



Pesticide Use in U.S. Crop Production: 2002

Insecticides & Other Pesticides

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Introduction

This report, accompanying the National Pesticide Use Database: 2002 (NPUD2002), delineating 2002 insecticide and other pesticide use (plant growth regulators, defoliants, and fumigants) is an update of two previously issued reports. The previous reports were issued in November 2000 and November 1995, delineating 1997 and 1992 usage respectively.[1][2] The 2002 database is being issued in two stages. This installment includes use data for insecticides and other pesticides (plant growth regulators, defoliants, and fumigants). The first installment covering herbicides and fungicides was issued in February 2006.

The same basic methodology has been used in assembling the 2002 database as was used in assembling the 1997 and 1992 databases: pesticide use data from publicly available reports are organized into a national database. For states and crops not covered by available surveys and reports, a survey of extension specialists was conducted for pesticide use profiles. For states and crops for which there are no published surveys and no expert opinion estimates, values were assigned by assuming that a state's pesticide use profile is identical to that of a neighboring state.

Database Parameters

This installment of the National Pesticide Use Database: 2002 contains estimates for active ingredients of which 68 are insecticides and 22 are other pesticides. These active ingredients, their product names and manufacturers/registrants are listed in Table 1A (insecticides) and Table 1B (other pesticides).

The 2002 database includes applications to cropland only (foliar, soil and in-furrow applications). Non-cropland uses are not included. Seed treatments, greenhouse uses, ornamental uses, livestock uses, and post-harvest uses also are not included. Applications to nonbearing orchards and vineyards are not included. These exclusions are consistent with the 1992 and 1997 databases.

Eighty-seven crops are included in the 2002 database. These are the same 87 crops included in the 1992 and 1997 databases. Estimates of crop acreage by state for 2002 are drawn from the *2002 Census of Agriculture*.^[3] Not all states with acreage of the 87 crops are included in the database. Generally, the database includes those states that collectively account for at least 90% of U.S. acreage for each crop.

The database is limited to the 48 coterminous states: Alaska and Hawaii are not included.

Data Sources

The 2002 database is not specific for 2002. Rather, it is best described as "circa 2002." While the acreage data in the database represents 2002 plantings, the use surveys compiled for the database cover 1999 through 2004.

The 2002 insecticide and other pesticide database consists of 6,074 records organized by individual state, crop and active ingredient combinations. Each line of data contains a reference code that identifies the data source. These references are shown in the data source list attached to this document. The sources of information are categorized as follows:

- **Surveys by the National Agricultural Statistics Service (NASS):**

The following 12 NASS Agricultural Chemical Usage survey reports were used in assembling the 2002 database: Field Crops 1999, 2000, 2001, 2002, 2003, 2004; Vegetables 2000, 2002, 2004; and Fruit 1999, 2001, 2003.[4] For records attributed to these sources, the two parameters, area applied (% acres treated) and rate per crop year (lbs. AI/acre), were drawn directly from NASS data.

Data parameters drawn from NASS Agricultural Chemical Usage reports are combined with acreage planted data from the *Census of Agriculture* to estimate total acres treated and total pounds active ingredient applied. There is not an exact agreement between the acreage estimates from the *2002 Census* and those used in the NASS Agricultural Chemical Usage reports. As a result, there is not an exact agreement between NASS's published estimates of pounds of active ingredient used and the 2002 database, even though both sets of estimates rely on the same usage coefficients.

- **USDA Crop Profiles/Strategic Management Plans:**

For the past several years, USDA has funded the development by university crop specialists of documents known as Crop Profiles and Strategic Management Plans. These documents include descriptions of pest problems and control alternatives for specific crops and states.[5] Many of the profiles and strategic plans include pesticide use data that are based either on growers' surveys or expert opinions. Usage estimates were drawn from 102 crop profiles and strategic plans.

- **State of California Department of Pesticide Regulation**

The State of California requires full reporting of pesticides used in agriculture. The California Department of Pesticide Regulation compiles individual use records, summarizing pesticide use across the state by active ingredient by crop.[6] CalDPR's published reports include estimates of pounds applied and acres treated.

CalDPR's published acres treated estimates represent cumulative acre treatments. Acres receiving multiple treatments of an active ingredient are included in CalDPR's acres treated data multiple times. This measurement can result in an acres treated figure number greater than the total acres planted. CalDPR has prepared an unpublished summary of their data that counts acres receiving one or more treatment of an active ingredient, counting each treated acre only once. An electronic version of this unpublished data was obtained and incorporated in the 2002 database.[7] The CalDPR data were integrated into NPUD2002 by replacing CalDPR's crop and active ingredient names with standard designations. Percent acres treated for NPUD2002 were calculated by dividing CalDPR estimates of acres treated by *Census of Agriculture* California crop acreage figures. Generally, there is close agreement between DPR's estimates of total pounds active ingredient applied by crop and NPUD2002 estimates. In some cases, the 2002 database relies on pesticide use coefficients for California crops from NASS surveys.

- **Survey of Extension Service Specialists**

Survey forms asking for profiles of active ingredient usage by crop for 2002 were sent to state extension service specialists to collect data for crops and states not represented in the sources listed above. The survey forms included the 1997 estimates for comparison. Forms were targeted at specialists who had previously provided estimates for the 1992 and 1997 databases. 319 extension service specialists responded to the survey. Respondents are listed individually in the reference list.

- **Other Sources**

Several commodity organizations provided estimates of active ingredient use by crop and state: Mint Industry Research Council, Cranberry Institute, U.S. Hop Plant Protection Committee, Oregon Hop Commission, and the New England Vegetable and Berry Growers Association. Two states other than California with pesticide use reporting requirements provided estimates for which statewide aggregations had been tabulated: Arizona and Nevada. Individual survey reports prepared at the state-level were available for certain crops in several states: Nebraska, Washington, North Dakota, Georgia and Virginia.

- **Assignments**

In cases where usage profiles for a crop in a state were not available from the above sources, usage estimates were assigned by assuming that a state's pesticide use profile for an active ingredient/crop combination is similar to that of a nearby state. Use coefficients (% acres treated and average annual rate) from known states were applied to the corresponding crop acreage based upon *Census of Agriculture* acreage planted figures in the unknown states. These records have all been assigned a reference code of "999."

Final Record Selection and Review Procedure

All usage data available for 1999 through 2004 from the above listed sources were included in a database for analysis. For approximately two-thirds of the records in NPUD2002 (individual state/crop/active ingredient combinations), only one observation was available for use from the 1999-2004 period. In these cases that observation was assigned as the record for 2002. The remaining one-third of the use sites had multiple observations in the 1999-2004 input data. Many crops were included in multiple NASS surveys, resulting in several possible use coefficients for crops such as corn. When multiple estimates of use were available for the same crop/state/active ingredient combination, the NPUD2002 record was selected from all available possibilities. Selection was based upon a hierarchy that chose 2002 data first, followed by 2001, 2003, 2004, 2000, and finally 1999.

