

BACKGROUND

In 1978, the New Jersey Department of Health attempted to estimate agricultural pesticide use by requesting County Extension Agents to estimate the acres planted with particular crops and then further estimate the pesticide burden for each crop. This data, while useful as an initial estimate, did not provide information below the county level and could not be effectively used in planning environmental monitoring or impact projects. Since New Jersey's agricultural sector is complex, accurate pesticide use data is critical. Even though relatively small in size, about 9000 farms covering 850,000 acres of land are devoted to agriculture, which includes not only food crops but nursery, greenhouse and sod production as well. New Jersey ranks in the top five states in the production of blueberries, cranberries, peaches, bell peppers and head lettuce (New Jersey Department of Agriculture, 1995). Due to this wide diversity of crops, there is a corresponding diversity in the types and amounts of pesticides used in the state. An estimated 12,000 products, containing over 400 major active ingredients, are currently registered for use as pesticides in New Jersey.

While there are several different methods for estimating pesticide use, they do not provide a complete use pattern. Federal agencies and individual states employ methods such as dealer sales records, surveys of growers in selected target areas, and surveys of pesticide use on major crops to determine trends of use. In a state such as New Jersey, a more complete pattern of use is needed, since the boundaries between agricultural lands and residential areas are vague in many areas. The distribution of New Jersey's agricultural industry in suburban and urban, as well as rural areas, makes the need for specific data imperative in order to better evaluate the impact of pesticides in the state.

In order to address the need for information on the types, amounts and locations of pesticides currently in use, the Pesticide Control Program (PCP) in the New Jersey Department of Environmental Protection (NJDEP), with the assistance of Rutgers Cooperative Extension (RCE), has conducted agricultural pesticide use surveys of New Jersey's private pesticide applicators. A "private pesticide applicator" is defined as a person who uses or supervises pesticide use for the production of an agricultural commodity on property owned or rented by him or his employer. Examples of private applicators include farmers, ranchers, sod farmers, Christmas tree growers, and nut growers. These surveys began in 1986 with a survey of 1985 agricultural pesticide use statewide and have been conducted since every three years. Results of the 1985 and 1988 use surveys were previously published in report #E155 put out by RCE.

The recording and submission of pesticide use data is governed under the New Jersey Pesticide Control Code (NJAC 7:30-1 et.seq.) which requires private applicators to maintain application records for all pesticides applied for a two year period and submit their use records to the PCP when requested. This regulative authority provides an accuracy and level of response that is difficult to duplicate in a voluntary survey. In fact, the PCP's agricultural pesticide use surveys more closely represent a use census rather than a probabilistic survey. In 1994 an estimated 2700 private applicators were registered with the NJDEP/PCP.

Funds for this pesticide use survey were provided by the PCP and a grant from the USDA CSRS.

SURVEY PROCEDURES

For both the 1991 and 1994 surveys, the following basic information was requested:

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|--------------------------------------|---|
| 1. Farm name | 2. Farm street and town |
| 3. Municipality and County | 4. Pesticide name (trade or common) |
| 5. Formulation (% active ingredient) | 6. EPA registration number |
| 7. Amount used for the year | 8. Acres treated (Sq. feet for greenhouses) |
| 9. Crop code | 10. Application code (ground or aerial) |

The 1991 survey had twenty-five separate categories defined for crop codes:

- | | |
|-----------------------|-----------------------------|
| 1. Apples | 2. Peaches |
| 3. Other tree fruit | 4. Blueberries |
| 5. Cranberries | 6. Strawberries/brambles |
| 7. Grapes | 8. Sweet corn |
| 9. Field corn | 10. Small grains |
| 11. Soybeans | 12. Other beans/peas |
| 13. Asparagus | 14. Cucumbers |
| 15. Tomatoes | 16. Other solanaceous crops |
| 17. Potatoes | 18. Chinese vegetables |
| 19. Cole crops | 20. Leafy vegetables |
| 21. Alfalfa/other hay | 22. Sod |
| 23. Ornamentals | 24. Livestock/poultry |
| 25. Other not listed | |

The 1994 survey was further defined with thirty-three separate crop codes:

