



Pesticide Use in U.S. Crop Production: 2002
With Comparison to 1992 & 1997

Fungicides & Herbicides

February 2006

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Development of this report and the National Pesticide Use Database 2002 was made possible with funding from the United States Department of Agriculture, United States Environmental Protection Agency, United States Geological Survey, and the member companies of CropLife America.

Introduction

This report, accompanying the National Pesticide Use Database: 2002 (NPUD2002), delineating 2002 herbicide and fungicide use is an update of two previously issued reports. The previous reports were issued in November 2000 and 1995, delineating 1997 and 1992 usage respectively.[1][2] The 2002 database is being issued in two stages. This installment includes use data for herbicides and fungicides. The second installment, including insecticides, fumigants, and plant growth regulators, will be issued later in 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. In 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

The first installment of the National Pesticide Use Database: 2002 contains estimates for 154 active ingredients of which 45 are fungicides and 109 are herbicides. These active ingredients, their product names and manufacturers/registrants are listed in Table 1A (fungicides) and Table 1B (herbicides).

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 herbicide and fungicide database consists of 10,277 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)** [2,631 records]:
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** [657 records]:
For the past several years, USDA has funded the development of documents known as Crop Profiles and Strategic Management Plans by university crop specialists. 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** [1,054 records]
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 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** [4,830 records]
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** [538 records]
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** [567 records]
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."

Of the fungicide and herbicide use estimated in NPUD2002, 59% of the total poundage applied was drawn from NASS surveys, 19% from extension specialist surveys, 15% from CalDPR, 3% from Crop Profiles and Strategic Pest Management Plans, and 2% from other sources. 2% of the total poundage of herbicides and fungicides is based upon data assignments from neighboring states.

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 *Herbicides* or *Fungicides*
- **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 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 fungicides and herbicides, respectively. Tables 3A&B are sums of individual crop and active ingredient records. Tables 4A and 4B summarize fungicide and herbicide 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 fungicide and herbicide 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 18 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 8 active ingredients. NPUD2002 estimates are lower than EPA's 2001 range for 3 active ingredients and higher than EPA's usage range for 6 active ingredients.

Table 9 compares aggregate fungicide and herbicide use estimates from NPUD2002 and EPA's aggregate estimates for 2001. NPUD2002's aggregate fungicide use estimate is within 2 % of EPA's estimate for 2001 while the aggregate herbicide use estimate from NPUD2002 is within 8% of EPA's 2001 estimate.

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/>.

Comparison of 2002 Data with 1992 & 1997 Data

In the aggregate, fungicide use declined by 17 million pounds between 1997 and 2002, while herbicide use declined by 61 million pounds. (Tables 2A and 2B) The declines in amount of active ingredient used between 1997 and 2002 followed increases between 1992 and 1997 for both fungicides and herbicides. These fluctuations in use are consistent with EPA's trend data for the same period of time for both fungicides and herbicides. (Table 10)

The largest increase in herbicide use was accounted for by glyphosate, which rose from 17 million pounds in 1992 to 35 million pounds in 1997, then reached 102 million pounds in 2002. The rise in glyphosate's use is attributed to increased planting of glyphosate tolerant biotech crop varieties and rising adoption of no-till farming techniques that replace tillage with the use of glyphosate.

Although there was a 67 million pound increase in glyphosate use between 1997 and 2002, the aggregate amount of herbicides applied to cropland declined by 61 million pounds during that period, indicating significant reductions in the use of other herbicide active ingredients. Much of this reduction occurred in cotton and soybeans, where several herbicides were replaced by glyphosate (million lbs. reduction): bentazon (-4.4), DSMA (-0.8), fluometuron (-4.5), imazethapyr (-1.0), metribuzin (-1.5), MSMA (-1.7), paraquat (-2.9), pendimethalin (-14.0), sethoxydim (-1.1), and trifluralin (-13.0).

Metolachlor, which accounted for 67 million pounds of herbicide use in 1997, was voluntarily withdrawn from the market prior to 2002. Many corn growers substituted the newly registered S-metolachlor, which totaled 25 million pounds in 2002. S-metolachlor is used at a lower per acre rate than metolachlor, 1.3 lb versus 1.8lb, resulting in a use reduction on acres that were switched from metolachlor to S-metolachlor. Glyphosate was adopted on many soybean acres that were previously treated with metolachlor. Cyanazine was also voluntarily withdrawn from the market prior to 2002, although it accounted for 20 million pounds of the herbicide use in 1997. It was largely supplanted by glyphosate in cotton. Cyanazine's use in corn was replaced by glyphosate, mesotrione, rimsulfuron and simazine.

An overall reduction of 48 million pounds of herbicide use occurred in corn between 1997 and 2002 largely due to the replacement of older high rate herbicides (butylate, cyanazine, EPTC, metolachlor) with new lower rate herbicides (flufenacet, mesotrione, rimsulfuron, s-metolachlor).