Preliminary data from the 2002 database were sent to active ingredient manufacturers and registrants for review. If discrepancies existed between the use data presented in NPUD2002 and usage estimates made by company reviews, efforts were made to resolve them. In some cases, the preliminary 2002 estimates were revised by the substitution of data sources. For example, a preliminary estimate based upon a 2002 NASS survey may be revised and based on the corresponding 2003 NASS survey. In other cases, usage estimates from Crop Profiles or

extension specialists were substituted in records previously based upon NASS data. If data substitution could not resolve the discrepancy, follow-up surveys were conducted with extension specialists to generate new possible estimates. Often, these procedures were successful, permitting revision of preliminary 2002 data and alignment with review estimates. However, these procedures were not successful in resolving all discrepancies and some preliminary estimates were not revised.

Record Description

Each record in the 2002 database has standardized fields for 1992, 1997 and 2002. The standard fields are:

- **Pesticide:** Active Ingredient
- **Type:** Pesticide Type, either *Insecticides* or *Other Pesticides*
- **Crop:** Crop Name
- **State:** State Names
- **Acres Planted:** *Census of Agriculture* Acres Planted
- **% Acres Treated:** % of crop acres in a state treated with the active ingredient.
- **Rate:** The average annual amount of the active ingredient applied to a treated acre of the crop in the state. (Lbs. AI/Acre/Year)
- **Acres Treated:** The acreage receiving an application of the active ingredient.
 - $Acres\ Planted \times \% \text{ Acres treated} \times 0.01$
- **Lbs AI Applied:** Total pounds of the active ingredient applied to the crop in the state.
 - $Acres\ Treated \times Rate$
- **Ref:** Reference code that identifies the source of the estimate.

Results/Summaries

Tables 2A and 2B list estimates of national pesticide usage in terms of pounds of individual active ingredients according to pesticide type. These national estimates are sums of the individual state and crop records and present data for 1992, 1997 and 2002. Tables 3A and 3B show national use estimates by crop for insecticides and other pesticides, respectively. Tables 3A&B are sums of individual crop and active ingredient records. Tables 4A and 4B summarize insecticide and other pesticide use at the state level, summing across crops and active ingredients. Tables 5 through 7 list the ten highest aggregate pesticide use amounts by active ingredient (Table 5), crop (Table 6), and state (Table 7).

Figures 1 and 2 are national maps delineating insecticide and other pesticide use by state.

Comparison with U.S. EPA Estimates

Table 8 compares the estimates contained in NPUD2002 with EPA's estimates of the national use in 2001 for 7 active ingredients used in agriculture. 2001 is the latest year for which EPA has released estimates for these high volume active ingredients. NPUD2002 use estimates are within the range of EPA's 2001 estimates for 3 active ingredients. NPUD2002 estimates are lower than EPA's 2001 range for 2 active ingredients and higher than EPA's usage range for 2 active ingredients.

Table 9 compares aggregate insecticide and other pesticide use estimates from NPUD2002 and EPA's aggregate estimates for 2001. NPUD2002's aggregate insecticide use estimate is within

32 % of EPA's estimate for 2001 while the aggregate other pesticide use estimate from NPUD2002 is within 6% of EPA's 2001 estimate.

In the aggregate, insecticide use declined by 40 million pounds between 1997 and 2002, while other pesticide use declined by 25 million pounds. (Tables 2A and 2B) These fluctuations in use are consistent with EPA's trend data for the same period of time for both insecticides and other pesticides. (Table 10)

Caveats/Disclaimers

The National Pesticide Use Database: 2002 is a compilation of records from a wide variety of sources. There is no way to determine the accuracy of any of the estimates in the database. No claims of statistical accuracy or significance are made regarding NPUD2002.

References

- 1) National Pesticide Use Database: 1992, National Center for Food and Agricultural Policy, 1995, available at http://www.croplifefoundation.org/cpri_pestuse.htm.
- 2) National Pesticide Use Database: 1997, National Center for Food and Agricultural Policy, 2000, available at http://www.croplifefoundation.org/cpri_pestuse.htm.
- 3) 2002 Census of Agriculture, United States Department of Agriculture, National Agricultural Statistics Service, 2005, available at http://www.nass.usda.gov/Census_of_Agriculture/index.asp.
- 4) Agricultural Chemical Usage, United States Department of Agriculture, National Agricultural Statistics Service, available at <http://usda.mannlib.cornell.edu/reports/nassr/other/pcu-bb/>.
- 5) Crop Profiles & Pest Management Strategic Plans, United States Department of Agriculture, Regional IPM Centers, available at <http://www.ipmcenters.org/>.
- 6) Pesticide Use Reporting, California Department of Pesticide Regulation, available at <http://www.cdpr.ca.gov/docs/pur/purmain.htm>.
- 7) Wilhoit, Larry, *Special Data Analysis, Pesticide Use Reporting*, California Department of Pesticide Regulation.
- 8) Pesticide Industry Sales and Usage: 2000 and 2001 Market Estimates, United States Environmental Protection Agency, Biological and Economic Analysis Division, 2004, <http://www.epa.gov/oppbead1/pestsales/>.

Table 1A: Insecticide Active Ingredients

Active Ingredient	Registrants/Manufacturers	Trade Names
Abamectin	Syngenta	Agri-Mek, Zephyr
Acephate	Valent, MicroFlo, Cheminova	Orthene
Acetamiprid	Cerexagri, DuPont	Assail, Intruder
Aldicarb	Bayer	Temik
Azadirachtin	Certis, Amvac, Gowan	Neemix, Amazin, Aza-Direct
Azinphos-Methyl	Bayer, MicroFlo, Makhteshim	Guthion
Bifenazate	Chemtura	Acramite
Bifenthrin	FMC, Makhteshim	Capture, Brigade, Fanfare
Bt	Valent, Certis	Biobit, Dipel, Javelin
Buprofezin	Nichino	Applaud, Courier
Carbaryl	Bayer, UAP, Helena	Sevin
Carbofuran	FMC	Furadan
Chlorethoxyfos	Amvac	Fortress
Chlorpyrifos	Dow, Gowan, Cheminova	Lorsban, Nufos
Clofentezine	Makhteshim	Apollo
Cryolite	Cerexagri	Kryocide, ProKil
Cyfluthrin	Bayer	Baythroid
Cypermethrin	UAP, Helena, TenKuz	Ammo
Cyromazine	Syngenta	Trigard
Deltamethrin	Bayer	Decis
Diazinon	Makhteshim	
Dicofol	Dow	Kelthane
Dicrotophos	Amvac	Bidrin
Diflubenzuron	Chemtura	Dimilin
Dimethoate	Cheminova	
Disulfoton	Bayer	Di-Syston
Emamectin	Syngenta	Proclaim, Denim
Endosulfan	Makhteshim	Thionex
Esfenvalerate	DuPont	Asana
Ethoprop	Bayer	Mocap
Fenamiphos	Bayer	Nemacur
Fenbutatin Oxide	DuPont	Vendex
Fenpropathrin	Valent	Danitol
Fenpyroximate	Nichino	Fujimite
Fipronil	BASF	Regent
Formetanate HCl	Gowan	Carzol
Hexythiazox	Gowan	Savey
Imidacloprid	Bayer	Admire, Provado
Indoxacarb	DuPont	Avaunt, Steward
Kaolin	Engelhard	Surround
Lambdacyhalothrin	Syngenta, Makhteshim	Warrior, Karate, Silencer
Malathion	Cheminova	
Metaldehyde	Amvac	Deadline, Durham

