PESTICIDE USE IN ARIZONA COTTON: 1995 AND 1996

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Abstract

Federal and state record keeping of pesticide application are forcing agricultural producers to maintain pesticide application records. In cooperation with the Arizona Agricultural Statistics Service, and Arizona Department of Agriculture, we evaluated 96,894 records of pesticide use by commercial applicators in 1995 and 1996, using primarily the state 1080 Form. Based on pesticide class, insecticides represented 83% and 79% of the total acres treated, while accounting for 65% and 59% of the AI applied for both years. Of the total acres treated with a pesticide, 11 to 13 of the top 15 most commonly used products were insecticides. The top 22 to 27 products make up more than 90% of the accumulated percentage of treated acres, leaving the remaining 10% to make up the next 60 plus products. Of the top three fungicides, sulfur, mancozeb, and dichloropropene accounted for nearly 95% of the total treated acres. Three soil-applied herbicides (prometryn, pendimethalin, and trifluralin) account for between 66% and 75% of the total acres treated and between 66% and 71% of the active ingredient applied. The pesticide use class rankings (high to low) were as follows: insecticide, defoliants, herbicides, others and fungicides.

Introduction

Pesticides are currently used on over 90% of the cotton acreage in the United States (Arizona Agricultural Statistics, 1997). Insecticides and herbicides are applied to 97% and 75%, respectively, of the national cotton acreage. Cotton remains the number one agricultural commodity in Arizona, with more than 412,100 acres harvested at an economic value of 335 million dollars (1995 Arizona Agricultural Statistics). In Arizona, insecticides were applied to 97% of the cotton acreage and herbicides were applied to 89% of the cotton acreage in 1995. Thus, the Arizona cotton crop was treated with more herbicide than the national average.

The Arizona cotton industry is undergoing rapid changes in pesticide use patterns due to initial reported successes with new technologies such as insect growth regulators (IGRs) and Bt cotton, a new selective herbicide (Staple), and herbicide resistant cotton varieties (e.g., BXN and Roundup Ready). These new technologies require cautious use and a continuous pursuit of information that will enable us to maintain their viability. However, if the past use of pesticides is an indicator of the future, resistance to new pest control technologies will occur. Therefore, it is important to establish baseline data on current technologies and practices in order to observe and document changes resulting from new technologies. Also, baseline data will aid in the management of resistance development.

Pesticide use surveys conducted by the National Agricultural Statistics Service (NASS) and Arizona Agricultural Statistics Services were designed to provide statewide data. In addition to these data, Federal and State record keeping requirements are forcing agricultural producers to keep and maintain better application records. We believe that grower records, coupled with commercial pesticide use recorded on the Arizona 1080 form, will provide a more accurate picture of pesticide use statewide. The Arizona Department of Agriculture (ADA) is charged with monitoring the use of farm pesticides in the state. Applications of products identified on the state's Groundwater Protection List are reportable to ADA, as are all pesticides applied by licensed commercial applicators. Reported use records are submitted on the state Form 1080. Data from the 1080 forms are entered into several data bases that were made available to us for the purposes of this research. The objectives of this study were 1) to survey growers for BMP/IPM practices (not reported here); 2) to establish baseline pesticide usage data on cotton (reported here); and 3) to survey weed populations in Arizona cotton fields prior to the widespread use of new herbicide technologies (see abstracts).

Discussion

All *commercial* applicators who apply pesticides are required to submit a 1080 form to the Arizona Department of Agriculture within 7 days of the application (see Appendix A for form). The 1080 form requires applicators to fill in a number of items, including but not limited to: brand name, EPA registration number, rate, total chemical, total acres, label restrictions, days to harvest, section, township, range, and application method (ground or air). An entry clerk at ADA enters the forms into a data base. The clerk making entries in the database does not have the authority or background to make judgements about the quality of the data. The total number of forms processed by ADA varies between 45,000 and 60,000 per year; over 50,000 were filed for cotton for both years. Each 1080 form can contain up to seven pesticide use records per form.

Before the 1080 data could be summarized, considerable time and effort were required to remove duplication, rectify internal inconsistencies, and correct obvious reporting and data entry errors. Errors no doubt remain in the data set, but they are not of such magnitude as to distort the information contained in this study. Information on the amount of active ingredients in the reported pesticides was extracted from

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files maintained by the National Agricultural Statistics Service of USDA. Because of the way the data are represented in the ADA databases, it was necessary to develop a routine to properly prorate the quantity of chemical applied to each field reported on the 1080 form. We were able to utilize 96,894 pesticide use records filed from over 68,000 Arizona Department of Agricultures 1080 forms filed in 1995 and 1996.

A summary of usage by pesticide class, acres treated, mean application/acre, active ingredient, and mean A.I. pounds/acre is presented in Table 1. As expected, due to insect pressure (Dennehy and Williams, 1997), insecticides represent most of the total amounts of pesticides applied. Insecticides represented 83% and 79% of the total acres treated, while accounting for 56% and 59% of the active ingredient applied for 1995 and 1996 respectively (Table 1). It follows that the highest mean application rates and mean AI per acre were also insecticide applications. In addition, for both years, herbicides accounted for only 5% and 6% of active ingredient and A.I./acre respectively. We believe because most growers apply pre-emergent herbicides that are not subject to state filings, and thus are under reported here. Fungicides accounted for only 1% of acres treated either year, but in 1995 four times the A.I. was applied per acre. Defoliants account for approximately 10% of the acres treated in either year, and approximately 25% of the active ingredient applied. If cotton needs to be defoliated to be harvested, some large portions of the defoliant are being applied by growers who may not have to report their applications to the state via the 1080 form. Based on the dated reported in Table 1, we see a reduction in the overall use of pesticides reported on the 1080 form of 28% from 1995 to 1996, with insecticides (down 32%) and herbicides (down 27%), accounting for most of the reduction.

A summary of liquid and dry pesticide usage by regions and counties for 1995 only is presented in Table 2. In general, this table reveals that the East Region (Cochise, Graham, and Greenlee counties) contains the smallest amount of cotton acreage, 10.5% of the state total (14,759/139,697), and thus accounts for the smallest amount of liquid and dry pesticide usage at 2% and 1.2%, respectively. In contrast, the Central Region (Pima, Pinal, and Maricopa counties) contained nearly 73% of the total state cotton acreage grown and thus accounts for the largest amount of liquid (87%) and dry pesticide usage (73%). As expected, the western region was intermediate compared to the other regions with respect to both acres of cotton grown and amount of pesticide applied. As for the type of pesticide used, liquid or dry, it was nearly equal at 48% liquid and 52% dry.

A list of commercially applied pesticides used on cotton in Arizona during the 1995 and 1996 growing season is presented in Table 3. It should be noted that other pesticide applications (both general use and restricted use pesticides) were applied by *private* applicators, and the records from those applications are not present in this data set. Growers, many of whom are private applicators, incorporate preemergence herbicides at planting time and during the season and are not required to report these applications to the state. In addition, as the season progresses and the canopy close, the only way any pesticide can be applied is by air. Thus, all applications after canopy closure (layby) are commercially applied and a 1080 form is required. As a result, the number of reported pesticide applicator records increases as the season progresses.