Easing of potato late blight pressure was a primary factor in declining fungicide use between 1997 and 2002. New strains of the late blight fungus required frequent fungicide applications in 1997. By 2002 a better understanding of the fungus led to less frequent treatments and fewer pounds of active ingredient used (-3.3 million lbs.).

An overall reduction of 4 million pounds was achieved in sugarbeets between 1997 and 2002, partially due to the substitution of low-rate tetraconazole for the higher rate active

ingredients mancozeb and TPTH. Sulfur use on sugarbeets declined by 3 million pounds due to a 50% reduction in California's sugarbeet acres.

Several newly-introduced fungicides, such as azoxystrobin, were adopted on broad range of crops between 1997 and 2002. These new products reduced the use of active ingredients such as chlorothalonil.

Table 1A: Fungicide Active Ingredients

Active Ingredient	Registrants/Manufacturers	Trade Names
Azoxystrobin	Syngenta	Abound
Benomyl	DuPont	Benlate
Captan	Microflo	Captan, Captec
Chlorothalonil	Syngenta, Sipcam	Bravo, Echo
Copper	DuPont, Cerexagri, Nufarm	Kocide, Cuprofix, Champ
Cymoxanil	DuPont	Curzate, Tanos
Cyprodinil	Syngenta	Switch ¹ , Vanguard
DCNA	Gowan	Botran
Dimethomorph	BASF	Acrobat
Dodine	UAP	Syllit
Etridiazole	Chemtura	Terramaster, Terraclor Super ²
Fenarimol	Gowan	Rubigan
Fenbuconazole	Dow	Enable, Indar
Fenhexamid	Arysta	Elevate
Ferbam	Taminco	Ferbam
Fluazinam	Syngenta	Omega
Fludioxonil	Syngenta	Switch ¹
Flutolanil	Gowan, Nichino	Moncut
Fosetyl-Al	Bayer	Aliette
Iprodione	Bayer	Rovral
Kresoxim	BASF	Sovran
Mancozeb	Cerexagri, Dow, DuPont	Penncozeb, Dithane, Manzate
Maneb	Cerexagri, DuPont	Manex, Maneb
Mefenoxam	Syngenta	Ridomil Gold
Metiram	UAP	Polyram
Myclobutanil	Dow	Rally, Nova
Oxytetracycline	Nufarm	Mycoshield
PCNB	AMVAC, Chemtura	Terraclor, Blocker, Terraclor Super ²
Propamocarb	Bayer	Previcur
Propiconazole	Syngenta, Dow, Makhteshim	Orbit, Propimax, Tilt
Pyraclostrobin	BASF	Headline, Cabrio
Streptomycin	Nufarm	Agri-Mycin
Sulfur	Nufarm, Syngenta, BASF	Micro Sulf, Thiolux, Kumulus
Tebuconazole	Bayer	Elite, Folicur
Tetraconazole	Sipcam	Eminent
Thiophanate Methyl	Cerexagri	Topsin
Thiram	Taminco	Thiram
Triadimefon	Bayer	Bayleton
Trifloxystrobin	Syngenta	Flint
Triflumizole	Chemtura	Procure
Triforine	Sumitomo Corp	Funginex
Triphenyltin Hyd	Nufarm, DuPont	AgriTin, SuperTin
Vinclozolin	BASF	Ronilan
Ziram	Cerexagri	Ziram
Zoxamide	Dow	Gavel ³

¹ Combination Product w/ Cyprodinil & Fludioxonil

² Combination Product w/ Etridiazole & PCNB

³ Combination Product w/ Mancozeb & Zoxamide

Table 1B: Herbicide Active Ingredients

Active Ingredient	Registrants/Manufacturers	Trade Names
2,4-D	Dow, Nufarm	2,4-D, Weedar
2,4-DB	Albaugh, Nufarm	Butyrac
Acetochlor	Monsanto, Dow	Harness, Surpass, Top Notch
Acifluorfen	United Phosphorus	Blazer, Storm
Alachlor	Monsanto	Lasso, Micro-Tech
Ametryn	Syngenta	Evik
Asulam	Bayer	Asulox
Atrazine	Syngenta	AAtrex
Benefin	UAP	Balan
Bensulfuron	DuPont	Londax
Bensulide	Gowan	Prefar
Bentazon	MicroFlo	Basagran
Bispyribac	Valent	Regiment
Bromacil	DuPont	Hyvar
Bromoxynil	Bayer	Buctril
Carfentrazone	FMC	Shark, Aim
Chlorimuron	DuPont	Classic
Chlorsulfuron	DuPont	Glean
Clethodim	Valent	Prism, Select
Clodinafop	Syngenta	Discover
Clomazone	FMC	Command
Clopyralid	Dow	Stinger
Cloransulam	Dow	Firstrate
Cycloate	Helm	Ro-Neet
Cyhalofop	Dow	Clincher
DCPA	AMVAC	Dacthal
Desmedipham	Bayer	Betanex
Dicamba	BASF, MicroFlo	Clarity, Banvel
Dichlobenil	Chemtura	Casoron
Diclofop	Bayer	Hoelon
Diclosulam	Dow	Strongarm
Difenzoquat	BASF	Avenge
Diflufenzopyr	BASF	Distinct ⁴
Dimethenamid	BASF	Frontier
Diquat	Syngenta	Reglone
Diuron	DuPont	Direx, Karmex
DSMA	Drexel	DSMA
Endothall	Cerexagri	Accelerate, Desicate
EPTC	Drexel, Syngenta	Eptek, Eptam
Ethalfuralin	Dow	Sonalan
Ethofumesate	Bayer	Nortron
Fenoxaprop	Bayer	Puma, Whip, Ricestar
Fluazifop	Syngenta	Fusilade
Flufenacet	Bayer	Define
Flumetsulam	Dow	Python
Flumiclorac	Valent	Resource
Flumioxazin	Valent	Valor, Chateau