- | | |
|------------------------|----------------------------|
| 1. Apples | 2. Peaches |
| 3. Other tree fruit | 4. Blueberries |
| 5. Cranberries | 6. Strawberries/brambles |
| 7. Grapes | 8. Sweet corn |
| 9. Field corn | 10. Small grain |
| 11. Soybeans | 12. Other beans/peas |
| 13. Asparagus | 14. Cucumbers |
| 15. Tomatoes | 16. Peppers |
| 17. Eggplants | 18. Potatoes |
| 19. Chinese vegetables | 20. Cabbage |
| 21. Cauliflower | 22. Broccoli |
| 23. Brussel sprouts | 24. Other cole crops |
| 25. Lettuce | 26. Spinach |
| 27. Leafy greens | 28. Other leafy vegetables |
| 29. Alfalfa/other hay | 30. Sod |
| 31. Ornamentals | 32. Livestock/poultry |
| 33. Other not listed | |

A survey form, along with an instructional letter and return envelope, were sent to all registered private applicators for the 1991 and 1994 surveys. A second mailing, including another survey, letter and envelope, was sent out to non-respondents about two months later indicating that the initial survey had not been received and regulatory action would result if the survey was not returned. A third and final mailing was sent out after another two months via certified mail to persons not responding to the previous two mailings.

A database was designed using D-BaseIII+ (Ashton-Tate). Upon receipt of a survey form by PCP, each was logged in, checked for duplication (and discarded if a duplicate return), and entered into the database. Sub-routines in the database identified the active ingredient(s) in the listed product and using the formulation and amount values calculated the pounds of active ingredients used. Quality assurance checks were made by comparing randomly selected original survey forms to the database entries. Before the sub-routines are run, product names, formulations and EPA registration numbers listed in the database are compared to the original pesticide labels for consistency.

RESULTS

For the 1991 survey a total of 2647 out of 2889 surveys were received for a return rate of 92%. For the 1994 survey a total of 2545 out of 2748 were received for a return rate of 93%. In all the surveys conducted by the PCP a return of 90% or higher is expected.

Besides a 7-8% no response rate, in many instances there were cases where the applicator was no longer farming or two or more applicators were affiliated with a single farm. The final data represents 1566 and 1520 separate New Jersey farm operations for the 1991 and 1994 surveys respectively.

1991 PESTICIDE USAGE

Total agricultural pesticide use in New Jersey for 1991 was 1,649,126 pounds active ingredient. Herbicides accounted for 28.8% of the total, insecticides 25.0%, fungicides 41.3%, fumigants 3.9%, and miscellaneous materials 0.9% (Figure 1).

The single most frequently used pesticide in 1991 was sulfur, which makes up about half (47%) of New Jersey's agricultural fungicide use and nearly one fifth (19%) of the state's total agricultural pesticide use. Other high use compounds and their associated percentage of total state use were metolachlor (9%), captan (7%), dormant oil (6%), chlorothalonil (5.5%), sodium aluminofluoride (5%) and atrazine (3.5%).

Table 2 lists the percentage of herbicides, insecticides, fungicides, etc., used on each crop type. Herbicides dominate field corn, grain, soybean, and sod production treatments. Insecticides were relatively uniform in distribution but tended to dominate potato production. Fungicides dominate peach, cranberry, grape and to a certain extent blueberry treatments. Other pesticide types (fumigants, growth regulators, etc.) show minor use except for strawberries where fumigants made up 48% of the treatments on this fruit.

Certain crops were dominated by a few chemicals. Peaches received the highest weight of pesticide application with 72% of the treatment being sulfur. Scale oils made up 73% of all insecticide applications and captan made up 76% of all fungicide applications to apples. Chlorothalonil and ferbam made up 75% of the fungicide treatments on cranberries. Alachlor, metolachlor, atrazine, and cyanazine made up 91% of the herbicide treatments on field corn. Alachlor, metolachlor, and linuron made up 77% of the herbicide treatments on soybeans. Sodium aluminofluoride made up 80% of all insecticide treatments to potatoes.

Table 3 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 county, located in central New Jersey, showed a moderate amount of pesticide use. Warren county, 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.

Table 1. Herbicide amounts (lbs active ingredient) reported in the New Jersey 1991 Agricultural Pesticide Use Survey.