Table 3 gives a breakdown of the products by class, number of reports/forms evaluated, total acres treated, pounds of active ingredient applied, percent of the total acres receiving that product, an accumulation of percent of the product toward 100% of those reported, mean application/acre, and mean pounds A.I./acre. Of the total acres treated with a particular product, 11 to 13, depending on the year, of the top 15 most commonly used pesticide products are insecticides. These top 15 products make up between 77% and 80% of the accumulated percent of treated acres. In addition, the first 22 to 27 products make up over 90% of the accumulated percentage of treated acres, leaving the remaining 10% to be made up of the next 60 plus products. It is important to note that we have great confidence in the reports and the information they provide, having used a minimum of 100 reports in this survey. However, we believe that information obtained from less than 100 reports, unless verified by an independent source, is subject to varying degrees of interpretation.

A breakdown of Table 3 into usage by class of pesticide is presented in Tables 4 through 11. For fungicides, the top three of the eight products—sulfur, mancozeb and dichloropropene— accounted for over 95% of the total treated acres (Tables 4 and 5). Three soil-applied herbicides— prometryn, pendimethalin, and trifluralin—accounted for between 66% and 75% of total acres treated, and between 66% and 71% of the active ingredients applied (Tables 6 and 7). Prometryn, which is tank mixed with pendimethalin or trifluralin prior to or at planting, or at post-directed ("chemical-hoe") or layby treatment, was the most commonly applied herbicide. The six most widely used herbicides account for over 82% of both the acres treated and the total amount of active ingredient applied in both years. Only one of these herbicides, MSMA, is a postemergence foliar applied herbicide. Soil applied herbicides accounted for 90% of the treated acres and active ingredients, although some of the herbicides (including prometryn, cyanazine, diuron, oxyfluorfen, and fluometuron) are occasionally used as foliar-applied, post-directed, postemergence herbicides. Herbicides that are strictly postemergence, foliar-applied (i.e. MSMA, fluozifop, clethodin, sethoxydim and glyphosate) accounted for approximately less than 10% of both the treated acres and active ingredient applied. Because growers typically apply these materials by ground and are not required to file 1080 reports, these postemergence applications are probably under-reported.

Grower applied preemergence herbicide applications do not have to be reported, making conclusions regarding related importance of pre- and postemergence herbicides difficult. However, grower IMP/BMP surveys did find that postemergence herbicides were not as widely used as preemergence herbicides. As point of interest, two postemergence herbicides that were thought to be more commonly used in 1996 and potentially in 1997, pyrothiobac-sodium (Staple) and bromoxynil (Buctril), did not appear in 1995 and had only limited reporting in 1996.

As for insecticide usage, the top 16 or 17 products made up over 90% of the total acres treated (Table 8). In addition, the top 15 to 18 products account for over 80% of the total accumulated acres treated with insecticides. We believe that the addition of two IGR's of Knack (pyriproxyfen) and Applaud (Burprofezin) to the list of available insecticides in 1996 enable growers to reduce their pesticide load to the environment by 10% to 15%. In addition, according to other researchers, short sustained cold weather may be a factor in reducing whitefly overwintering populations. Regarding defoliant usage, thidiazuron made up nearly 35% to 50% of the total, with chlorate and sodium chlorate compiling 87% and 96% of the pounds A.I. applied (Tables 9 and 10).

Summary

The 1995 and 1996 pesticide use data obtained from the Department of Agriculture's 1080 form will be used to establish a baseline for pesticide use on cotton in Arizona; however, a preliminary screening of the data was necessary to increase the reliability of the information. A 28% reduction in pesticide use is reported form 1995 to 1996, with a reduction in insecticide use by 32% and herbicide use by 27%. From the 1995 data, the Central counties contained nearly 73% of the total state acreage of cotton. As for overall pesticide use, the top 22 to 27 products, which accounted for 90% of the total accumulated treated acres, were insecticides. In general, the pesticide use rankings were as follows: insecticide, defoliants, herbicides, other, and fungicides.

References

Arizona Agricultural Statistics Services, Bulletin S-32, August 1997.

Dennehy, T.J. and L. Williams III. 1997, Management of Resistance in *Bemisia* in Arizona Cotton, *Pestic Sci.,* **51**, 398-406, 1997.

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Table 1-A. Summary of Pesticide Usage on Cotton in 1995 and 1996 from the 1080 Forms.

Pesticide Class	Acres Treated	
	1995	1996
Insecticide	4,977,266	3,403,128
Herbicide	319,205	233,738
Fungicide	50,980	44,272
Defoliant	517,343	492,064
Other	138,954	114,909
TOTAL	6,003,746	4,288,111

Table 1-B. Summary of Pesticide Usage on Cotton in 1995 and 1996 from the 1080 Forms.

Pesticide Class	Mean Applications Per Acre	
	1995	1996
Insecticide	12.1	9.5
Herbicide	0.8	0.7
Fungicide	0.1	0 1
Defoliant	1.3	1.4
Other	0.3	.4
TOTAL	14.6	12.0

Table 1-C. Summary of Pesticide Usage on Cotton in 1995 and 1996 from the 1080 Forms.

Pesticide Class	Active Ingredient (Pounds)	
	1995	1996
Insecticide	1,810,626	1,609,118
Herbicide	207,282	161,152
Fungicide	398,688	118,220
Defoliant	801,629	709,176
Other	23,465	97,776
TOTAL	3,230,631	2,695,442

From Arizona Department of Agriculture 1080 Forms
(Products not included on the State's "Groundwater Protection List" may be under reported)

Table 1-D. Summary of Pesticide Usage on Cotton in 1995 and 1996 from the 1080 Forms.

Pesticide Class	Mean AI Pounds Per Acre	
	1995	1996
Insecticide	4.4	4.5
Herbicide	0.5	0.5
Fungicide	0.9	0.3
Defoliant	2.0	2.0
Other	0.1	0.3
TOTAL	7.9	7.6

From Arizona Department of Agriculture 1080 Forms
(Products not included on the State's "Groundwater Protection List" may be under reported)

Table 2-A. 1995 Liquid Pesticide Usage on Cotton in Arizona, by County and Region

Pesticide Class	Liquid Products	
	Gallons	Acres
Cochise County (East Region)		
Fungicide	310	1,151
Herbicides	457	3,494
Insecticides	185	2,199
Other	505	3,775
Subtotal:	1,457	10,619
Graham County (East Region)		
Fungicide	0	0
Herbicides	11,377	4,922
Insecticides	965	20,541
Other	8	89
Subtotal:	12,350	25,552
REGION TOTALS:	13,807	36,171
Pima County (Central Region)		
Fungicide	0	0
Herbicides	27,155	40,488
Insecticides	8,696	63,129
Other	2,131	19,385
Subtotal:	37,982	123,002
Pinal County (Central Region)		
Fungicide	18	49
Herbicides	188,373	245,838
Insecticides	138,623	1,464,609
Other	12,326	132,636
Subtotal:	339,340	1,843,132
Maricopa County (Central Region)		
Fungicide	22,952	5,074
Herbicides	95,760	137,616
Insecticides	185,605	1,751,944
Other	15,244	146,331
Subtotal:	319,561	2,040,965
REGION TOTALS:	696,883	4,007,099
Mohave County (West Region)		
Fungicide	0	0
Herbicides	434	222
Insecticides	598	8,930
Other	30	527
Subtotal:	1,062	9,679
La Paz County (West Region)		
Fungicide	5,561	1,051
Herbicides	12,486	34,045
Insecticides	25,425	383,838
Other	4,900	47,540
Subtotal:	48,372	466,474
Yuma County (West Region)		
Fungicide	0	0
Herbicides	6,588	27,814
Insecticides	28,007	231,984
Other	5,747	46,846
Subtotal:	40,342	306,644
REGION TOTALS:	89,776	782,797
STATE OF AZ	800,466	4,826,067