Methamidophos	Bayer, Valent	Monitor
Methidathion	Gowan	Supracide
Methomyl	DuPont	Lannate
Methoxyfenozide	Dow	Intrepid
Methyl Parathion	Cerexagri	Pennacp-M
Naled	Amvac, Helena	Dibrom
Oil	Helena	Stylet, Sunspray, Volck
Oxamyl	DuPont	Vydate
Oxydemeton-Methyl	Gowan	MSR
Permethrin	FMC, Amvac	Ambush, Pounce
Phorate	Amvac	Thimet
Phosmet	Gowan	Imidan
Profenofos	Syngenta	Curacron
Propargite	Chemtura	Comite, Omite
Pymetrozine	Syngenta	Fulfill
Pyridaben	BASF	Nexter, Pyramite
Pyriproxyfen	Valent	Knack, Esteem
Spinosad	Dow	Tracer, SpinTor, Success
Tebufenozide	Dow	Confirm
Tebupirimphos	Bayer	Aztec (with Cyfluthrin)
Tefluthrin	Syngenta, Amvac	Force
Terbufos	BASF	Counter
Thiamethoxam	Syngenta	Actara, Platinum, Cruiser
Thiodicarb	Bayer	Larvin
Z-Cypermethrin	FMC	Mustang, Fury

Table 1B: Other Pesticide Active Ingredients

Active Ingredient	Registrants/Manufacturers	Trade Names
1,3-D	Dow	Telone
Benzyladenine	Valent	Accel, Promalin, BAP
Butenoic Acid	Valent	Retain, AVG
Butralin	Chemtura	
Chloropicrin	Chemtura	
Cyclanilide	Bayer	Finish
Cytokinins	Westbridge, Valent	Triggrr, Promalin
Dimethipin	Chemtura	Harvarde
Ethephon	Bayer, MicroFlo	Cerone, Ethrel, Prep
Flumetralin	Syngenta, Chemtura	Prime, Flupro
Gibberellic Acid	Valent	ProGibb, Release, RyzUp
Maleic Hydrazide	Chemtura	Royal MH
Mepiquat Chloride	BASF	Pix, Pentia
Metam Sodium	Amvac, Cerexagri	Vapam
Methyl Bromide	Chemtura	
NAA	Amvac	Fruitone, FruitFix
NAD	Amvac	Amid-Thin
Prohexadione	BASF	Apogee
Sodium Chlorate	Nichino, Drexel	Defol, ET
Sulfuric Acid	J.R. Simplot	
Thidiazuron	Bayer, MicroFlo	Dropp
Tribufos	Amvac, Bayer	Folex, Def

Table 2A: National Pesticide Use by Active Ingredient *Insecticides*

Active Ingredient	Lbs. AI Applied		
	1992	1997	2002
Abamectin	8,642	14,932	12,793
Acephate	3,389,865	2,462,354	2,524,510
Acetamiprid			39,249
Aldicarb	4,022,468	4,277,552	3,419,213
Amitraz	79,473	137,097	
Azadirachtin		556	1,577
Azinphos-Methyl	2,548,867	2,091,014	1,224,100
Bifenazate			52,922
Bifenthrin	116,716	110,246	150,720
Bt ¹			
Buprofezin		20,598	28,830
Carbaryl	4,542,878	4,857,542	2,985,514
Carbofuran	5,101,406	3,398,067	1,015,382
Chlorethoxyfos		252,792	118,775
Chlorpyrifos	14,764,535	13,463,879	8,481,225
Clofentezine	1,537	21,467	13,070
Cryolite	4,053,299	2,560,365	1,102,201
Cyfluthrin	124,360	177,782	148,741
Cypermethrin	228,082	187,991	72,187
Cyromazine	16,997	14,297	6,004
Deltamethrin		27,045	9,584
Diazinon	1,265,739	918,087	858,476
Dicofol	1,391,691	786,805	395,285
Dicrotophos	666,136	359,726	979,586
Diiflubenzuron	16,470	57,112	55,898
Dimethoate	2,619,437	1,896,947	1,346,215
Disulfoton	1,806,527	1,196,066	359,103
Emamectin			1,961
Endosulfan	1,796,726	1,601,195	867,954
Esfenvalerate	331,522	228,885	181,038
Ethion	990,706	504,535	
Ethoprop	1,449,743	1,010,807	433,980
Ethyl Parathion	2,318,251	529,379	
Fenamiphos	614,937	726,675	219,295
Fenbutatin Oxide	414,195	265,275	112,886
Fenpropathrin	63,368	31,839	75,219
Fenpyroximate			826
Fenvalerate	66,281		
Fipronil			419,164
Fonofos	3,233,797	417,372	
Formetanate Hcl	290,467	134,527	64,732
Hexythiazox		12,802	11,059
Imidacloprid		272,207	381,597
Indoxacarb			78,695
Kaolin			1,689,723

Lambdacyhalothrin	205,329	321,284	258,297
Lindane	61,188	39,366	
Malathion	3,377,678	5,809,943	5,132,122
Metaldehyde	47,587	53,977	35,200
Methamidophos	1,088,479	965,584	338,193
Methidathion	372,953	314,091	80,071
Methomyl	2,754,907	1,997,489	917,773
Methoxychlor	88,906	77,957	
Methoxyfenozone			55,712
Methyl Parathion	5,961,740	5,917,481	2,147,836
Mevinphos	283,887		
Naled	230,244	605,456	178,932
Oil	51,101,675	102,336,882	91,606,018
Oxamyl	945,861	938,838	747,737
Oxydemeton-Methyl	241,288	154,227	122,713
Oxythioquinox	149,657	35,231	
Permethrin	1,068,598	1,066,056	586,274
Phorate	4,452,622	3,218,465	1,196,854
Phosmet	941,175	1,333,468	1,495,040
Profenofos	2,062,744	879,776	154,160
Propargite	3,628,217	2,538,969	1,407,370
Pymetrozine			12,187
Pyridaben		17,719	72,516
Pyriproxyfen		13,284	15,452
Spinosad		117,315	207,041
Sulprofos	852,352	308,039	
Tebufenozide		104,413	232,125
Tebupirimphos		272,177	537,622
Tefluthrin	238,429	576,865	630,355
Terbufos	8,690,363	6,515,603	3,362,885
Thiamethoxam			79,040
Thiodicarb	1,705,528	821,267	224,651
Tralomethrin	60,105	23,767	
Trichlorfon	13,974		
Trimethacarb	156,800		
Z-Cypermethrin			136,370
Total	149,117,404	182,400,808	141,909,835

1) Bt not estimated in terms of pounds of active ingredient; estimates in NPUD2002 are of acres treated only.