Active Ingredient	Amount (lbs)	Active Ingredient	Amount (lbs)
2,4-D	13,976	Acifluorfen	3,681
Alachlor	35,323	Atrazine	57,128
Bensulide	11,000	Bentazone	2,977
Butylate	4,189	Chloramben	1,063
Chlorimuron Ethyl	1,290	Chlorthal-dimethyl	24,968
Clomazone	2,118	Cyanazine	21,374
Cycloate	2,448	Dicamba	3,990
Diethatyl Ethyl	5,366	Diuron	5,936
EPTC	4,561	Glyphosate	16,400
Imazaquin	1,600	Linuron	31,155
Mecoprop	1,792	Metolachlor	144,418
Metribuzin	3,020	Napropamide	9,538
Naptalam	2,062	Norflurazon	5,141
Oryzalin	5,277	Paraquat	18,038
Pebulate	1,741	Pendimethalin	9,957
Pronamide	2,627	Propachlor	1,016
Simazine	4,691	Terbacil	4,585
Trifluralin	4,317	Others (<1,000 lbs)	5,932

Table 2. Insecticide amounts (lbs active ingredient) reported in the New Jersey 1991 Agricultural Pesticide Use Survey.

Active Ingredient	Amount (lbs)	Active Ingredient	Amount (lbs)
Acephate	14,023	Azinphos-methyl	24,534
Carbaryl	16,768	Carbofuran	19,956
Chlorpyrifos	14,318	Diazinon	8,310
Dicofol	1,440	Dimethoate	5,337
Disulfoton	2,047	Endosulfan	14,434
Fenvalerate	1,184	Fonophos	1,160
Formetanate HCL	1,586	Isazofos	1,477
Malathion	6,252	Methamidophos	1,796
Methomyl	29,331	Methoxychlor	1,191
Mevinphos	3,085	Oil	100,683
Oxamyl	14,157	Parathion	15,633
Parathion-methyl	4,849	Permethrin	3,843
Phorate	1,600	Phosmet	8,431
Propargite	1,271	Soap	2,135
Sodiumaluminoflouride	80,341	Terbufos	4,424
Thiodicarb	2,258	Others (<1,000 lbs)	4,731

Table 3. Fungicide amounts (lbs active ingredient) reported in the New Jersey 1991 Agricultural Pesticide Use Survey.

Active Ingredient	Amount (lbs)	Active Ingredient	Amount (lbs)
Benomyl	4,326	Captan	11,3392
Chlorothalonil	90,829	Copper salts	41,513
Dodine	2,651	Etridiazole	1,794
Ferbam	26,302	Fosetyl-al	1,802
Iprodione	4,381	Mancozeb/Mnb/Znb	27,620
Metalaxyl	21,312	Metiram	1,007
Quintozene	1,395	Sulfur	319,936
Thiophanate	9,107	Thiophanate-methyl	2,793
Triforine	1,441	Vinclozolin	1,385
Ziram	3,802		

Table 4. Fumigant amounts (lbs active ingredient) reported in the New Jersey 1991 Agricultural Pesticide Use Survey.

Active Ingredient	Amount (lbs)	Active Ingredient	Amount (lbs)
Dichloropropene	25,106	Metam-sodium	27,829
Methylbromide	5,374	Methylisothiocynt	5,812
Others (<100 lbs)	114		

Table 5. Miscellaneous pesticide amounts (lbs active ingredient) reported in the New Jersey 1991 Agricultural Pesticide Use Survey.

Active Ingredient	Amount (lbs)	Active Ingredient	Amount (lbs)
Calciumchloride	3,749	Chlormequatchloride	196
Daminozide	384	Ethephon	1,352
Kinoprene	380	Methyloctanoate	354
Oxatetracycline	1,597	Piperonyl butoxide	7,547
Streptomycin	162	Zinc Phosphide	273
Zinc sulfate	180	Others (<100 lbs)	481

Table 6. Total pesticide amounts (in pounds active ingredient) applied to crops in 1991.