Table 2-B. 1995 Dry Pesticide Usage on Cotton in Arizona, by County and Region

Pesticide Class	Dry Products	
	Pounds	Acres
Cochise County (East Region)		
Fungicide	1,775	989
Herbicides	11	110
Insecticides	161	300
Other	0	0
Subtotal:	1,947	1,399
Graham County (East Region)		
Fungicide	300	185
Herbicides	20	20
Insecticides	8,164	12,056
Other	0	0
Subtotal:	8,484	12,261
REGION TOTALS:	10,431	13,660
Pima County (Central Region)		
Fungicide	1,030	642
Herbicides	180	140
Insecticides	15,149	21,029
Other	0	0
Subtotal:	16,359	21,811
Pinal County (Central Region)		
Fungicide	33,786	17,704
Herbicides	2,315	2,053
Insecticides	268,828	420,370
Other	1,460	9,708
Subtotal:	306,389	449,835
Maricopa County (Central Region)		
Fungicide	33,404	8,571
Herbicides	11,130	15,368
Insecticides	263,764	348,751
Other	4,864	37,350
Subtotal:	313,162	410,040
REGION TOTALS:	635,910	881,686
Mohave County (West Region)		
Fungicide	0	0
Herbicides	0	0
Insecticides	1,684	3,670
Other	34	339
Subtotal:	1,718	4,009
La Paz County (West Region)		
Fungicide	121,916	15,689
Herbicides	3,426	3,192
Insecticides	45,755	77,210
Other	1,698	9,189
Subtotal:	172,795	105,280
Yuma County (West Region)		
Fungicide	456	381
Herbicides	9,601	1,450
Insecticides	35,194	55,821
Other	976	4,613
Subtotal:	46,227	62,265
REGION TOTALS:	220,740	171,554
STATE OF AZ	867,081	1,066,900

Table 3-A.Commercial Pesticide Usage on Arizona Cotton in 1995 and 1996 Using the 1080 Form
From Arizona Department of Agricultural 1080 Forms*

Product	Class	Reports
CHLORPYRIFOS	I	4769
ACEPHATE	I	3816
PHEROMONE	I	3627
ENDOSULFAN	I	2884
LAMBDA-CYHALOTHRIN	I	2106
METHYL PARATHION	I	2088
PERMETHRIN	I	1931
THIDIAZURON	D	1953
PYRIPROXYFEN-KNACK	I	1355
METHIDATHION	I	1218
OXAMYL	I	1051
AMITRAZ	I	1162
TRIBUFOS	D	1099
MEPIQUAT CHLORIDE	G	1277
CHLORATE	D	987
PROMETRYN	H	652
PROFENOFOS	I	622
ZETA-CYPER-METHRIN	I	
BURPROFEZIN- APPLAUD	I	598
IMIDACLOPRID	I	663
PENDIMETHALIN	H	467
ENDOTHAL	D	683
SODIUM CHLORATE	D	559
FENPROPATHRIN	I	574
TRIFLURALIN	H	471
ACETATE	I	455
CYPERMETHRIN	I	447
DIMETHOATE	I	288
PARAQUAT	D	457
METHOMYL	I	265
TRALOMETHRIN	I	199
BIFENTHRIN	I	426
SULFUR	F	237
CYANAZINE	H	208
ETHEPHON	G	155
ALDICARB	I	135
DICHLOROPROPENE	F	101
ESFENVALERATE	I	132
MALATHION	I	83
GIBBERELLIC ACID	G	
CACODYLIC ACID	D	155
CYFLUTHRIN	I	178
CLETHODIM	H	110
DIURON	H	84
METOLACHLOR	H	
MSMA	H	78
OXYDEMETON-METHYL	I	76
PYRITHIOBAC-SODIUM	H	84
PHORATE	I	55
AZINPHOS-METHYL	I	35
METHAMIDOSPHOS	I	62
THIODICARB	I	35
PCNB	I	22
FLUAZIFOP-P-BUTYL	H	45

Table 3-A Continued

Product	Class	Reports
NORFLURAZON	H	40
MANCOZEB	F	34
SETHOXYDIM	H	39
GLYPHOSATE	H	61
GARLIC	I	24
TRIMETHYL DODECATRIENE	I	23
DISULFOTON	I	21
EPTC	H	14
OXYFLUORFEN	H	18
PGR	G	
CARBOFURAN	I	6
FLUOMETURON	H	17
NEEM OIL EXTRACT	I	11
PRONAMIDE	H	6
DICOFOL	I	15
PIPERONYL BUTOXIDE	I	14
BT	I	11
PROPARGITE	I	15
ABAMECTIN	I	7
BROMOXYNIL	H	5
MCPA	H	3
BENEFIN	H	3
NALED	I	5
METALAXYL	F	4
CARBARYL	I	5
ETHYL PARATHION	I	5
DIAZINON	I	4
DIPHENAMID	H	1
DIETHATYL-ETHYL	H	2
MANEB	F	2
BENSULIDE	H	1
VINCLOZOLIN	F	1
BENDIOCARB	I	5
PYRETHRUM	I	3
ORYZALIN	H	1
DIMETHIPIN	D	1
DICLORAN	F	1
SULPROFOS	I	3
TOTAL		41650

Table 3-B.Commercial Pesticide Usage on Arizona Cotton in 1995 and 1996 Using the 1080 Form.
From Arizona Department of Agricultural 1080 Forms*