⁴ Combination Product w/ Dicamba & Diflufenzopyr

Fluometuron	Makhteshim	Cotoran
Fluroxypyr	Dow	Starame
Fomesafen	Syngenta	Reflex, Flexstar
Foramsulfuron	Bayer	Option
Glufosinate	Bayer	Liberty, Ignite
Glyphosate	Monsanto, Syngenta, Dow	Roundup, Touchdown, Glyphomax
Halosulfuron	Monsanto, Gowan	Permit, Sandea
Hexazinone	DuPont	Velpar
Imazamethabenz	Nufarm	Assert
Imazamox	BASF	Raptor
Imazapic	BASF	Cadre
Imazapyr	BASF	Lightning ⁵
Imazaquin	BASF	Scepter
Imazethapyr	BASF	Pursuit
Isoxaflutole	Bayer	Balance
Lactofen	Valent	Cobra
Linuron	DuPont	Lorox
MCPA	Nufarm	Chiptox, Rhonox
MCPB	Nufarm	Thistrol
Mesotrione	Syngenta	Callisto
Metribuzin	Bayer	Sencor
Metsulfuron	DuPont	Ally
Molinate	Syngenta	Ordram
MSMA	Drexel	MSMA
Napropamide	United Phosphorus	Devrinol
Naptalam	Chemtura	Alanap
Nicosulfuron	DuPont	Accent
Norflurazon	Syngenta	Solicam, Zorial
Oryzalin	United Phosphorus	Surflan
Oxyfluorfen	Dow	Goal
Paraquat	Syngenta	Gramoxone
Pebulate	Cedar	Tillam
Pendimethalin	BASF	Prowl
Phenmedipham	Bayer	Spin-Aid, Betamix ⁶
Picloram	Dow	Tordon
Primisulfuron	Syngenta	Beacon
Prometryn	Syngenta	Caparol
Pronamide	Dow	Kerb
Propanil	RiceCo, Dow	Wham, Stam
Prosulfuron	Syngenta	Peak, Exceed ⁷
Pyrazon	MicroFlo	Pyramin
Pyridate	Syngenta	Tough
Pyrithiobac	DuPont	Staple
Quinclorac	BASF	Facet
Quizalofop	DuPont	Assure
Rimsulfuron	DuPont	Matrix
Sethoxydim	Microflo	Poast, Poast Plus
Simazine	Syngenta	Princep
S-Metolachlor	Syngenta	Dual II Magnum

⁵ Combination Product w/ Imazapyr & Imazethapyr

⁶ Combination Product w/ Desmedipham & Phenmedipham

⁷ Combination Product w/ Primisulfuron & Prosulfuron

Sulfentrazone	FMC	Spartan
Sulfosulfuron	Monsanto	Maverick
Tebuthiuron	Dow	Spike
Terbacil	Syngenta	Sinbar
Thifensulfuron	DuPont	Harmony, Harmony Extra ⁸
Thiobencarb	Valent	Bolero
Tralkoxydim	Syngenta	Achieve
Triallate	Gowan	Far-Go
Triasulfuron	Syngenta	Amber
Tribenuron	DuPont	Express
Triclopyr	Dow	Garlon, Remedy
Trifluralin	Dow	Treflan
Triflusulfuron	DuPont	UpBeet