Crop	Amount	Use by Type of Pesticide (% of total)			
		Herbicide	Insecticide	Fungicide	Other
Apples	151,840	3	54	42	1
Peaches	430,607	2	10	86	1
Other Tree Fruit	3,156	4	53	42	1
Blueberries	61,999	14	25	61	0
Cranberries	63,931	5	11	84	0
Strawberries	7,412	19	13	20	48
Grapes	1,881	3	19	78	0
Sweet Corn	43,581	51	48	1	0
Field Corn	164,766	90	10	0	0
Small Grains	3,973	89	4	7	0
Soybeans	150,552	98	1	1	0
Beans/Peas	22,112	41	44	15	0
Asparagus	2,565	42	46	12	0
Cucumbers	22,711	34	19	46	0
Tomatoes	80,404	7	33	48	11
Other Solanaceous Crops	60,307	8	35	34	23
Potatoes	114,968	7	72	14	7
Chinese Vegetables	9,416	57	18	24	1
Cole Crops	22,968	45	28	22	5
Leafy Vegetables	38,280	34	25	19	23
Hay/Alfalfa	6,289	56	40	0	3
Sod	19,496	73	22	5	0
Ornamentals	90,965	27	45	20	8
Livestock	415	0	21	0	79
No Code*	74,532	21	14	35	30
ALL CROPS	1,649,126	29	25	41	5

* no crop codes were indicated or commodity treated was not originally listed on survey. Frequently reported commodities not appearing on the list were root vegetables such as onions, carrots and radishes.

Table 7. Total pesticide amounts (lbs active ingredient) applied by county in 1991.

County	Amount	% of Total
Atlantic	166,571	10.1
Bergen	8,842	0.5
Burlington	205,459	12.5
Camden	40,726	2.5
Cape May	5,591	0.3
Cumberland	261,858	15.9
Essex	368	0.0
Gloucester	419,336	25.4
Hudson	0	0.0
Hunterdon	46,946	2.8
Mercer	38,222	2.3
Middlesex	37,294	2.3
Monmouth	79,882	4.8
Morris	18,522	1.1
Ocean	10,860	0.7
Passaic	18,871	1.1
Salem	194,053	11.8
Somerset	14,550	0.9
Sussex	19,912	1.2
Union	916	0.1
Warren	56,221	3.4
not listed*	4,127	0.3
TOTAL	1,649,126	100.0

* actual location of agricultural establishment uncertain.

1994 PESTICIDE USAGE

Table 4 lists the chemicals and their amounts reported in the 1994 survey. Total New Jersey agricultural pesticide use for 1994 according to the survey was 1,613,869 pounds ai. Herbicides accounted for 31.2% of the total, insecticides 23.6%, fungicides 35.5%, growth regulators 0.2%, fumigants 9.0%, bactericides 0.1%, and miscellaneous 0.4%.

The single most frequently used pesticide in 1994 was sulfur, which makes up more than a third (40%) of New Jersey's agricultural fungicide use and nearly one seventh (14%) of the state's total agricultural pesticide use. Other high use compounds and their associated percentage of total state use were metolachlor (8.5%), sodium aluminofluride (7%), chlorothalonil (6%), captan (5%), dormant oil (5%) and atrazine (4%).

Table 5 lists the percentage of herbicides, insecticides, fungicides, etc., used on each crop type. Herbicides dominate field corn, grain, soybean, and sod production treatments. Insecticides were relatively uniform in distribution but tended to dominate potato treatments. Fungicides dominate peach, cranberry, grape and to a certain extent blueberry and chinese vegetable treatments. Other pesticide types show minor use except for the eggplant, other cole crops, and lettuce categories, where fumigants made up a large percentage of the treatments.

Certain crops were dominated by a few chemicals. Peaches received the highest weight of pesticide application with 71% of the treatment being sulfur. On apples, scale oils made up 79% of all insecticide applications. Alachlor, metolachlor, atrazine, and cyanazine made up 89% of the herbicide treatments on sweet corn and 80% on field corn. Carbaryl made up 98% of insecticide applications on grapes and 92% on asparagus. On chinese vegetables, chlorthal-dimethyl made up 98% of all herbicide applications and quintozene 82% of fungicide applications. Sodium aluminofluoride made up 89% of all insecticide treatments to potatoes.

Table 8 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 county, located in central New Jersey, showed a moderate amount of pesticide use. Warren county, 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.

Table 8. Herbicide amounts (lbs active ingredient) reported in the New Jersey 1994 Agricultural Pesticide Use Survey.