Product	1995 Acres	1996 Acres
CHLORPYRIFOS	950,793.20	532,243.5
ACEPHATE	856,881.60	450,165.2
PHEROMONE	134,987.70	386,733.5
ENDOSULFAN	337,785.10	298,930.9
LAMBDA-CYHALOTHRIN	339,301.60	239,120.5
METHYL PARATHION	117,398.80	218,400.0
PERMETHRIN	290,613.90	214,985.7
THIDIAZURON	180,219.20	168,795.0
PYRIPROXYFEN-KNACK		149,078.6
METHIDATHION	45,837.60	143,239.0
OXAMYL	137,803.80	133,340.2
AMITRAZ	86,488.80	108,010.6
TRIBUFOS	95,191.50	96,402.6
MEPIQUAT CHLORIDE	94,712.40	95,309.2
CHLORATE	79,672.60	72,156.2
PROMETRYN	100,614.50	71,150.1
PROFENOFOS	204,460.40	59,774.6
ZETA-CYPER-METHRIN	182,129.90	
BURPROFEZIN- APPLAUD		57,986.2
IMIDACLOPRID	78,335.80	57,981.2
PENDIMETHALIN	69,564.20	54,421.2
ENDOTHAL	43,964.20	52,999.0
SODIUM CHLORATE	77,843.50	52,822.8
FENPROPATHRIN	594,035.80	45,044.3
TRIFLURALIN	69,276.20	43,809.5
ACETATE		40,622.1
CYPERMETHRIN	7,818.90	39,544.6
DIMETHOATE	39,699.10	36,957.6
PARAQUAT	40,452.00	36,616.6
METHOMYL	171,765.00	35,187.4
TRALOMETHRIN	32,739.00	30,437.1
BIFENTHRIN	224,690.10	28,417.4
SULFUR	38,263.60	23,887.2
CYANAZINE	25,294.60	19,698.0
ETHEPHON	9,144.40	19,600.1
ALDICARB	7,393.20	19,295.9
DICHLOROPROPENE	5,302.10	16,936.2
ESFENVALERATE	42,726.20	12,890.7
MALATHION	7,106.40	12,455.1
GIBBERELLIC ACID	6,564.10	
CACODYLIC ACID	26,048.50	12,236.0
CYFLUTHRIN	12,711.20	11,514.4
CLETHODIM	3,044.50	10,089.6
DIURON	11,391.50	6,235.2
METOLACHLOR	9,841.90	
MSMA	9,994.80	6,215.0
OXYDEMETON-METHYL	1,765.80	5,903.0
PYRITHIOBAC-SODIUM		5,308.7
PHORATE	2,546.00	5,287.8
AZINPHOS-METHYL	14,593.40	4,553.9
METHAMIDOSPHOS	21,453.70	4,503.7
THIODICARB	9,635.10	4,113.9
PCNB		4,079.9

Table 3-B Continued

Product	1995 Acres	1996 Acres
FLUAZIFOP-P-BUTYL	3,686.20	3,079.3
NORFLURAZON	6,523.90	2,959.0
MANCOZEB	5,477.40	2,933.0
SETHOXYDIM	2,102.40	2,319.7
GLYPHOSATE	2,101.30	2,229.0
GARLIC		1,855.8
TRIMETHYL DODECATRIENE		1,747.7
DISULFOTON	1,367.60	1,535.0
EPTC	2,174.90	1,320.1
OXYFLUORFEN	2,540.50	1,265.2
PGR	2,250.90	
CARBOFURAN		1,171.5
FLUOMETURON	547.70	1,097.3
NEEM OIL EXTRACT		1,082.4
PRONAMIDE		1,045.0
DICOFOL	700.70	1,031.9
PIPERONYL BUTOXIDE		940.5
BT	1,995.80	760.0
PROPARGITE	513.40	737.9
ABAMECTIN	184.20	394.3
BROMOXYNIL		376.0
MCPA		367.0
BENEFIN		363.0
NALED	178.10	329.1
METALAXYL	356.30	320.4
CARBARYL	82.00	207.0
ETHYL PARATHION	5,173.30	202.4
DIAZINON	21.00	163.0
DIPHENAMID		140.0
DIETHATYL-ETHYL		108.0
MANEB	1,200.00	107.5
BENSULIDE		95.0
VINCLOZOLIN		77.9
BENDIOCARB	185.60	66.0
PYRETHRUM	3,634.80	62.6
ORYZALIN		47.3
DIMETHIPIN		36.0
DICLORAN		10.0
SULPROFOS	5,785.90	42.0
TOTAL		4,288,111.7

Table 3-C. Commercial Pesticide Usage on Arizona Cotton in 1995 and 1996 Using the 1080 Form
From Arizona Department of Agricultural 1080 Forms*

Product	Active Ing.	Acres %	Accum.
CHLORPYRIFOS	318,558.5	12.4	12.4
ACEPHATE	286,025.2	10.5	22.9
PHEROMONE	350,528.7	9.0	31.9
ENDOSULFAN	191,998.7	7.0	38.9
LAMBDA-CYHALOTHRIN	7,136.5	5.6	44.5
METHYL PARATHION	183,847.1	5.1	49.6
PERMETHRIN	2,320.1	5.0	54.6
THIDIAZURON	20,919.6	3.9	58.5
PYRIPROXYFEN-KNACK	8,270.7	3.5	62.0
METHIDATHION	58,185.9	3.3	65.3
OXAMYL	70,616.0	3.1	68.4
AMITRAZ	22,826.9	2.5	70.9
TRIBUFOS	81,789.2	2.2	73.1
MEPIQUAT CHLORIDE	15,851.9	2.2	75.3
CHLORATE	325,138.6	1.7	77.0
PROMETRYN	56,072.8	1.7	78.7
PROFENOFOS	42,146.6	1.4	80.1
ZETA-CYPER-METHRIN			
BURPROFEZIN- APPLAUD	19,897.7	1.4	81.5
IMIDACLOPRID	2,754.1	1.4	82.9
PENDIMETHALIN	34,442.1	1.3	84.2
ENDOTHAL	3,345.8	1.2	85.4
SODIUM CHLORATE	257,056.7	1.2	86.6
FENPROPATHRIN	7,464.1	1.1	87.7
TRIFLURALIN	24,791.0	1.0	88.7
ACETATE	3,264.6	0.9	89.6
CYPERMETHRIN	741.9	0.9	90.5
DIMETHOATE	18,078.8	0.9	91.4
PARAQUAT	8,209.7	0.9	92.3
METHOMYL	9,481.2	0.8	93.1
TRALOMETHRIN	610.0	0.7	93.8
BIFENTHRIN	1,708.7	0.7	94.5
SULFUR	81,400.1	0.6	95.1
CYANAZINE	16,898.8	0.5	95.6
ETHEPHON	21,922.0	0.5	96.1
ALDICARB	22,179.9	0.5	96.6
DICHLOROPROPENE	32,111.0	0.4	97.0
ESFENVALERATE	483.0	0.3	97.3
MALATHION	19,306.9	0.3	97.6
GIBBERELLIC ACID			
CACODYLIC ACID	12,702.4	0.3	97.9
CYFLUTHRIN	517.7	0.3	98.2
CLETHODIM	6,136.7	0.2	98.4
DIURON	5,998.1	0.1	98.5
METOLACHLOR			
MSMA	8,025.5	0.1	98.6
OXYDEMETON-METHYL	1,116.7	0.1	98.7
PYRITHIOBAC-SODIUM	286.9	0.1	98.8
PHORATE	4,415.6	0.1	98.9
AZINPHOS-METHYL	2,543.4	0.1	99.0
METHAMIDOSPHOS	2,344.0	0.1	99.1
THIODICARB	1,422.6	0.1	99.2