Table 2B: National Pesticide Use by Active Ingredient <i>Other Pesticides</i>			
Active Ingredient	Lbs. AI Applied		
	<i>1992</i>	<i>1997</i>	<i>2002</i>
1,3-D	40,083,611	34,717,237	29,660,778
Benzyladenine		518	2,031
Butenoic Acid		1,475	2,785
Butralin			48,953
Cacodylic Acid	135,915	47,571	
Chloropicrin	11,086,567	13,882,188	15,002,877
Cyclanilide		177,086	191,193
Cytokinins	2,970	2,518	334
Dimethipin	212,365	282,458	132,304
Ethephon	2,701,284	5,407,986	5,540,405
Flumetralin		352,742	147,075
Gibberellic Acid	30,636	35,964	26,531
Maleic Hydrazide	2,073,238	2,143,154	1,246,245
Mepiquat Chloride	123,081	182,576	409,073
Metam Sodium	29,095,179	60,023,092	54,997,698
Methyl Bromide	44,196,554	32,803,943	20,577,159
NAA	13,146	10,486	8,433
NAD	3,527	2,187	1,658
Prohexadione			13,370
Sodium Chlorate	8,293,087	7,261,557	4,866,122
Sulfuric Acid	17,240,871	47,994,188	49,840,327
Thidiazuron	325,241	326,239	370,422
Tribufos	3,963,864	4,918,265	2,425,830
Total	159,581,136	210,573,430	185,511,603

Table 3A: National Pesticide Use by Crop *Insecticides*

Crop	Lbs. AI Applied		
	1992	1997	2002
Alfalfa	5,471,010	3,018,921	1,498,130
Almonds	8,151,421	7,154,181	6,470,972
Apples	15,897,118	14,526,951	11,374,310
Apricots	308,421	246,466	207,596
Artichokes	45,367	31,783	20,645
Asparagus	160,834	147,285	112,216
Avocados	39,990	90,917	778,754
Barley	118,824	157,768	13,131
Beets	10,400	5,409	1,599
Blackberries	10,653	8,583	13,356
Blueberries	156,591	164,971	198,246
Broccoli	283,709	338,929	200,993
Brussel Sprouts	26,303	26,239	15,226
Cabbage	267,943	186,117	99,427
Canola	86	12,145	64,531
Cantaloupes	170,161	131,205	91,320
Carrots	78,292	62,639	34,177
Cauliflower	286,233	132,273	54,568
Celery	137,151	174,984	81,003
Cherries	949,005	1,822,101	2,367,049
Citrus	22,713,035	70,691,752	64,258,164
Collards	42,058	3,498	12,063
Corn	26,418,415	19,175,623	9,602,338
Cotton	19,930,776	19,555,628	12,699,140
Cranberries	113,297	228,385	235,313
Cucumbers	129,773	161,082	114,194
Dates	12,441	16,699	9,428
Dry Beans	428,552	446,925	173,026
Dry Peas	37,606	86,121	22,374
Eggplant	23,691	12,774	2,398
Figs	10,685		6,606
Flax	1,400		
Garlic	1,499	3,795	2,432
Grapes	4,977,748	3,717,884	3,363,854
Green Beans	498,026	442,228	316,823
Green Onions	7,886	10,148	6,014
Green Peas	104,102	64,341	27,687
Hazelnuts	37,110	11,353	31,112
Hops	86,492	51,172	76,282
Hot Peppers	6,015	43,618	20,531
Kiwi	15,807	38,108	21,279
Lettuce	949,715	727,193	678,652
Melons	92,874	48,740	34,248
Mint	479,650	255,459	223,071

Nectarines	1,215,517	1,987,972	1,197,868
Oats	73,685	9,649	608
Okra	2,778	3,632	2,393
Olives	238,665	174,842	48,023
Onions	214,455	247,519	275,474
Other Hay	448,650	1,160,428	872,458
Parsley	1,252	977	388
Pasture	179,790		
Peaches	2,824,137	4,396,452	3,144,083
Peanuts	3,251,532	2,127,569	1,222,265
Pears	5,610,872	5,260,596	5,136,974
Pecans	1,338,806	1,385,322	979,636
Pistachios	87,539	1,137,611	895,707
Plums/Prunes	2,581,511	3,882,190	1,338,460
Pomegranates	2,233	1,860	938
Potatoes	3,913,410	3,545,475	2,194,167
Pumpkins	75,141	80,943	64,207
Radishes	26,687	16,760	1,529
Raspberries	37,094	41,235	29,562
Rice	512,219	708,794	395,515
Rye	1,741		28
Safflower	50,476	55,520	12,932
Seed Crops	104,099	126,909	18,472
Sod	14,459	17,661	10,264
Sorghum	2,598,159	933,876	500,301
Soybeans	1,143,883	692,562	1,734,425
Spinach	37,588	34,668	47,970
Squash	103,204	118,149	133,358
Strawberries	209,647	152,290	192,793
Sugarbeets	1,579,509	1,329,923	1,524,011
Sugarcane	791,248	231,804	78,386
Sunflowers	858,007	260,348	62,680
Sweet Corn	1,378,237	841,794	717,895
Sweet Peppers	264,535	225,959	111,127
Sweet Potatoes	265,055	208,232	291,227
Tobacco	3,461,445	2,204,856	826,706
Tomatoes	751,669	566,270	600,491
Walnuts	534,733	671,730	548,155
Watermelons	270,343	156,074	99,062
Wheat	2,368,696	3,161,599	945,026
Wild Rice	6,533	8,366	19,993
Total	149,117,404	182,400,808	141,909,835

Table 3B: National Pesticide Use by Crop *Other Pesticides*

Crop	Lbs. AI Applied		
	1992	1997	2002
Almonds	2,086,500	1,156,075	491,658
Apples	142,144	58,281	72,509
Apricots	44,285		
Artichokes	14,467	39,352	32,327
Asparagus	1,577		
Barley	657	1,088	9,051
Beets	8,536	22,280	26,681
Blackberries		5,856	6,666
Blueberries	2,622	2,294	7,659
Broccoli	95,478	296,905	458,957
Brussel Sprouts	166,075	172,132	64,029
Cabbage	8,522		21,964
Cantaloupes	118,873	982,207	1,758,415
Carrots	5,123,576	10,017,798	6,725,312
Cauliflower	83,135		34,988
Celery	107,974		123,306
Cherries	141,712	80,782	143,799
Citrus	3,473	408,161	78,100
Collards	12,460	15,903	11,943
Cotton	20,043,975	22,660,249	13,855,618
Cucumbers	725,558	968,250	2,209,119
Dry Beans	482,727	94,956	
Eggplant	280,662	374,607	466,963
Garlic	35,837		44,568
Grapes	2,634,448	3,335,729	485,662
Green Beans	22,447	8,496	18,819
Green Onions	43,878	22,310	17,774
Green Peas			5,859
Hops	20	33	18
Hot Peppers	28,287	1,020,683	530,693
Lettuce	736,280	350,461	559,764
Melons	138,460	245,638	253,083
Mint			24,295
Nectarines	411,118	129,366	112,478
Olives	381	588	480
Onions	609,101	5,319,341	4,401,956
Parsley	66,249	71,926	67,435
Peaches	927,129	444,549	323,818
Peanuts	7,471,854	7,765,275	6,219,705
Pears	2,637	2,893	1,939
Pistachios			141,747
Plums/Prunes	540,148	400,283	121,695
Potatoes	48,663,580	93,743,100	94,203,754
Pumpkins	68	38	13,845