Active Ingredient	Amount (lbs)	Active Ingredient	Amount (lbs)
2,4-D	14,908	Acetochlor	2,723
Acifluorfen	4,080	Alachlor	48,945
Atrazine	58,790	Bensulide	11,093
Bentazone	2,482	Butylate	2,618
Chlorimuron Ethyl	2,218	Chlorthal-dimethyl	24,376
Clomazone	1,842	Cyanazine	18,233
Cycloate	2,565	Dicamba	5,723
Diethatyl Ethyl	2,296	Diuron	4,786
EPTC	1,879	Glyphosate	24,183
Imazaquin	2,642	Linuron	24,132
Mecoprop	1,512	Metolachlor	137,387
Metribuzin	9,182	Napropamide	9,233
Naptalam	1,553	Nicosulfuron	8,193
Norflurazon	8,364	Oryzalin	4,669
Paraquat	19,260	Pendimethalin	20,027
Pronamide	1,864	Simazine	5,846
Terbacil	2,318	Trifluralin	5,055
Others (<1,000 lbs)	8,543		

Table 9. Insecticide pesticide amounts (lbs active ingredient) reported in the New Jersey 1994 Agricultural Pesticide Use Survey.

Active Ingredient	Amount (lbs)	Active Ingredient	Amount (lbs)
Acephate	8,866	Azinphos-methyl	22,609
Bt	1,332	Carbaryl	16,331
Carbofuran	10,353	Chlorpyrifos	15,230
Diazinon	12,641	Dimethoate	4,903
Disulfoton	1,112	Endosulfan	9,172
Fenamiphos	1,224	Fenvalerate	1,379
Fonophos	1,400	Lindane	4,095
Malathion	3,923	Methomyl	28,089
Mevinphos	1,364	Oil	77,516
Oxamyl	6,954	Parathion-methyl	6,635
Permethrin	3,211	Phosmet	9,998
Soap	1,240	Sodium aluminoflouride	118,710
Terbufos	4,023	Thiodicarb	2,517
Others (<1,000 lbs)	6,340		

Table 10. Fungicide amounts (lbs active ingredient) reported in the New Jersey 1994 Agricultural Pesticide Use Survey.

Active Ingredient	Amount (lbs)	Active Ingredient	Amount (lbs)
Benomyl	5,573	Captan	84,209
Chlorothalonil	92,404	Copper salts	38,281
Dodine	1,143	Ferbam	8,908
Fosetyl-al	3,920	Iprodione	3,989
Mancozeb/Mnb/Znb	53,649	Metalaxyl	15,160
Metiram	2,866	Quintozene	12,666
Sulfur	229,646	Thiophanate	3,793
Vinclozolin	1,040	Ziram	12,069
Others (<1,000 lbs)	4,821		

Table 11. Fumigant amounts (lbs active ingredient) reported in the New Jersey 1994 Agricultural Pesticide Use Survey.

Active Ingredient	Amount (lbs)	Active Ingredient	Amount (lbs)
Metam-sodium	140,056	Methyl bromide	5,336
Sulfotep	258	Others (<100 lbs)	0

Table 12. Miscellaneous pesticide amounts (lbs active ingredient) reported in the New Jersey 1994 Agricultural Pesticide Use Survey.

Active Ingredient	Amount (lbs)	Active Ingredient	Amount (lbs)
Ammonium chloride	118	Calcium chloride	314
Chlormequat chloride	180	Creosote	324
Daminozide	427	Ethephon	902
Kinoprene	126	Methyloctanoate	919
Oxatetracycline	732	Piperonyl butoxide	5,116
Streptomycin	139	Others (<100 lbs)	97

Table 12. Total pesticide amounts (in pounds active ingredient) applied to crops in 1994.

Crop	Amount	Use by Type of Pesticide (% of total)			
		Herbicide	Insecticide	Fungicide	Other
Apples	167,590	2	46	51	1
Peaches	268,601	4	11	85	0
Other Tree Fruit	6,216	4	46	49	1
Blueberries	80,525	15	26	59	0
Cranberries	56,992	10	10	80	0
Strawberries	4,936	36	14	41	9
Grapes	1,499	14	18	68	0
Sweet Corn	4,3552	51	47	2	0
Field Corn	192,373	89	9	1	1
Small Grains	2,758	100	0	0	0
Soybeans	168,908	99	1	0	0
Beans/Peas	17,381	50	38	12	0
Asparagus	3,299	57	43	0	0
Cucumbers	20,131	36	14	47	3
Tomatoes	60,522	5	42	44	9
Peppers	50,694	8	23	54	15
Eggplants	18,255	4	24	16	56
Potatoes	135,752	5	81	12	2
Chinese Vegetables	16,132	27	10	62	1
Cabbage	15,903	41	23	23	13
Cauliflower	1,204	67	16	17	0
Broccoli	4,555	41	9	49	1
Brussel Sprouts	735	66	27	4	3
Other Cole Crops	15,268	9	4	6	81
Lettuce	20,453	12	13	15	60
Spinach	11,605	47	16	35	2
Leafy Greens	7,874	45	16	4	35
Other Leafy Vegetables	1,176	30	46	18	6
Hay/Alfalfa	3,954	74	26	0	0
Sod	13,948	80	18	2	0
Ornamentals	55,157	24	30	23	23
Livestock	1,532	6	75	0	19
No Code*	144,391	13	7	24	56
ALL CROPS	1,613,869	31	24	36	9