⁸ Combination Product w/ Thifensulfuron & Tribenuron

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

Active Ingredient	Lbs. AI Applied		
	1992	1997	2002
Anilazine	168,835		
Azoxystrobin		228,614	567,751
Benomyl	1,198,371	675,500	235,608
Captan	3,197,989	3,992,782	3,092,448
Carboxin	46,968		
Chlorothalonil	11,566,092	11,916,713	8,678,206
Copper	8,270,289	13,682,409	12,554,202
Cymoxanil		45,886	17,763
Cyprodinil			120,906
DCNA	169,333	188,683	106,493
Dimethomorph		51,536	35,615
Dinocap	10,902		
Dodine	264,664	151,538	70,342
Etridiazole	193,896	91,669	44,523
Fenarimol	47,600	46,272	22,983
Fenbuconazole		32,818	56,535
Fenhexamid			83,044
Ferbam	219,486	317,125	157,997
Fluazinam			96,748
Fludioxonil			9,670
Flutolanil		24,960	127,637
Fosetyl-Al	533,646	904,718	560,855
Iprodione	873,547	689,648	515,816
Kresoxim			27,169
Mancozeb	8,062,374	9,585,777	8,177,459
Maneb	3,525,322	3,039,930	1,680,952
Mefenoxam		210,101	304,398
Metalaxyl	855,400	659,997	
Metiram	539,206	1,385,330	716,628
Myclobutanil	136,849	174,482	161,699
Oxytetracycline	30,163	33,536	36,188
PCNB	1,662,371	819,086	905,514
Propamocarb		173,885	8,181
Propiconazole	281,355	493,998	461,429
Pyraclostrobin			137,531
Streptomycin	100,029	50,434	49,366
Sulfur	82,883,332	77,788,188	70,956,181
Tebuconazole		478,568	510,206
Tetraconazole			131,555
Thiabendazole	155,403		
Thiophanate Methyl	498,283	453,792	441,546
Thiram	199,251	179,809	229,761
Triadimefon	135,112	53,098	8,095
Trifloxystrobin			76,768
Triflumizole		92,481	78,287
Triforine	73,644	23,625	8,848
Triphenyltin Hyd	424,910	660,971	415,690
Vinclozolin	135,035	121,959	54,672
Ziram	2,804,087	1,992,552	1,652,766
Zoxamide			12,398
Total	129,094,908	131,512,472	114,398,433

Table 2B: National Pesticide Use by Active Ingredient <i>Herbicides</i>			
Active Ingredient	Lbs. AI Applied		
	1992	1997	2002
2,4-D	41,938,491	40,589,955	40,071,957
2,4-DB	980,980	603,975	522,486
Acetochlor		32,591,175	36,160,962
Acifluorfen	1,477,973	1,846,789	404,455
Alachlor	51,591,633	15,159,641	6,269,543
Ametryn	321,656	445,571	263,863
Asulam	726,577	551,775	1,077,594
Atrazine	72,315,295	74,560,407	76,914,999
Benefin	478,205	161,983	104,880
Bensulfuron	30,134	31,884	26,443
Bensulide	449,951	545,406	584,076
Bentazon	7,171,284	7,749,130	3,254,559
Bispyribac			8,072
Bromacil	1,333,728	614,219	434,379
Bromoxynil	3,444,727	2,920,222	2,058,153
Butylate	8,468,938	2,251,426	
Carfentrazone			97,200
Chloramben	1,335,274		
Chlorimuron	236,871	190,345	89,840
Chlorsulfuron	46,013	59,745	37,594
Clethodim	80,003	670,721	619,944
Clodinafop			63,074
Clomazone	1,801,776	2,531,160	1,735,844
Clopyralid	89,112	891,662	956,046
Cloransulam			82,184
Cyanazine	32,189,859	20,233,056	
Cycloate	938,925	877,657	243,877
Cyhalofop			126,053
DCPA	1,746,892	596,723	538,981
Desmedipham	152,864	205,144	243,787
Dicamba	9,064,161	10,447,441	7,558,786
Dichlobenil	65,424	43,711	34,492
Diclofop	1,597,585	974,268	337,527
Diclosulam			3,466
Diethyl Ethyl	454,336		
Difenzoquat	175,042	346,308	28,279
Diflufenzopyr			125,975
Dimethenamid		5,991,003	7,900,814
Diphenamid	105,009		
Diquat	161,449	266,858	217,649
Diuron	3,994,531	4,370,448	3,580,627
DSMA	1,257,802	842,665	30,602
Endothall	134,016	86,622	39,470
EPTC	14,457,278	8,791,984	5,593,753
Ethalfuralin	2,738,309	2,422,198	1,988,953
Ethofumesate	378,488	409,666	65,054
Fenoxaprop	390,976	984,697	824,670
Fluazifop	897,988	608,520	245,856
Flufenacet			998,339
Flumetsulam		308,892	260,092
Flumiclorac		43,158	38,130
Flumioxazin			65,690
Fluometuron	3,907,191	5,313,290	785,774