Table 3-C Continued

Product	Active Ing.	Acres %	Accum.
PCNB	2,484.3	0.1	99.3
FLUAZIFOP-P-BUTYL	608.9	0.1	99.4
NORFLURAZON	1,377.7	0.1	99.5
MANCOZEB	3,978.0	0.1	99.6
SETHOXYDIM	408.1	0.1	99.7
GLYPHOSATE	2,215.9	0.1	99.8
GARLIC	982.5	0.0	99.8
TRIMETHYL DODECATRIENE	4.0	0.0	99.8
DISULFOTON	517.0	0.0	99.8
EPTC	2,366.6	0.0	99.8
OXYFLUORFEN	477.3	0.0	99.8
PGR			
CARBOFURAN	1,170.0	0.0	99.8
FLUOMETURON	459.0	0.0	99.8
NEEM OIL EXTRACT	440.4	0.0	99.8
PRONAMIDE	8.8	0.0	99.8
DICOFOL	819.1	0.0	99.9
PIPERONYL BUTOXIDE	236.6	0.0	99.9
BT	20.0	0.0	99.9
PROPARGITE	936.1	0.0	99.9
ABAMECTIN	2.2	0.0	99.9
BROMOXYNIL	127.3	0.0	99.9
MCPA	227.2	0.0	99.9
BENEFIN	84.1	0.0	100.0
NALED	229.0	0.0	100.0
METALAXYL	570.2	0.0	100.0
CARBARYL	126.6	0.0	100.0
ETHYL PARATHION	120.0	0.0	100.0
DIAZINON	208.7	0.0	100.0
DIPHENAMID	5.0	0.0	100.0
DIETHATYL-ETHYL	33.2	0.0	100.0
MANEB	78.6	0.0	100.0
BENSULIDE	96.2	0.0	100.0
VINCLOZOLIN	82.6	0.0	100.0
BENDIOCARB	1.0	0.0	100.0
PYRETHRUM	0.2	0.0	100.0
ORYZALIN	4.8	0.0	100.0
DIMETHIPIN	15.1	0.0	100.0
DICLORAN	0.1	0.0	100.0
SULPROFOS	29.0	0.0	100.0
TOTAL	2,695,442.1		

Table 3-D.Commercial Pesticide Usage on Arizona Cotton in 1995 and 1996 Using the 1080 Form
From Arizona Department of Agricultural 1080 Forms*

Product	1995 Mean AP Per Acre	1996 Mean AP Per Acre
CHLORPYRIFOS	2.31	1.49
ACEPHATE	2.08	1.26
PHEROMONE	0.33	1.08
ENDOSULFAN	0.82	0.84
LAMBDA-CYHALOTHRIN	0.82	0.67
METHYL PARATHION	0.28	0.61
PERMETHRIN	0.71	0.60
THIDIAZURON	0.44	0.47
PYRIPROXYFEN-KNACK		0.42
METHIDATHION	0.11	0.40
OXAMYL	0.33	0.37
AMITRAZ	0.21	0.30
TRIBUFOS	0.23	0.27
MEPIQUAT CHLORIDE	0.23	0.27
CHLORATE	0.19	0.20
PROMETRYN	0.24	0.20
PROFENOFOS	0.50	0.17
ZETA-CYPER-METHRIN	0.44	
BURPROFEZIN- APPLAUD		0.16
IMIDACLOPRID	0.19	0.16
PENDIMETHALIN	0.17	0.15
ENDOTHAL	0.11	0.15
SODIUM CHLORATE	0.19	0.15
FENPROPATHRIN	1.44	0.13
TRIFLURALIN	0.17	0.12
ACETATE		0.11
CYPERMETHRIN	0.02	0.11
DIMETHOATE	0.10	0.10
PARAQUAT	0.10	0.10
METHOMYL	0.42	0.10
TRALOMETHRIN	0.08	0.09
BIFENTHRIN	0.55	0.08
SULFUR	0.09	0.07
CYANAZINE	0.06	0.06
ETHEPHON	0.02	0.05
ALDICARB	0.02	0.05
DICHLOROPROPENE	0.01	0.05
ESFENVALERATE	0.10	0.04
MALATHION	0.02	0.03
GIBBERELLIC ACID	0.02	
CACODYLIC ACID	0.06	0.03
CYFLUTHRIN	0.03	0.03
CLETHODIM	0.01	0.03
DIURON	0.03	0.02
METOLACHLOR	0.02	
MSMA	0.02	0.02
OXYDEMETON-METHYL	0.00	0.02
PYRITHIOBAC-SODIUM		0.01
PHORATE	0.01	0.01
AZINPHOS-METHYL	0.04	0.01
METHAMIDOSPHOS	0.05	0.01
THIODICARB	0.02	0.01
PCNB		0.01

Table 3-D Continued

Product	1995 Mean AP Per Acre	1996 Mean AP Per Acre
FLUAZIFOP-P-BUTYL	0.01	0.01
NORFLURAZON	0.02	0.01
MANCOZEB	0.01	0.01
SETHOXYDIM	0.01	0.01
GLYPHOSATE	0.01	0.01
GARLIC		0.01
TRIMETHYL DODECATRIENE		0.00
DISULFOTON	0.00	0.00
EPTC	0.01	0.00
OXYFLUORFEN	0.01	0.00
PGR	0.01	
CARBOFURAN		0.00
FLUOMETURON	0.00	0.00
NEEM OIL EXTRACT		0.00
PRONAMIDE		0.00
DICOFOL	0.00	0.00
PIPERONYL BUTOXIDE		0.00
BT	0.00	0.00
PROPARGITE	0.00	0.00
ABAMECTIN	0.00	0.00
BROMOXYNIL		0.00
MCPA		0.00
BENEFIN		0.00
NALED	0.00	0.00
METALAXYL	0.00	0.00
CARBARYL	0.00	0.00
ETHYL PARATHION	0.01	0.00
DIAZINON	0.00	0.00
DIPHENAMID		0.00
DIETHATYL-ETHYL		0.00
MANEB	0.00	0.00
BENSULIDE		0.00
VINCLOZOLIN		0.00
BENDIOCARB	0.00	0.00
PYRETHRUM	0.01	0.00
ORYZALIN		0.00
DIMETHIPIN		0.00
DICLORAN		0.00
SULPROFOS	0.01	0.00
TOTAL		

Table 4-A. Arizona Cotton Fungicide Usage - 1995
From Arizona Department of Agriculture 1080 Forms*

Product	Reports	Acres	Active Ing. lbs
SULFUR	394	38,263.6	143,206.14
MANCOZEB	53	5,477.4	6,354.68
DICHLOROPROPENE	38	5,302.1	236,192.16
MANEB	16	1,200.0	1,310.00
METALAXYL	6	356.3	1.13
FOSETYL-AL	2	316.0	352.00
TRIADIMEFON	1	65.0	8.00
TOTAL	510	50,980.4	387,424.11

* Products not included on the State's "Groundwater Protection List" may be under reported

Table 4-B. Arizona Cotton Fungicide Usage - 1995
From Arizona Department of Agriculture 1080 Forms*

Product	Acres %	Accum. %
SULFUR	75.0	75.0
MANCOZEB	10.7	85.7
DICHLOROPROPENE	10.4	96.1
MANEB	2.3	98.5
METALAXYL	0.6	99.2
FOSETYL-AL	0.6	99.8
TRIADIMEFON	0.1	100
TOTAL	100	

