Methidation	257
Methiocarb	152
Methomyl	10485
Methoxychlor	<1
Methoxyfenozide	483
Nicotine	1
Novaluron	8
Oil	84851
Oxamyl	2589
Oxydemeton-methyl	108
Parathion-methyl	12
Permethrin	1199
Phorate	556
Phosmet	13908
Pymetrozine	54
Pyrethrins	8
Pyridaben	117
Rotenone	<1
Soap	170
Spinosad	1147
Spirodiclofen	13
Spiromesifen	114
Tefluthrin	115
Terbufos	606
Thiacloprid	4
Thiamethoxam	306
Thiodicarb	98
Trichlorfon	317
<b>TOTAL INSECTICIDES:</b>	<b>173185</b>

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**FUNGICIDES:**

Acibenzolar-methyl	5
Azoxystrobin	2892

Benomyl	41
Boscalid	902
Buprofezin	<1
Captan	44710
Carboxin	19
Chlorothalonil	65054
Coniothyrium mintans	171
Copper salts	24982
Cyazofamid	13
Cymoxanil	514
Cyprodinil	576
Dicloran	6
Dimethomorph	355
Dinocap	3
Dodine	58
Etridiazole	645
Famoxadone	504
Fenarimol	62
Fenbuconazole	309
Fenhexamid	2005
Ferbam	1533
Fludioxonil	215
Flutolanil	433
Fosetyl-al	2096
Iprodione	1321
Kresoxim-methyl	95
Mancozeb/Mnb/Znb	38278
Mefenoxam	1739
Metalaxyl	398
Metiram	2486
Myclobutanil	816
Oxytetracycline	42
Phosphorous acid	858
Prochloraz	1739
Propamocarb HCL	4758
Propiconazole	909
Pyraclostrobin	1039
Primethanil	7
Quinoxyfen	6
Quintozene	308
Sulfur	59326
Tebuconazole	276
Thiabendazole	28
Thiophanate-methyl	7440
Thiram	184

Triadimefon	977
Trifloxystrobin	112
Triflumizole	67
Triforine	1
Vinclozolin	108
Ziram	42672
Zoxamide	11
<b>TOTAL FUNGICIDES:</b>	<b>314104</b>

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**RODENTICIDES:**

Chlorophacinone	<1
Diphacinone	<1
Zinc Phosphide	<1
<b>TOTAL RODENTICIDES:</b>	<b>1</b>

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**GROWTH REGULATORS:**

Aminoethoxyvinylglycine	7
Ancymidol	1
Benzyladenine	3
Chlormequat chloride	144
Cyromazine	13
Cytokinin	<1
Daminozide	473
Diflubenzuron	28
Ethephon	397
Fenoxycarb	<1
Gibberellin	43
IBA	<1
Kinoprene	20
Methyl octanoate	169
NAA, NAD	5
Paclobutrazol	23
Pyriproxyfen	91
Trinexapac	20
Uniconazole	1
<b>TOTAL GRs:</b>	<b>1438</b>

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**FUMIGANTS:**

Aluminum Phosphide	24
Dazomet	14329
Metam-sodium	94362

Methyl bromide	402
Sulfotep	<1
<b>TOTAL FUMIGANTS:</b>	<b>109177</b>

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**BACTERICIDES:**

Ammonium chloride	658
Oxytetracycline	416
Streptomycin	151
<b>TOTAL BACTERICIDES:</b>	<b>1225</b>

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**MISCELLANEOUS:**

4-Aminopyridine	<1
Calcium chloride	55
Calcium polysulfide	246
Canola Oil	11
Capsaicin	2
Hydrogen Peroxide	4400
Kaolin	2625
Menthol	3
Metaldehyde	35
Methyl anthranilate	15
OBD	1
Peroxyacetic acid	131
Piperonyl butoxide	16
Potassium salts	6016
Sodium percarbonate	546
<b>TOTAL MISCELLANEOUS:</b>	<b>14102</b>

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**TOTAL PESTICIDE USE: 929770**

Herbicides:	34%
Insecticides:	19%
Fungicides:	34%
Fumigants:	11%
Other:	2%

TABLE II. Highest use compounds in 2006 from the main pesticide categories. Shown are compounds  $\geq$  5% of class.

<u>Compound</u>	<u>Lbs active ingredient</u>	<u>% of class</u>	<u>% of total use</u>
<b>HERBICIDES:</b>			
Glyphosate	92253	29%	9%
Atrazine	38002	12%	4%
Metolachlor	23828	8%	3%
2,4-D	18765	6%	2%
S-metolachlor	18603	6%	2%
<b>INSECTICIDES:</b>			
Oil	84851	49%	9%
Phosmet	13908	8%	2%
Carbaryl	12793	7%	2%
Methomyl	10485	6%	1%
<b>FUNGICIDES:</b>			
Chlorothalonil	65054	20%	7%
Sulfur	59326	18%	6%
Captan	44710	14%	5%
Ziram	42672	13%	5%
Mancozeb	38278	12%	4%
Copper Salts	24982	8%	3%
<b>FUMIGANTS:</b>			
Metam-Sodium	94362	86%	10%



TABLE III. Total pesticide amounts (in pounds active ingredient) applied to crops in 2006.

<u>CROP</u>	<u>AMOUNT</u>	<u>% of Total Pesticide Use</u>
Apples	54218	5.8
Peaches	128264	13.8
Other Tree Fruit	16940	1.8
Blueberries	101560	10.9
Cranberries	31340	3.4
Strawberries	5689	0.6
Grapes	6986	0.7
Sweet Corn	23878	2.5
Field Corn	95599	10.3
Grains	4134	0.4
Soybeans	74368	8.0
Beans/Peas	5625	0.6
Asparagus	4223	0.4
Cucumbers	17280	1.8
Tomatoes	36768	3.9
Peppers	29802	3.2
Eggplants	8002	0.8
Potatoes	21296	2.3
Chinese Vegetables	29312	3.2
Cabbage	5007	0.5
Cauliflower	646	0.1
Broccoli	1404	0.1
Brussel Sprouts	86	0.0
Other Cole	2045	0.2
Lettuce	8696	0.9
Spinach	5050	0.5
Leafy Greens	8956	0.9
Other Leafy	2202	0.7
Hay/Alfalfa	10157	1.1
Sod	31561	3.4
Ornamentals	79875	8.6
Livestock	60	0.0
no code*	78742	8.4
ALL CROPS	929770	100.0

\*no crop codes were indicated or commodity treated was not originally listed on survey.

Frequently reported commodities not appearing on the list were pumpkins and root vegetables such as onions, carrots and radishes.

TABLE IV. Total pesticide amounts (lbs active ingredient) applied by county in 2006.

<u>COUNTY</u>	<u>Amount</u>	<u>% Total Use</u>
Atlantic	137982	15%
Bergen	1016	<1%
Burlington	108058	12%
Camden	17293	2%
Cape May	5884	1%
Cumberland	114906	12%
Essex	0	<1%
Gloucester	201185	22%
Hudson	0	0%
Hunterdon	36129	4%
Mercer	15510	2%
Middlesex	10175	1%
Monmouth	60505	6%
Morris	10088	1%
Ocean	3460	<1%
Passaic	174	<1%
Salem	138552	15%
Somerset	2864	<1%
Sussex	7739	1%
Union	141	<1%
Warren	58109	6%
<b>TOTAL</b>	<b>929770</b>	<b>100%</b>

2006 Agricultural Pesticide Use by County