Fluroxypyr			200,453
Fomesafen	425,657	1,100,341	583,010
Foramsulfuron			29,889
Glufosinate			982,324
Glyphosate	16,793,371	34,817,639	102,325,419
Halosulfuron		53,919	83,870
Hexazinone	460,058	332,116	623,344
Imazamethabenz	231,898	458,875	114,176
Imazamox			86,662
Imazapic		19,002	62,150
Imazapyr			4,356
Imazaquin	924,799	756,915	89,451
Imazethapyr	914,090	1,253,046	343,422
Isopropalin	129,287		
Isoxaflutole			372,838
Lactofen	227,475	389,388	140,611
Linuron	2,026,683	516,133	441,582
MCPA	4,540,632	5,360,932	3,577,339
MCPB	42,475	27,542	23,287
MCPD	32,584	13,415	
Mesotrione			621,470
Methazole	510,692		
Metolachlor	59,383,910	67,336,211	
Metribuzin	3,440,715	3,320,231	1,802,371
Metsulfuron	18,576	45,336	65,472
Molinate	4,886,748	3,669,398	2,885,422
MSMA	6,021,679	4,867,366	3,160,018
Napropamide	500,695	448,400	232,359
Naptalam	162,366	185,376	90,926
Nicosulfuron	169,743	211,881	232,003
Norflurazon	2,670,328	2,459,703	1,198,022
Oryzalin	822,759	899,044	391,189
Oxyfluorfen	457,644	705,255	530,936
Paraquat	4,658,597	6,884,630	3,997,753
Pebulate	673,046	343,322	158,517
Pendimethalin	20,281,766	27,284,718	13,101,758
Phenmedipham	183,311	196,442	146,802
Picloram	2,042,016	1,322,430	1,915,653
Primisulfuron	47,013	133,171	83,809
Prometryn	1,448,310	1,675,421	1,736,087
Pronamide	239,773	206,779	212,166
Propachlor	4,316,315	904,932	
Propanil	9,132,883	8,035,946	7,791,686
Prosulfuron		73,076	35,508
Pyrazon	340,501	118,294	107,150
Pyridate	84,556	161,697	89,942
Pyrithiobac		208,136	106,216
Quinclorac	111,656	287,704	385,818
Quizalofop	216,204	340,818	122,608
Rimsulfuron		19,774	89,191
Sethoxydim	1,350,566	1,717,271	638,796
Siduron	745		
Simazine	3,978,487	5,224,439	4,792,495
S-Metolachlor			24,789,492
Sulfentrazone		69,073	560,978
Sulfosulfuron			48,455
Tebuthiuron	111,215	115,712	118,802

Terbacil	298,026	342,277	243,730
Thifensulfuron	93,563	105,145	85,928
Thiobencarb	1,473,511	1,925,093	1,061,201
Tralkoxydim			51,694
Triallate	1,590,727	2,178,254	1,674,895
Triasulfuron	6,942	57,320	30,278
Tribenuron	33,126	63,114	46,821
Triclopyr	115,514	590,366	1,336,972
Tridiphane	262,516		
Trifluralin	25,686,076	22,263,693	8,985,861
Triflusulfuron		23,023	25,793
Vernolate	520,412	181,789	
Total	454,218,983	461,432,822	399,582,069

Table 3A: National Pesticide Use by Crop Fungicides

Crop	Lbs. AI Applied		
	1992	1997	2002
Alfalfa	460,090	425,809	531,904
Almonds	3,080,204	2,543,851	1,793,341
Apples	6,855,782	8,229,945	7,283,748
Apricots	152,556	82,577	53,229
Artichokes	1,315	413	1,133
Asparagus	214,973	194,674	106,479
Avocados	505,436	99,418	198,530
Barley	40,770	31,937	22,504
Beets	5,140	1,713	3,328
Blackberries	86,647	90,912	117,357
Blueberries	363,691	266,980	400,934
Broccoli	230,027	57,653	17,177
Brussel Sprouts	13,576	15,990	13,673
Cabbage	398,801	165,453	221,968
Cantaloupes	808,432	570,835	331,599
Carrots	770,555	786,930	510,859
Cauliflower	34,145	24,709	13,962
Celery	439,164	465,963	222,621
Cherries	1,511,419	2,420,998	2,177,142
Citrus	5,413,900	8,314,810	7,006,204
Collards	20,890	51,349	31,431
Cotton	2,117,635	1,007,776	977,108
Cranberries	159,195	224,186	266,822
Cucumbers	595,968	516,179	469,002
Dates	112,382	712,764	8,818
Dry Beans	430,445	487,217	196,921
Dry Peas	346,627	304,166	
Eggplant	29,663	14,662	7,686
Figs		7,963	14,177
Garlic	34,912	17,930	22,751
Grapes	47,316,170	44,152,288	44,861,729
Green Beans	690,647	768,662	663,556
Green Onions	4,010	11,790	9,146
Green Peas	26,031	5,477	757
Hazelnuts	25,900	63,548	72,876
Hops	96,100	2,216,210	229,476
Hot Peppers	801	23,492	7,655
Kiwi	142	285	1,653
Lettuce	684,222	1,091,450	981,328
Melons	69,653	125,668	47,741
Mint	225,374	94,182	29,611
Nectarines	354,143	459,940	405,971
Oats	2,200		
Okra			1,483
Olives	28,174	81,675	188,792
Onions	994,258	1,080,012	859,461
Parsley		1,453	5,886
Peaches	7,475,113	6,147,239	5,303,069
Peanuts	8,442,300	3,961,757	3,435,378
Pears	969,624	1,481,317	1,385,340
Pecans	1,671,206	610,285	372,271
Pistachios	518,733	625,711	601,472
Plums/Prunes	672,895	742,454	510,064