* Products not included on the State's "Groundwater Protection List" may be under reported

Table 4-C. Arizona Cotton Fungicide Usage - 1995
From Arizona Department of Agriculture 1080 Forms*

Product	Mean Applications Per Acre	Mean AI Lbs/Acre
SULFUR	0.09	0.34
MANCOZEB	0.01	0.01
DICHLOROPROPENE	0.01	0.57
MANEB	0.01	0.00
METALAXYL	0.00	0.00
FOSETYL-AL	0.00	0.00
TRIADIMEFON	0.00	0.00
TOTAL		

* Products not included on the State's "Groundwater Protection List" may be under reported

Table 5-A. Arizona Cotton Fungicide Usage - 1996
From Arizona Department of Agriculture 1080 Forms (*)

Product	Class	Reports	Acres
SULFUR	F	237	23,887.2
DICHLOROPROPENE	F	101	16,936.2
MANCOZEB	F	34	2,933.0
METALAXYL	F	4	320.4
MANEB	F	2	107.5
VINCLOZOLIN	F	1	77.9
DICLORAN	F	1	10.0
TOTAL		380	44,272.2

* Products not included on the State's "Groundwater Protection List" may be under reported

Table 5-B. Arizona Cotton Fungicide Usage - 1996
From Arizona Department of Agriculture 1080 Forms (*)

Product	Active Ing.	Acres %	Accum.
SULFUR	81,400.1	54.0	54.0
DICHLOROPROPENE	32,111.0	38.3	92.3
MANCOZEB	3,978.0	6.6	98.9
METALAXYL	570.2	0.7	99.6
MANEB	78.6	0.2	99.8
VINCLOZOLIN	82.7	0.2	100.0
DICLORAN	0.1	0.0	100.0
TOTAL	118,220.6		

* Products not included on the State's "Groundwater Protection List" may be under reported

Table 5-C. Arizona Cotton Fungicide Usage - 1996
From Arizona Department of Agriculture 1080 Forms (*)

Product	Mean AP Per Acre	Mean AI Lbs/Acre
SULFUR	0.07	0.23
DICHLOROPROPENE	0.05	0.09
MANCOZEB	0.01	0.01
METALAXYL	0.00	0.00
MANEB	0.00	0.00
VINCLOZOLIN	0.00	0.00
DICLORAN	0.00	0.00
TOTAL		

* Products not included on the State's "Groundwater Protection List" may be under reported

Table 6-A. Arizona Cotton Herbicides Usage - 1995
From Arizona Department of Agriculture 1080 Forms*

Product	Reports	Acres
PROMETRYN	749	100,614.5
PENDIMETHALIN	507	69,564.2
TRIFLURALIN	624	69,276.2
CYANAZINE	256	25,294.6
DIURON	127	11,391.5
MSMA	142	9,994.8
METOLACHLOR	56	9,841.9
NORFLURAZON	63	6,523.9
FLUAZIFOP-P-BUTYL	71	3,686.2
CLETHODIM	54	3,044.5
OXYFLUORFEN	43	2,540.5
EPTC	25	2,174.9
SETHOXYDIM	49	2,102.4
GLYPHOSATE	54	2,101.3
FLUOMETURON	11	547.7
METAM-SODIUM	9	506.0
TOTAL	2,840	319,205.1

* Products not included on the State's "Groundwater Protection List" may be under reported

Table 6-B. Arizona Cotton Herbicides Usage - 1995
From Arizona Department of Agriculture 1080 Forms*

Product	Active Ing. lbs	Acres %	Accum. %
PROMETRYN	63,590.89	31.52	31.52
PENDIMETHALIN	42,982.66	21.80	53.32
TRIFLURALIN	31,012.07	21.70	75.02
CYANAZINE	26,109.96	7.92	82.94
DIURON	11,006.69	3.57	86.51
MSMA	11,494.20	3.13	89.64
METOLACHLOR	35.41	3.08	92.72
NORFLURAZON	2,996.76	2.04	94.76
FLUAZIFOP-P-BUTYL	1,002.60	1.16	95.92
CLETHODIM	494.70	0.95	96.87
OXYFLUORFEN	969.16	0.80	97.67
EPTC	2,226.18	0.68	98.35
SETHOXYDIM	431.64	0.66	99.01
GLYPHOSATE	1,443.70	0.66	99.67
FLUOMETURON	222.24	0.17	99.84
METAM-SODIUM	11,263.56	0.16	100.00
TOTAL	207,282.42	100	

* Products not included on the State's "Groundwater Protection List" may be under reported

Table 6-C. Arizona Cotton Herbicides Usage - 1995
From Arizona Department of Agriculture 1080 Forms*

Product	Mean Applications Per Acre	Mean AI Lbs/Acre
PROMETRYN	0.24	0.15
PENDIMETHALIN	0.17	0.10
TRIFLURALIN	0.17	0.08
CYANAZINE	0.06	0.06
DIURON	0.03	0.03
MSMA	0.03	0.03
METOLACHLOR	0.02	0.00
NORFLURAZON	0.02	0.01
FLUAZIFOP-P-BUTYL	0.01	0.00
CLETHODIM	0.01	0.00
OXYFLUORFEN	0.01	0.00
EPTC	0.01	0.01
SETHOXYDIM	0.01	0.00
GLYPHOSATE	0.01	0.00
FLUOMETURON	0.00	0.00
METAM-SODIUM	0.00	0.03
TOTAL		

* Products not included on the State's "Groundwater Protection List" may be under reported

Table 7-A. Arizona Cotton Herbicide Usage in 1996
From Arizona Department of Agriculture 1080 Forms

Product	Class	Reports	Acres
PROMETRYN	H	652	71,150.1
PENDIMETHALIN	H	467	54,421.2
TRIFLURALIN	H	471	43,809.5
CYANAZINE	H	208	19,698.0
CLETHODIM	H	110	10,089.6
DIURON	H	84	6,235.2
MSMA	H	78	6,215.0
PYRITHIOBAC-SODIUM	H	84	5,308.7
FLUAZIFOP-P-BUTYL	H	45	3,079.3
NORFLURAZON	H	40	2,959.0
SETHOXYDIM	H	39	2,319.7
GLYPHOSATE	H	61	2,229.0
EPTC	H	14	1,320.1
OXYFLUORFEN	H	18	1,265.2
FLUOMETURON	H	17	1,097.3
PRONAMIDE	H	6	1,045.0
BROMOXYNIL	H	5	376.0
MCPA	H	3	367.0
BENEFIN	H	3	363.0
DIPHENAMID	H	1	140.0
DIETHATYL-ETHYL	H	2	108.0
BENSULIDE	H	1	95.0
ORYZALIN	H	1	47.3
TOTAL		2,410.00	233,738.22

* Products not included on the State's "Groundwater Protection List" may be under reported

Table 7-B. Arizona Cotton Herbicide Usage in 1996
From Arizona Department of Agriculture 1080 Forms