Radishes	3,891		5,748
Raspberries	4,297	12,798	296,009
Rice	19,192		104,837
Rye			11,239
Safflower		6,004	12,226
Sod			131,228
Sorghum	507	73,957	3,894
Soybeans		472,172	1,277,710
Spinach	9,924	69,474	211,684
Squash	12,061	533	604,533
Strawberries	7,880,684	10,619,847	9,252,854
Sugarbeets	5,534,805	726,843	3,127,076
Sunflowers	21,291	25,736	23,454
Sweet Corn	32,311		53,975
Sweet Peppers	4,662,232	5,884,238	5,518,559
Sweet Potatoes	2,549,892	1,867,652	1,223,836
Tobacco	19,373,816	22,970,916	12,988,899
Tomatoes	19,080,998	15,084,555	14,016,680
Walnuts	484,970	616,827	305,061
Watermelons	7,883,353	1,923,990	2,193,649
Total	159,581,136	210,573,430	185,511,603

Table 4A: National Pesticide Use by State *Insecticides*

State	Lbs. AI Applied		
	1992	1997	2002
Alabama	2,294,189	1,188,031	668,493
Arizona	2,685,450	1,649,772	772,071
Arkansas	1,229,107	1,626,130	2,805,331
California	34,600,203	39,247,197	29,205,295
Colorado	1,248,150	827,092	393,738
Connecticut	136,001	65,559	37,115
Delaware	281,845	130,092	105,109
Florida	21,116,964	65,861,873	58,477,040
Georgia	5,269,936	3,578,502	2,662,733
Idaho	2,194,939	2,146,414	1,359,268
Illinois	3,771,962	2,206,865	1,408,546
Indiana	1,844,283	1,401,614	1,015,388
Iowa	4,171,572	2,302,010	784,214
Kansas	2,814,407	1,497,962	956,386
Kentucky	1,117,487	896,202	330,696
Louisiana	3,115,984	3,228,334	2,100,066
Maine	295,232	198,688	153,373
Maryland	371,023	223,899	245,922
Massachusetts	325,593	331,951	187,998
Michigan	3,875,205	1,886,418	1,312,609
Minnesota	1,661,550	1,307,177	719,688
Mississippi	6,342,942	4,456,032	2,450,259
Missouri	1,267,094	1,289,187	479,117
Montana	629,004	1,785,606	71,064
Nebraska	4,631,223	3,537,482	1,307,451
Nevada	36,451	87,763	38,996
New Hampshire	89,081	83,802	32,520
New Jersey	383,934	274,644	284,144
New Mexico	409,639	276,372	384,049
New York	2,670,835	2,124,663	1,221,583
North Carolina	4,324,248	3,034,994	1,949,655
North Dakota	970,774	909,478	593,358
Ohio	1,380,651	929,046	584,266
Oklahoma	1,995,266	1,378,820	979,156
Oregon	2,907,324	2,991,756	2,970,848
Pennsylvania	1,717,844	1,059,999	1,363,796
Rhode Island	34,093	10,889	12,293
South Carolina	1,455,215	1,443,572	941,257
South Dakota	1,891,336	1,999,625	190,993
Tennessee	1,112,929	1,167,149	1,356,120
Texas	5,975,071	7,492,459	5,638,765
Utah	310,663	306,460	162,178
Vermont	122,995	111,172	42,067
Virginia	1,630,041	1,307,598	1,109,592

Washington	9,734,348	10,714,327	11,222,396
West Virginia	426,912	198,556	94,708
Wisconsin	2,029,996	1,365,790	530,656
Wyoming	216,415	261,784	197,469
Total	149,117,404	182,400,808	141,909,835

Table 4B: National Pesticide Use by State *Other Pesticides*

State	Lbs. AI Applied		
	1992	1997	2002
Alabama	3,122,959	1,379,408	1,131,676
Arizona	1,939,056	2,209,816	744,663
Arkansas	1,311,768	1,910,989	2,882,077
California	32,293,699	36,731,405	30,985,311
Colorado	6,884,516	11,313,318	18,175,209
Connecticut	17,645	3,704	8
Delaware	6,425	11,488	2,932
Florida	18,757,023	19,058,019	15,051,998
Georgia	10,527,862	7,076,759	5,817,552
Idaho	15,495,215	47,038,477	33,793,512
Illinois	47,437	14,169	17,866
Indiana	59,308	167,711	102,430
Iowa	32		
Kansas			6
Kentucky	1,924,737	1,197,748	579,956
Louisiana	1,403,625	745,699	547,836
Maine	54,401	1,687,466	838,340
Maryland	121,789	208,303	52,973
Massachusetts	15,096	6,896	3,471
Michigan	426,240	2,471,296	488,931
Minnesota	1,699,045	2,183,640	394,006
Mississippi	1,924,654	2,335,228	2,174,083
Missouri	475,320	693,843	1,054,309
Montana	324,800	114,917	268,930
Nebraska	2,585,027	120,506	139,935
Nevada	92		9,743
New Hampshire	8,530	3,747	
New Jersey	34,151	54,860	87,743
New Mexico	216,395	1,232,254	575,029
New York	173,309	753,177	59,530
North Carolina	19,216,819	23,866,094	12,861,335
North Dakota	297,582	1,447,661	5,816
Ohio	62,815	236,472	18,419
Oklahoma	416,728	48,767	4,133
Oregon	4,229,535	11,973,558	10,963,031
Pennsylvania	179,033	791,654	50,493
Rhode Island	4,636	357	77
South Carolina	3,935,712	5,702,447	2,087,202
South Dakota	955	395	53
Tennessee	862,637	1,330,586	1,588,756
Texas	2,845,812	2,569,530	1,132,793
Utah	733	103,657	32,227
Vermont	6,590	143	
Virginia	1,997,377	3,935,683	7,063,432

Washington	21,047,347	14,131,095	25,340,468
West Virginia	21,406	3,176	88
Wisconsin	1,313,502	3,707,184	7,806,720
Wyoming	1,291,762	128	576,506
Total:	159,581,136	210,573,430	185,511,603

Table 5: National Ranking of Pesticide Use by Active Ingredient 2002					
<i>Lbs. AI/Year</i>					
Insecticides					
1	Oil	91,606,018	6	Carbaryl	2,985,514
2	Chlorpyrifos	8,481,225	7	Acephate	2,524,510
3	Malathion	5,132,122	8	Methyl Parathion	2,147,836
4	Aldicarb	3,419,213	9	Kaolin	1,689,723
5	Terbufos	3,362,885	10	Phosmet	1,495,040
Other Pesticides					
1	Metam Sodium	54,997,698	6	Ethephon	5,540,405
2	Sulfuric Acid	49,840,327	7	Sodium Chlorate	4,866,122
3	1,3-D	29,660,778	8	Tribufos	2,425,830
4	Methyl Bromide	20,577,159	9	Maleic Hydrazide	1,246,245
5	Chloropicrin	15,002,877	10	Mepiquat Chloride	409,073