Pomegranates	46,353	104,724	68,607
Potatoes	4,754,606	10,484,415	7,201,839
Pumpkins	191,633	381,652	338,059
Radishes		775	1,346
Raspberries	122,586	207,939	198,947
Rice	1,755,636	3,171,845	3,293,216
Rye	202	19	7
Seed Crops	135,928	185,154	4,510
Sod	7,406	6,870	350,548
Sorghum			688
Soybeans	177,920	18,908	99,202
Spinach	86,658	59,950	44,985
Squash	508,887	558,116	359,574
Strawberries	857,504	971,655	966,010
Sugarbeets	10,274,516	8,313,533	4,088,245
Sunflowers			18
Sweet Corn	1,104,127	437,573	502,798
Sweet Peppers	649,944	434,890	391,588
Sweet Potatoes	153,510	848	1,492
Tobacco	371,645	804,196	116,378
Tomatoes	8,763,772	10,311,437	10,311,723
Walnuts	1,071,972	1,436,707	1,431,267
Watermelons	1,453,549	884,380	933,494
Wheat	1,272,290	811,583	645,219
Wild Rice	1,065	44,640	51,554
Total:	129,263,743	131,512,472	114,398,433

Table 3B: National Pesticide Use by Crop *Herbicides*

Crop	Lbs. AI Applied		
	1992	1997	2002
Alfalfa	4,921,532	3,960,058	4,325,029
Almonds	978,650	1,229,246	1,342,773
Apples	550,636	1,530,220	760,105
Apricots	12,485	12,313	10,948
Artichokes	8,855	12,119	8,246
Asparagus	242,998	213,604	187,615
Avocados	86,062	77,067	85,051
Barley	3,061,989	3,311,360	1,973,943
Beets	67,472	49,259	33,342
Blackberries	15,326	14,362	11,794
Blueberries	96,905	107,912	125,141
Broccoli	325,246	226,001	156,278
Brussel Sprouts	1,362		72
Cabbage	143,553	110,790	115,449
Canola	5,873	365,422	686,580
Cantaloupes	129,931	110,554	76,588
Carrots	114,008	180,123	153,671
Cauliflower	107,987	51,660	29,606
Celery	33,724	50,431	40,244
Cherries	84,608	195,562	206,262
Citrus	5,451,659	6,437,185	5,626,433
Collards	38,386	20,022	15,269
Corn	213,195,403	206,264,025	158,547,080
Cotton	29,419,214	32,775,095	21,784,568
Cranberries	108,230	120,074	110,223
Cucumbers	277,663	252,793	227,091
Dates	3,285	1,611	12,206
Dry Beans	4,086,075	3,799,808	3,039,711
Dry Peas	98,817	261,739	139,512
Eggplant	3,340	3,344	2,840
Fallowland	7,845,090	9,861,689	6,452,996
Figs	49,205	28,602	17,232
Flax	58,982	57,869	285,940
Garlic	39,018	50,761	24,593
Grapes	1,087,056	1,831,293	1,779,753
Green Beans	805,076	769,223	667,908
Green Onions	35,867	17,396	11,322
Green Peas	279,167	258,082	163,293
Hazelnuts	54,921	59,241	62,384
Hops	29,112	71,363	28,645
Hot Peppers	38,708	111,284	29,900
Kiwi	10,533	5,085	5,261
Lettuce	254,352	290,541	394,811
Melons	33,373	26,445	7,170
Millet	60,005	15,907	13,126
Mint	451,741	375,438	268,622
Nectarines	57,685	79,675	89,414
Oats	785,898	429,100	306,904
Okra	1,470	888	548
Olives	78,646	76,450	74,857
Onions	958,232	568,053	662,418
Other Hay	4,825,249	1,579,278	3,637,206
Parsley	3,179	2,711	4,976

Pasture	24,823,544	21,678,185	29,595,734
Peaches	256,958	234,410	340,292
Peanuts	4,998,752	3,038,441	1,912,640
Pears	113,397	178,670	102,178
Pecans	321,579	298,975	434,726
Pistachios	115,460	214,290	267,346
Plums/Prunes	190,129	174,333	154,954
Pomegranates	4,134	3,008	14,639
Potatoes	2,275,438	2,908,417	2,209,464
Pumpkins	45,712	62,191	79,833
Radishes	3,232	7,710	4,538
Raspberries	18,800	34,169	29,050
Rice	16,538,568	15,736,856	15,281,996
Rye	43,290	22,524	17,580
Safflower	61,737	103,243	49,219
Seed Crops	1,704,499	1,484,437	209,692
Sod	520,090	450,678	537,790
Sorghum	16,286,653	16,579,438	12,358,195
Soybeans	73,112,877	83,561,556	91,108,753
Spinach	106,818	46,864	39,520
Squash	109,704	54,002	65,614
Strawberries	127,632	75,282	53,533
Sugarbeets	2,919,816	2,410,681	1,264,212
Sugarcane	3,610,641	5,904,385	7,039,124
Sunflowers	1,450,427	1,841,048	1,634,684
Sweet Corn	2,120,123	1,890,036	1,447,862
Sweet Peppers	68,078	77,524	52,640
Sweet Potatoes	128,229	71,601	69,387
Tobacco	1,193,646	994,273	404,665
Tomatoes	676,980	684,446	520,920
Walnuts	205,748	260,623	306,160
Watermelons	109,623	250,697	218,173
Wheat	18,442,219	21,789,157	16,933,627
Wild Rice	605	537	384
Total:	454,218,983	461,432,822	399,582,069