Product	Active Ing.	Acres %	Accum.
PROMETRYN	56,072.8	30.4	30.4
PENDIMETHALIN	34,442.1	23.3	53.7
TRIFLURALIN	24,791.0	18.7	72.5
CYANAZINE	16,898.8	8.4	80.9
CLETHODIM	6,136.7	4.3	85.2
DIURON	5,998.1	2.7	87.9
MSMA	8,025.5	2.7	90.5
PYRITHIOBAC-SODIUM	286.9	2.3	92.8
FLUAZIFOP-P-BUTYL	608.9	1.3	94.1
NORFLURAZON	1,377.7	1.3	95.4
SETHOXYDIM	408.1	1.0	96.4
GLYPHOSATE	2,215.9	1.0	97.3
EPTC	2,366.6	0.6	97.9
OXYFLUORFEN	477.3	0.5	98.4
FLUOMETURON	459.0	0.5	98.9
PRONAMIDE	8.8	0.4	99.4
BROMOXYNIL	127.3	0.2	99.5
MCPA	227.2	0.2	99.7
BENEFIN	84.1	0.2	99.8
DIPHENAMID	5.0	0.1	99.9
DIETHATYL-ETHYL	33.2	0.0	99.9
BENSULIDE	96.2	0.0	100.0
ORYZALIN	4.8	0.0	100.0
TOTAL	161,152.04		

* Products not included on the State's "Groundwater Protection List" may be under reported

Table 7-C. Arizona Cotton Herbicide Usage in 1996
From Arizona Department of Agriculture 1080 Forms

Product	Mean AP Per Acre	Mean AI Lbs/Acre
PROMETRYN	0.20	0.16
PENDIMETHALIN	0.15	0.10
TRIFLURALIN	0.12	0.07
CYANAZINE	0.06	0.05
CLETHODIM	0.03	0.02
DIURON	0.02	0.02
MSMA	0.02	0.02
PYRITHIOBAC-SODIUM	0.01	0.00
FLUAZIFOP-P-BUTYL	0.01	0.00
NORFLURAZON	0.01	0.00
SETHOXYDIM	0.01	0.00
GLYPHOSATE	0.01	0.01
EPTC	0.00	0.01
OXYFLUORFEN	0.00	0.00
FLUOMETURON	0.00	0.00
PRONAMIDE	0.00	0.00
BROMOXYNIL	0.00	0.00
MCPA	0.00	0.00
BENEFIN	0.00	0.00
DIPHENAMID	0.00	0.00
DIETHATYL-ETHYL	0.00	0.00
BENSULIDE	0.00	0.00
ORYZALIN	0.00	0.00

* Products not included on the State's "Groundwater Protection List" may be under reported

Table 8-A. Arizona Insecticide Usage on Cotton in 1996.
From Arizona Department of Agriculture 1080 Forms
Source: ADA 1080 Forms

Product	Class	Reports	Acres
CHLORPYRIFOS	I	4,769	532,243.5
ACEPHATE	I	3,816	450,165.2
PHEROMONE	I	3,627	386,733.5
ENDOSULFAN	I	2,884	298,930.9
LAMBDA-CYHALOTHRIN	I	2,106	239,120.5
METHYL PARATHION	I	2,088	218,400.0
PERMETHRIN	I	1,931	214,985.7
PYRIPROXYFEN-KNACK	I	1,355	149,078.6
METHIDATHION	I	1,218	143,239.0
OXAMYL	I	1,051	133,340.2
AMITRAZ	I	1,162	108,010.6
PROFENOFOS	I	622	59,774.6
BURPROFEZIN-APPLAUD	I	598	57,986.2
IMIDACLOPRID	I	663	57,981.2
FENPROPATHRIN	I	574	45,044.3
ACETATE	I	455	40,622.1
CYPERMETHRIN	I	447	39,544.6
DIMETHOATE	I	288	36,957.6
METHOMYL	I	265	35,187.4
TRALOMETHRIN	I	199	30,437.1
BIFENTHRIN	I	426	28,417.4
ALDICARB	I	135	19,295.9
ESFENVALERATE	I	132	12,890.7
MALATHION	I	83	12,455.1
CYFLUTHRIN	I	178	11,514.4
OXYDEMETON-METHYL	I	76	5,903.0
PHORATE	I	55	5,287.8
AZINPHOS-METHYL	I	35	4,553.9
METHAMIDOSPHOS	I	62	4,503.7
THIODICARB	I	35	4,113.9
PCNB	I	22	4,079.9
GARLIC	I	24	1,855.8
TRIMETHYL DODECATRIENE	I	23	1,747.7
DISULFOTON	I	21	1,535.0
CARBOFURAN	I	6	1,171.5
NEEM OIL EXTRACT	I	11	1,082.4
DICOFOL	I	15	1,031.9
PIPERONYL BUTOXIDE	I	14	940.5
BT	I	11	760.0
PROPARGITE	I	15	737.9
ABAMECTIN	I	7	394.3
NALED	I	5	329.1
CARBARYL	I	5	207.0
ETHYL PARATHION	I	5	202.4
DIAZINON	I	4	163.0
BENDIOCARB	I	5	66.0
PYRETHRUM	I	3	62.6
SULPROFOS	I	3	42.0
		31,534	3,403,127.63

* Products not included on the State's "Groundwater Protection List" may be under reported

Table 8-B. Arizona Insecticide Usage on Cotton in 1996.
From Arizona Department of Agriculture 1080 Forms
Source: ADA 1080 Forms

Product	Active Ing.	Acres %	Accum.
CHLORPYRIFOS	318,558.5	15.6	15.6
ACEPHATE	286,025.2	13.2	28.9
PHEROMONE	350,528.7	11.4	40.2
ENDOSULFAN	191,998.7	8.8	49.0
LAMBDA-CYHALOTHRIN	7,136.5	7.0	56.0
METHYL PARATHION	183,847.1	6.4	62.5
PERMETHRIN	2,320.1	6.3	68.8
PYRIPROXYFEN-KNACK	8,270.7	4.4	73.2
METHIDATHION	58,185.9	4.2	77.4
OXAMYL	70,616.0	3.9	81.3
AMITRAZ	22,826.9	3.2	84.5
PROFENOFOS	42,146.6	1.8	86.2
BURPROFEZIN-APPLAUD	19,897.7	1.7	87.9
IMIDACLOPRID	2,754.1	1.7	89.6
FENPROPATHRIN	7,464.1	1.3	90.9
ACETATE	3,264.6	1.2	92.1
CYPERMETHRIN	741.9	1.2	93.3
DIMETHOATE	18,078.8	1.1	94.4
METHOMYL	9,481.2	1.0	95.4
TRALOMETHRIN	610.0	0.9	96.3
BIFENTHRIN	1,708.7	0.8	97.2
ALDICARB	22,179.9	0.6	97.7
ESFENVALERATE	483.0	0.4	98.1
MALATHION	19,306.9	0.4	98.5
CYFLUTHRIN	517.7	0.3	98.8
OXYDEMETON-METHYL	1,116.7	0.2	99.0
PHORATE	4,415.6	0.2	99.1
AZINPHOS-METHYL	2,543.4	0.1	99.3
METHAMIDOSPHOS	2,344.0	0.1	99.4
THIODICARB	1,422.6	0.1	99.5
PCNB	2,484.3	0.1	99.6
GARLIC	982.5	0.1	99.7
TRIMETHYL DODECATRIENE	4.0	0.1	99.7
DISULFOTON	517.0	0.0	99.8
CARBOFURAN	1,170.0	0.0	99.8
NEEM OIL EXTRACT	440.4	0.0	99.9
DICOFOL	819.1	0.0	99.9
PIPERONYL BUTOXIDE	236.6	0.0	99.9
BT	20.0	0.0	99.9
PROPARGITE	936.1	0.0	100.0
ABAMECTIN	2.2	0.0	100.0
NALED	229.0	0.0	100.0
CARBARYL	126.6	0.0	100.0
ETHYL PARATHION	120.0	0.0	100.0
DIAZINON	208.7	0.0	100.0
BENDIOCARB	1.0	0.0	100.0
PYRETHRUM	0.2	0.0	100.0
SULPROFOS	29.0	0.0	100.0
	1,669,118.61		