See Tables 2A and 2B

Table 6: National Ranking of Pesticide Use by Crop 2002					
<i>Lbs. AI/Year</i>					
Insecticides					
1	Citrus	64,258,164	6	Pears	5,136,974
2	Cotton	12,699,140	7	Grapes	3,363,854
3	Apples	11,374,310	8	Peaches	3,144,083
4	Corn	9,602,338	9	Cherries	2,367,049
5	Almonds	6,470,972	10	Potatoes	2,194,167
Other Pesticides					
1	Potatoes	94,203,754	6	Carrots	6,725,312
2	Tomatoes	14,016,680	7	Peanuts	6,219,705
3	Cotton	13,855,618	8	Sweet Peppers	5,518,559
4	Tobacco	12,988,899	9	Onions	4,401,956
5	Strawberries	9,252,854	10	Sugarbeets	3,127,076

See Tables 3A and 3B

Table 7: National Ranking of Pesticide Use by State 2002					
<i>Lbs. AI /Year</i>					
Insecticides					
1	Florida	58,477,040	6	Arkansas	2,805,331
2	California	29,205,295	7	Georgia	2,662,733
3	Washington	11,222,396	8	Mississippi	2,450,259
4	Texas	5,638,765	9	Louisiana	2,100,066
5	Oregon	2,970,848	10	North Carolina	1,949,655
Other Pesticides					
1	Idaho	33,793,512	6	North Carolina	12,861,335
2	California	30,985,311	7	Oregon	10,963,031
3	Washington	25,340,468	8	Wisconsin	7,806,720
4	Colorado	18,175,209	9	Virginia	7,063,432
5	Florida	15,051,998	10	Georgia	5,817,552

See Tables 4A and 4B

Table 8: Comparison of National Pesticide Use Database 2002 with USEPA Pesticide Usage Estimates Major Active Ingredients		
<i>Million Lbs. AI/ Year</i>		
	EPA 2001¹	NPUD2002
Metam Sodium	57-62	55
Malathion	20-25	5
Methyl Bromide	20-25	21
1,3-D	20-25	30
Chlorpyrifos	8-10	8
Chloropicrin	5-9	15
Ethephon	5-8	6

- 1) Source: [8]
- 2) EPA estimates include the Boll Weevil Eradication Program which is not included in NPUD2002.

Table 9: Comparison of National Pesticide Use Database 2002 with USEPA Pesticide Usage Estimates Aggregate Use		
<i>Million Lbs. AI/Year</i>		
	EPA 2001¹	NPUD2002
Insecticides ²	73	50
Other Pesticides ^{3,4}	127	120

- 1) Source: [8]
- 2) NPUD estimates have been adjusted to exclude oil which is not included in EPA's insecticide use estimates.
- 3) EPA estimates include nematicides/fumigants only; plant growth regulators and sulfuric acid are not included.
- 4) NPUD estimates have been adjusted to include nematicides/ fumigants only.

Table 10: Comparison of National Pesticide Use Database 2002 with USEPA Pesticide Usage Estimates 1992 → 2002 Trends				
	<i>Million Lbs. AI/Year</i>			
	<i>Insecticides</i>		<i>Other Pesticides</i>	
	EPA¹	NPUD²	EPA^{1,3}	NPUD⁴
1992	78	98	150	124
1997	79	80	165	142
2002 ⁴	73	50	127	120

- 1) Source: [8]
- 2) NPUD estimates have been adjusted to exclude oil which is not included in EPA's insecticide use estimates.
- 3) EPA estimates include nematicides/fumigants only; plant growth regulators and sulfuric acid are not included.
- 4) NPUD estimates have been adjusted to include nematicides/ fumigants only.

Figure 1: Insecticide Use by State 2002

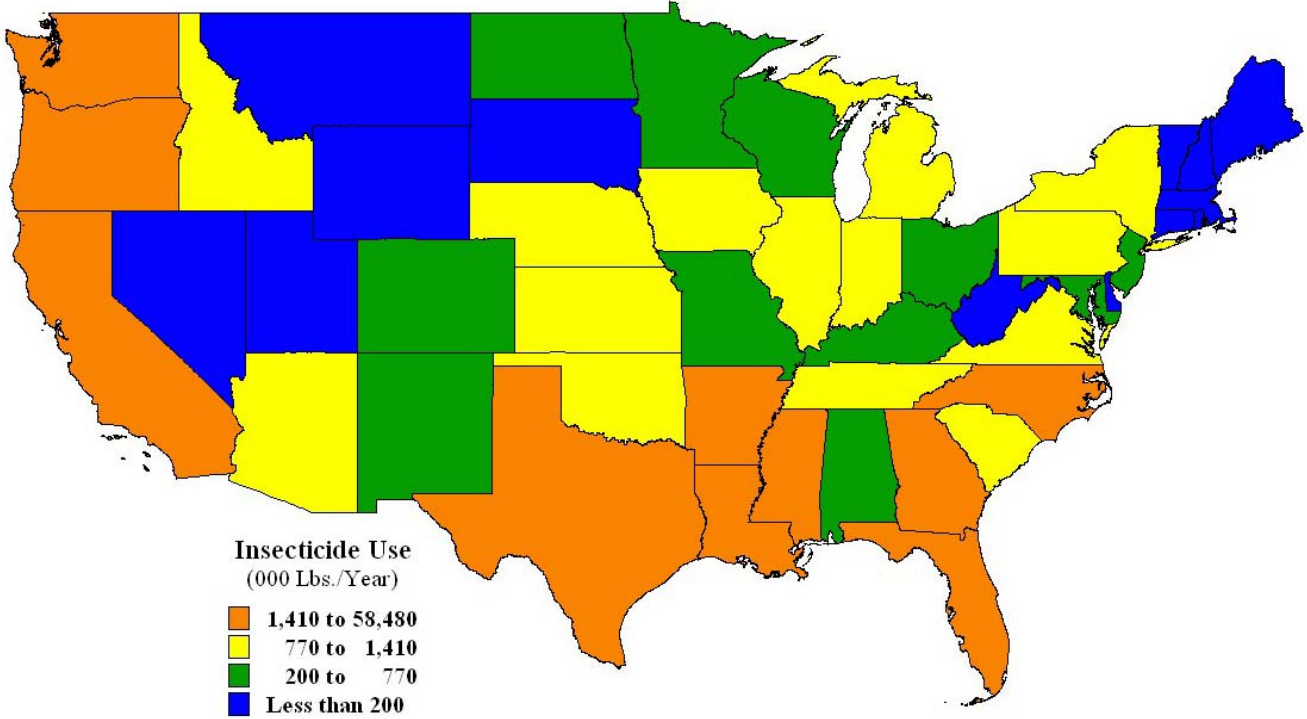
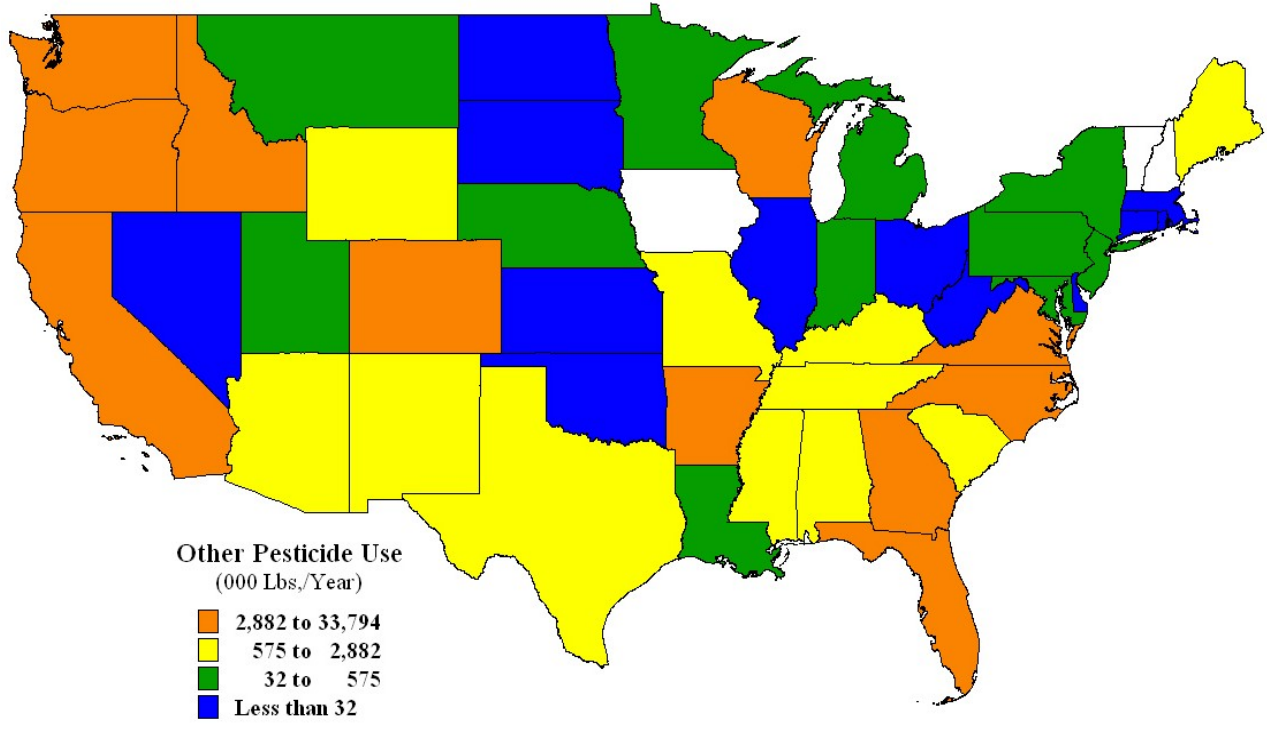