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

State	Lbs. AI Applied		
	1992	1997	2002
Alabama	2,634,209	1,151,661	939,148
Arizona	515,077	528,812	375,125
Arkansas	1,296,316	479,987	401,451
California	74,777,185	75,057,965	65,863,591
Colorado	308,455	409,615	345,676
Connecticut	88,222	60,094	71,497
Delaware	100,776	133,883	69,477
Florida	9,541,419	11,068,936	9,491,952
Georgia	8,065,316	4,148,986	3,794,813
Idaho	2,285,265	3,112,626	2,504,767
Illinois	514,290	311,261	375,780
Indiana	632,056	439,351	409,293
Iowa	86,744	21,747	88
Kansas	5,562	81,056	5,261
Kentucky	291,188	279,669	118,848
Louisiana	521,900	222,952	404,386
Maine	812,141	780,555	724,691
Maryland	297,433	370,533	172,787
Massachusetts	259,014	257,630	318,374
Michigan	3,903,793	5,016,298	3,765,882
Minnesota	815,564	2,017,399	989,347
Mississippi	650,496	289,040	318,536
Missouri	340,256	462,112	276,005
Montana	27,880	203,163	92,377
Nebraska	108,129	223,467	98,358
Nevada	20,930	21,882	78,677
New Hampshire	52,209	38,317	32,021
New Jersey	1,217,027	1,246,878	751,805
New Mexico	25,072	60,263	17,863
New York	2,105,570	2,769,483	2,311,577
North Carolina	1,584,816	1,325,524	952,718
North Dakota	850,565	1,973,872	1,718,247
Ohio	951,635	576,469	726,222
Oklahoma	404,592	202,584	102,975
Oregon	2,068,976	2,409,213	1,809,929
Pennsylvania	1,036,857	1,156,097	719,527
Rhode Island	15,618	9,547	6,077
South Carolina	2,932,030	1,706,300	1,268,417
South Dakota	34,201	48,247	45,173
Tennessee	384,863	391,186	372,828
Texas	1,827,820	1,312,917	865,261
Utah	383,681	131,762	52,896
Vermont	57,291	49,096	30,388
Virginia	1,276,940	1,152,963	1,015,891
Washington	1,982,029	6,268,506	7,733,274
West Virginia	396,739	217,965	334,615
Wisconsin	773,669	1,313,542	1,521,235
Wyoming	1,927	1,061	3,307
Total:	129,263,743	131,512,472	114,398,433

Table 4B: National Pesticide Use by State *Herbicides*

State	Lbs. AI Applied		
	1992	1997	2002
Alabama	4,311,219	3,450,506	3,352,018
Arizona	2,356,267	1,121,913	920,639
Arkansas	17,838,364	16,096,884	13,698,492
California	12,115,943	14,679,781	12,929,480
Colorado	6,870,857	4,131,404	4,565,041
Connecticut	159,430	132,942	42,506
Delaware	1,113,428	1,000,140	933,098
Florida	8,641,243	8,615,040	11,763,902
Georgia	7,651,378	8,943,763	5,508,941
Idaho	4,385,484	4,453,478	3,532,008
Illinois	49,865,039	46,185,753	39,821,266
Indiana	27,761,208	26,311,544	22,184,693
Iowa	48,844,913	53,493,458	37,314,077
Kansas	15,056,408	21,968,217	23,557,698
Kentucky	7,063,523	6,696,499	4,665,918
Louisiana	12,201,796	11,554,557	12,849,200
Maine	263,784	207,863	204,837
Maryland	2,915,918	2,761,350	2,563,498
Massachusetts	195,446	184,452	134,997
Michigan	13,945,831	11,992,373	9,377,227
Minnesota	27,203,944	21,359,857	22,005,318
Mississippi	11,484,640	9,190,142	8,224,746
Missouri	18,576,820	18,332,928	16,680,900
Montana	4,228,794	5,281,229	4,656,964
Nebraska	26,041,945	31,698,079	22,614,643
Nevada	111,467	67,602	55,648
New Hampshire	62,191	51,994	22,509
New Jersey	857,315	711,316	826,026
New Mexico	2,256,875	1,067,940	2,962,826
New York	5,602,020	5,083,970	3,535,420
North Carolina	7,658,590	7,972,814	6,864,608
North Dakota	12,901,410	13,541,177	14,192,512
Ohio	17,879,151	16,483,636	16,190,564
Oklahoma	3,920,291	4,749,765	4,377,499
Oregon	3,982,124	4,228,030	1,588,874
Pennsylvania	5,181,184	5,874,728	4,477,560
Rhode Island	19,981	16,933	13,603
South Carolina	3,127,731	3,335,420	3,107,481
South Dakota	13,782,549	13,767,832	15,175,460
Tennessee	5,578,225	5,217,725	4,546,384
Texas	18,615,655	27,982,702	17,819,323
Utah	1,684,670	482,706	690,410
Vermont	347,511	347,237	106,407
Virginia	3,290,996	3,329,089	4,354,071
Washington	4,998,028	6,630,739	5,765,683
West Virginia	330,489	395,726	432,324
Wisconsin	10,063,588	9,465,726	7,670,199
Wyoming	873,320	783,865	704,570
Total:	454,218,983	461,432,822	399,582,069