* no crop codes were indicated or commodity treated was not originally listed on survey. Frequently reported commodities not appearing on the list were root vegetables such as onions, carrots and radishes.

Table 13. Total pesticide amounts (lbs active ingredient) applied by county in 1994.

County	Amount	% of Total
Atlantic	179,608	11.1
Bergen	2,414	0.1
Burlington	197,974	12.3
Camden	22,922	1.4
Cape May	4,663	0.3
Cumberland	302,032	18.7
Essex	80	0.0
Gloucester	350,071	21.7
Hudson	0	0.0
Hunterdon	50,260	3.1
Mercer	26,397	1.6
Middlesex	43,802	2.7
Monmouth	67,933	4.2
Morris	15,134	0.9
Ocean	14,727	0.9
Passaic	397	0.0
Salem	245,137	15.2
Somerset	16,632	1.0
Sussex	12,067	0.7
Union	2,390	0.1
Warren	59,229	3.7
TOTAL	1,613,869	100.0

TRENDS

The 1985 and 1988 agricultural pesticide use data are included in this section for a short discussion on use trends over the past nine years. Figure 1 shows total agricultural pesticide use for each survey year. The breakdown of pesticide classes by year is also indicated. Across the four survey years there has been no substantial increase or decrease of total pesticide use. The least pesticide use amount recorded to date was in 1985 and the greatest in 1988. There has been a shift, however, in the various pesticide products being used by growers. The selection listed below are drawn from the 1985 and 1994 surveys and demonstrate significant changes in use (amounts are in lbs active ingredient):

		<u>1985</u>	<u>1988</u>	<u>1991</u>	<u>1994</u>
Herbicides	Alachlor	84,462	49,050	35,323	48,945
	Dinoseb	11,580	540	0	0
	Glyphosate	6,001	10,009	16,400	24,183
	Metolachlor	72,691	98,379	144,418	137,387
	Pendimethalin	1,982	4,970	9,957	20,027
Insecticides	Carbofuran	33,492	29,954	19,956	10,353
	Chlorpyrifos	8,153	13,340	14,318	15,230
	Endosulfan	40,032	18,227	14,434	9,172
	Parathion-ethyl	49,575	30,784	15,633	13
	Sodium aluminoflouride	0	158,947	80,341	118,710
Fungicides	Captafol	23,376	8,709	231	0
	Chlorothalonil	24,084	40,723	90,829	92,404
	Ferbam	23,416	29,161	26,302	8,908
	Metiram	17,612	21,460	1,007	2,866
	Ziram	0	1,187	3,802	12,069

Figure 2 shows another breakdown of total pesticide use by class. Herbicide use across the four survey years remained essentially static. Insecticides also shows a static pattern except for 1988 where there was a marked increase of use. Fungicides show more use variation from year to year and have the highest overall use in New Jersey agriculture. Fumigants show a consistent increase of use over the four survey years.

Figure 3 shows total pesticide use for the major New Jersey crops by survey year (1985 data is not included because the crop codes listed for that survey lack the diversity of the other years.) Peaches show a substantial decrease of pesticide use over the six years covered by the surveys. Blueberries, field corn and soybeans show a consistent increase of pesticide use over the same years.

Figure 4 shows the total pesticide use for New Jersey's top six agricultural counties. Gloucester county shows the highest overall use every survey year. Gloucester, Cumberland and Salem show a wide variation of use from year to year. Monmouth county shows a consistent decrease of use.

REFERENCES

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