Figure 2: Other Pesticide Use by State 2002



Data Source List
National Pesticide Use Database 2002

101	Jack	Baldwin	LA	Louisiana State University
102	Brent	Bean	TX	Texas A&M University
103	Ricardo	Bessin	KY	University of Kentucky
104	Prasanta	Bhowmik	MA	University of Massachusetts
105	Chris	Boerboom	WI	University of Wisconsin
106	Richard	Bonanno	MA	University of Massachusetts
107	Steven	Bost	TN	University of Tennessee
108	Barry	Brecke	FL	University of Florida
109	Peter	Bristow	WA	Washington State University
110	Steve	Brown	GA	University of Georgia
111	John	Byrd, Jr.	MS	Mississippi State University
112	Mike	Cannon	LA	Louisiana State University
113	Jay	Chapin	SC	Clemson University
114	Jeffrey	Derr	VA	Virginia Polytechnic University
115	Jerry	Doll	WI	University of Wisconsin
116	Lonnie	Mathews	NM	New Mexico State University
119	John	Everest	AL	Auburn University
120	Kathy	Flanders	AL	Auburn University
122	Robert	Forster	ID	University of Idaho
127	Austin	Hagan	AL	Auburn University
128	Frank	Hale	TN	University of Tennessee
129	Abner	Hammond	LA	Louisiana State University
130	Pat	Harris	MS	Mississippi State University
131	Mary	Hausbeck	MI	Michigan State University
132	Robert	Hayes	TN	University of Tennessee
133	Gary	Hein	NE	University of Nebraska
134	Donald	Hershman	KY	University of Kentucky
135	Clifford	Hoelscher	TX	Texas A&M University
136	Clayton	Hollier	LA	Louisiana State University
137	Dan	Horton	GA	University of Georgia
138	Jerome	Hull	MI	Michigan State University
139	Kenneth	Jackson	OK	Oklahoma State University
140	Barry	Jacobsen	MT	Montana State University
143	Roger	Jones	MN	University of Minnesota

144	Miles	Karner	OK	Oklahoma State University
145	Ed	Kee	DE	University of Delaware
146	Anthony	Keinath	SC	Clemson University
147	Andy	Kendig	MO	University of Missouri
155	Donald	Manley	SC	Clemson University
156	John	Masiunas	IL	University of Illinois
157	Michael	Matheron	AZ	University of Arizona
158	Marcia	McMullen	ND	North Dakota State University
160	Stephen	Miller	WY	University of Wyoming
162	Eugene	Milus	AR	University of Arkansas
163	Russell	Mizell	FL	University of Florida
164	Krishna	Mohan	ID	University of Idaho
165	Michael	Moore	GA	University of Georgia
168	Robert	Mulrooney	DE	University of Delaware
169	Tim	Murphy	GA	University of Georgia
170	Timothy	Murray	WA	Washington State University
171	Sharon	Von Broembsen	OK	Oklahoma State University
172	William	Nesmith	KY	University of Kentucky
174	John	Palumbo	AZ	University of Arizona
175	Carl	Patrick	TX	Texas A&M University
176	Charles	Patrick	TN	University of Tennessee
177	Mike	Patterson	AL	Auburn University
179	David	Pike	IL	Illini Crop Pro-Tech
180	Marvin	Pritts	NY	Cornell University
182	Danny	Peek	VA	Virginia Polytechnic University
184	Karen	Renner	MI	Michigan State University
185	Mitchell	Roof	SC	Clemson University
188	Jill	Schroeder	NM	New Mexico State University
189	Paul	Semtner	VA	Virginia Polytechnic University
190	Edward	Sikora	AL	Auburn University
191	Ronald	Smith	AL	Auburn University
192	Gus	Lorenz	AR	University of Arkansas
196	Joe	Street	MS	Mississippi State University
197	Glenn	Stuebaker	AR	University of Arkansas
199	Lee	Townsend	KY	University of Kentucky
202	James	Weeks	AL	Auburn University
203	Richard	Weinzierl	IL	University of Illinois