* Products not included on the State's "Groundwater Protection List" may be under reported

Table 8-C. Arizona Insecticide Usage on Cotton in 1996.
From Arizona Department of Agriculture 1080 Forms

Source: ADA 1080 Forms

Product	Mean AP Per Acre	Mean AI Lbs/Acre
CHLORPYRIFOS	1.49	0.89
ACEPHATE	1.26	0.80
PHEROMONE	1.08	0.98
ENDOSULFAN	0.84	0.54
LAMBDA-CYHALOTHRIN	0.67	0.02
METHYL PARATHION	0.61	0.51
PERMETHRIN	0.60	0.01
PYRIPROXYFEN-KNACK	0.42	0.02
METHIDATHION	0.40	0.16
OXAMYL	0.37	0.20
AMITRAZ	0.30	0.06
PROFENOFOS	0.17	0.12
BURPROFEZIN-APPLAUD	0.16	0.06
IMIDACLOPRID	0.16	0.01
FENPROPATHRIN	0.13	0.02
ACETATE	0.11	0.01
CYPERMETHRIN	0.11	0.00
DIMETHOATE	0.10	0.05
METHOMYL	0.10	0.03
TRALOMETHRIN	0.09	0.00
BIFENTHRIN	0.08	0.00
ALDICARB	0.05	0.06
ESFENVALERATE	0.04	0.00
MALATHION	0.03	0.05
CYFLUTHRIN	0.03	0.00
OXYDEMETON-METHYL	0.02	0.00
PHORATE	0.01	0.01
AZINPHOS-METHYL	0.01	0.01
METHAMIDOSPHOS	0.01	0.01
THIODICARB	0.01	0.00
PCNB	0.01	0.01
GARLIC	0.01	0.00
TRIMETHYL DODECATRIENE	0.00	0.00
DISULFOTON	0.00	0.00
CARBOFURAN	0.00	0.00
NEEM OIL EXTRACT	0.00	0.00
DICOFOL	0.00	0.00
PIPERONYL BUTOXIDE	0.00	0.00
BT	0.00	0.00
PROPARGITE	0.00	0.00
ABAMECTIN	0.00	0.00
NALED	0.00	0.00
CARBARYL	0.00	0.00
ETHYL PARATHION	0.00	0.00
DIAZINON	0.00	0.00
BENDIOCARB	0.00	0.00
PYRETHRUM	0.00	0.00
SULPROFOS	0.00	0.00

* Products not included on the State's "Groundwater Protection List" may be under reported

Table 9-A. Arizona Cotton Defoliants Usage - 1995
From Arizona Department of Agriculture 1080 Forms*

Product	Class	Reports
THIDIAZURON	D	1,989
TRIBUFOS	D	1,011
CHLORATE	D	834
SODIUM CHLORATE	D	822
ENDOTHAL	D	480
PARAQUAT	D	498
TOTAL		5,634

* Products not included on the State's "Groundwater Protection List" may e under reported

Table 9-B. Arizona Cotton Defoliants Usage - 1995
From Arizona Department of Agriculture 1080 Forms*

Product	Acres	Active Ing. lbs	Acres %
THIDIAZURON	180,219.2	12,804.33	34.8
TRIBUFOS	95,191.5	80,154.04	18.4
CHLORATE	79,672.6	345,761.65	15.4
SODIUM CHLORATE	77,843.5	351,309.74	15.1
ENDOTHAL	43,964.2	3,257.23	8.5
PARAQUAT	40,452.0	8,341.58	7.8
TOTAL	517,343.0	801,628.57	100

* Products not included on the State's "Groundwater Protection List" may be under reported

Table 9-C. Arizona Cotton Defoliants Usage - 1995
From Arizona Department of Agriculture 1080 Forms*

Product	Accum. %	Mean Applications Per Acre	Mean AI Lbs/Acre
THIDIAZURON	34.8	0.4	0.0
TRIBUFOS	53.2	0.2	0.2
CHLORATE	68.6	0.2	0.8
SODIUM CHLORATE	83.7	0.2	0.9
ENDOTHAL	92.2	0.1	0.0
PARAQUAT	100	0.1	0.0
TOTAL			

* Products not included on the State's "Groundwater Protection List" may be under reported

Table 10-A. Arizona Cotton Defoliants Usage in 1996
From Arizona Department of Agriculture 1080 Forms

Product	Class	Reports	Acres
THIDIAZURON	D	1,953	168,795.0
TRIBUFOS	D	1,099	96,402.6
CHLORATE	D	987	72,156.2
ENDOTHAL	D	683	52,999.0
SODIUM CHLORATE	D	559	52,822.8
PARAQUAT	D	457	36,616.6
CACODYLIC ACID	D	155	12,236.0
DIMETHIPIN	D	1	36.0
TOTAL		5,894	492,064.28

* Products not included on the State's "Groundwater Protection List" may be under reported

Table 10-B. Arizona Cotton Defoliants Usage in 1996
From Arizona Department of Agriculture 1080 Forms

Product	Active Ing.	Acres %	Accum.
THIDIAZURON	20,919.6	34.3	34.3
TRIBUFOS	81,789.2	19.6	53.9
CHLORATE	325,138.6	14.7	68.6
ENDOTHAL	3,345.8	10.8	79.3
SODIUM CHLORATE	257,056.7	10.7	90.1
PARAQUAT	8,209.7	7.4	97.5
CACODYLIC ACID	12,702.4	2.5	100.0
DIMETHIPIN	15.1	0.0	100.0
TOTAL	709,176.97		

* Products not included on the State's "Groundwater Protection List" may be under reported

Table 10. Arizona Cotton Defoliants Usage in 1996
From Arizona Department of Agriculture 1080 Forms

Product	Mean AP Per Acre	Mean AI Lbs/Acre
THIDIAZURON	0.47	0.06
TRIBUFOS	0.27	0.23
CHLORATE	0.20	0.91
ENDOTHAL	0.15	0.01
SODIUM CHLORATE	0.15	0.72
PARAQUAT	0.10	0.02
CACODYLIC ACID	0.03	0.04
DIMETHIPIN	0.00	0.00
TOTAL		

* Products not included on the State's "Groundwater Protection List" may be under reported