204	Joanne	Whalen	DE	University of Delaware
205	Kenneth	Whitam	LA	Louisiana State University
206	Robert	Wilson	NE	University of Nebraska
207	Allen	Wrather	MO	University of Missouri
208	Leon	Wrage	SD	South Dakota State University
209	David	Wright	FL	University of Florida
210	David	Yarborough	ME	University of Maine
211	Bernie	Zandstra	MI	Michigan State University
212	Richard	Zollinger	ND	North Dakota State University
214	Kenneth	Sorensen	NC	North Carolina State University
215	Roger	Becker	MN	University of Minnesota
217	Michael	Orzolek	PA	Pennsylvania State University
218	Steve	Johnston	NJ	Rutgers University
220	Rick	Foster	IN	Purdue University
223	John	McVay	AL	Auburn University
224	Brad	Lewis	NM	New Mexico State University
226	Tom	Royer	OK	Oklahoma State University
227	Sherman	Thomson	UT	Utah State University
236	Mark	Van Gessel	DE	University of Delaware
241	Ervin	Oelke	MN	University of Minnesota
242	Ames	Herbert	VA	Virginia Polytechnic University
243	Don	Morishita	ID	University of Idaho
244	William	Stall	FL	University of Florida
245	Gene	Reagan	LA	Louisiana State University
246	William	Curran	PA	Pennsylvania State University
248	Charles	Swann	VA	Virginia Polytechnic University
251	William	Kirk	MI	Michigan State University
252	Laura	Sweets	MO	University of Missouri
253	Ann	George	WA	Washington Hop Commission
254	Michelle	Palacios	OR	Oregon Hop Commission
255	Robert	McReynolds	OR	Oregon State University
257	Scott	Smith	FL	University of Florida
258	David	Handley	ME	University of Maine
260	Richard	Raid	FL	University of Florida
261	Richard	Sprenkel	FL	University of Florida
263	Jack	Riesselman	MT	Montana State University
265	Mark	Mossler	FL	University of Florida

266	Oscar	Liburd	FL	University of Florida
268	Edward	Murdock	SC	Clemson University
269	Gary	Palmer	KY	University of Kentucky
270	James	Martin	KY	University of Kentucky
271	Dale	Pollet	LA	Louisiana State University
273	Ruth	Hazzard	MA	University of Massachusetts
277	John	Howell	MA	University of Massachusetts
280	John	Van Duyn	NC	North Carolina State University
281	Rick	Brandenburg	NC	North Carolina State University
282	Alan	York	NC	North Carolina State University
283	David	Monks	NC	North Carolina State University
284	Fred	Yelverton	NC	North Carolina State University
285	Case	Medlin	OK	Oklahoma State University
286	Jay	Pscheidt	OR	Oregon State University
289	James	Walgenbach	NC	North Carolina State University
294	David	Regehr	KS	Kansas State University
295	Jeff	Olsen	OR	Oregon State University
296	Julian	Sauls	TX	Texas A&M University
300	Teryl	Roper	WI	University of Wisconsin
303	Michael	Drilias	WI	University of Wisconsin
304	James	Kells	MI	Michigan State University
309	George	Hamilton	NH	University of New Hampshire
310	Don	Murray	OK	Oklahoma State University
311	Vernon	Grubinger	VT	University of Vermont
312	Scott	Hagood	VA	Virginia Polytechnic University
313	Patrick	Phipps	VA	Virginia Polytechnic University
315	Kevin	Bradley	MO	University of Missouri
316	Ed	Peachy	OR	Oregon State University
321	Robin	Bellinder	NY	Cornell University
322	Arthur	Agnello	NY	Cornell University
324	Leroy	Ellerbrock	NY	Cornell University
325	Gary	Bergstrom	NY	Cornell University
326	Keith	Yoder	VA	Virginia Polytechnic University
327	Brad	Majek	NJ	Rutgers University
328	Ronald	Ritter	MD	University of Maryland
329	Ed	Beste	MD	University of Maryland
330	Phil	Brannen	GA	University of Georgia

331	Kathryne	Everts	MD	University of Maryland
332	Arvydas	Grybauskas	MD	University of Maryland
334	Blake	Layton	MS	Mississippi State University
335	Gordon	Andrews	MS	Mississippi State University
336	Mac	Gibbs	NC	North Carolina State University
337	John	Jemison	ME	University of Maine
338	Mat	Williams	ME	University of Maine
339	Powell	Smith	SC	Clemson University
340	Jude	Boucher	CT	University of Connecticut
342	Dennis	Calvin	PA	Pennsylvania State University
345	Thomas	Lee, Jr.	TX	Texas A&M University
346	James	Grichar	TX	Texas A&M University
349	Alan	Biggs	WV	West Virginia University
350	Henry	Hogmire	WV	West Virginia University
351	Richard	Cartwright	AR	University of Arkansas
352	John	Hartman	KY	University of Kentucky
361	Alan	Macnab	PA	Pennsylvania State University
368	Melvin	Newman	TN	University of Tennessee
372	Juan	Anciso	TX	Texas A&M University
374	David	Bade	TX	Texas A&M University
377	Heather	Faubert	RI	University of Rhode Island
388	Charles	Overstreet	LA	Louisiana State University
389	Mike	Hall	LA	Louisiana State University
390	John	Pyzner	LA	Louisiana State University
391	Dean	McCraw	OK	Oklahoma State University
392	Carl	Key	NY	Long Island Cauliflower Association
399	Ben	Whitty	FL	University of Florida
401	Randy	Sanderlin	LA	Lousiana State University
402	Andy	Bennett	FL	University of Florida
403	Mark	Hutton	ME	Maine Agricultural Experiment Station
404	Jimmy	Rich	FL	University of Florida
405	Bill	Johnson	IN	Purdue University
406	Bruce	Bordelon	IN	Purdue University
407	Joseph	Priest	NC	North Carolina State University
408	Robert	Kemerait	GA	University of Georgia
409	Joseph	Noling	FL	University of Florida
410	Michael	Parker	NC	North Carolina State University

411	Woods	Houghton	NM	New Mexico State University
412	Robert	McPherson	GA	University of Georgia
413	Dan	McGrath	OR	Oregon State University
414	Thomas	Kuhar	VA	Virginia Polytechnic University
415	Donald	Groth	LA	Louisiana State University
416	Clark	Israelsen	UT	Utah State University
417	Billy	Williams	LA	Louisiana State University
418	Steve	Kelly	LA	Louisiana State University
419	Boris	Castro	LA	Louisiana State University
420	Paul	Denton	TN	University of Tennessee
421	Peter	Hirst	IN	Purdue University
422	David	Jordan	NC	North Carolina State University
423	Gary	Franc	WY	University of Wyoming
424	Christine	Waldenmaier	VA	Virginia Polytechnic University
425	M.O.	Way	TX	Texas A&M University
426	Rick	Boydston	WA	USDA
427	Chuck	Wilson	AR	University of Arkansas
428	Johnny	Saichuk	LA	Louisiana State University
429	Bruce	Beck	MO	University of Missouri
430	Alicia	Whidden	FL	University of Florida
431	Jason	Norsworthy	SC	Clemson University
505	Rocky	Lundy	WA	Mint Industry Research Council
524	Diane	Alston	UT	Utah State University
526	Craig	Grau	WI	University of Wisconsin
527	Mike	Sun	MT	Montana State University
531	Stanley	Culpepper	GA	University of Georgia
532	David	Jones	GA	University of Georgia
533	Crop Profile, North Carolina, Strawberries, (11/25/2003).			
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