Table 5: National Ranking of Pesticide Use by Active Ingredient 2002					
<i>Lbs. AI/Year</i>					
Fungicides					
1	Sulfur	70,956,181	6	Maneb	1,680,952
2	Copper	12,554,202	7	Ziram	1,652,766
3	Chlorothalonil	8,678,206	8	PCNB	905,514
4	Mancozeb	8,177,459	9	Metiram	716,628
5	Captan	3,092,448	10	Azoxystrobin	567,751
Herbicides					
1	Glyphosate	102,325,419	6	Pendimethalin	13,101,758
2	Atrazine	76,914,999	7	Trifluralin	8,985,861
3	2,4-D	40,071,957	8	Dimethenamid	7,900,814
4	Acetochlor	36,160,962	9	Propanil	7,791,686
5	S-Metolachlor	24,789,492	10	Dicamba	7,558,786

See Tables 2A and 2B

Table 6: National Ranking of Pesticide Use by Crop 2002					
<i>Lbs. AI/Year</i>					
Fungicides					
1	Grapes	44,861,729	6	Peaches	5,303,069
2	Tomatoes	10,311,723	7	Sugarbeets	4,088,245
3	Apples	7,283,748	8	Peanuts	3,435,378
4	Potatoes	7,201,839	9	Rice	3,293,216
5	Citrus	7,006,204	10	Cherries	2,177,142
Herbicides					
1	Corn	158,547,080	6	Rice	15,281,996
2	Soybeans	91,108,753	7	Sorghum	12,358,195
3	Pasture	29,595,743	8	Sugarcane	7,039,124
4	Cotton	21,784,568	9	Fallowland	6,452,996
5	Wheat	16,933,627	10	Citrus	5,626,433

See Tables 3A and 3B

Table 7: National Ranking of Pesticide Use by State 2002					
<i>Lbs. AI/Year</i>					
Fungicides					
1	California	65,863,591	6	Idaho	2,504,767
2	Florida	9,491,952	7	New York	2,311,577
3	Washington	7,733,274	8	Oregon	1,809,929
4	Georgia	3,794,813	9	North Dakota	1,718,247
5	Michigan	3,765,882	10	Wisconsin	1,521,235
Herbicides					
1	Illinois	39,821,266	6	Minnesota	22,005,318
2	Iowa	37,314,077	7	Texas	17,819,323
3	Kansas	23,557,698	8	Missouri	16,680,900
4	Nebraska	22,614,643	9	Ohio	16,190,564
5	Indiana	22,184,693	10	South Dakota	15,175,460

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
Glyphosate	85-90	102
Atrazine	74-80	77
Acetochlor	30-35	36
2,4-D	28-33	40
S-Metolachlor	20-24	25
Metolachlor ²	15-22	0
Pendimethalin	15-19	13
Trifluralin	12-16	9
Chlorothalonil	8-11	9
Copper	8-10	13
Alachlor	6-9	6
Propanil	6-9	8
Dimethenamid	6-8	8
Mancozeb	6-8	8
EPTC	5-8	6
Simazine	5-7	5
Dicamba	5-7	8
Sulfosate	3-7	--- ³

- 1) Source: [8]
- 2) Phased out in 2001
- 3) Included in Glyphosate.

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
Herbicides ²	433	400
Fungicides ³	42	43

- 1) Source: [8]
- 2) EPA estimates include plant growth regulator use with herbicide use.
- 3) NPUD2002 fungicide estimates have been adjusted to exclude sulfur, which is not included in EPA's fungicide use estimates.

Table 10: Comparison of National Pesticide Use Database 2002 with USEPA Pesticide Usage Estimates 1992 → 2002 Trends				
	<i>Million Lbs. AI/Year</i>			
	<i>Herbicides</i>		<i>Fungicides</i>	
	EPA^{1,2}	NPUD	EPA¹	NPUD³
1992	450	454	45	46
1997	470	461	53	53
2002 ⁴	433	400	42	43

- 1) Source: [8]
- 2) EPA estimates include plant growth regulator use with herbicide use.
- 3) NPUD2002 fungicide estimates have been adjusted to exclude sulfur, which is not included in EPA's fungicide use estimates.
- 4) EPA estimate listed is for 2001.

Figure 1: Fungicide Use by State 2002

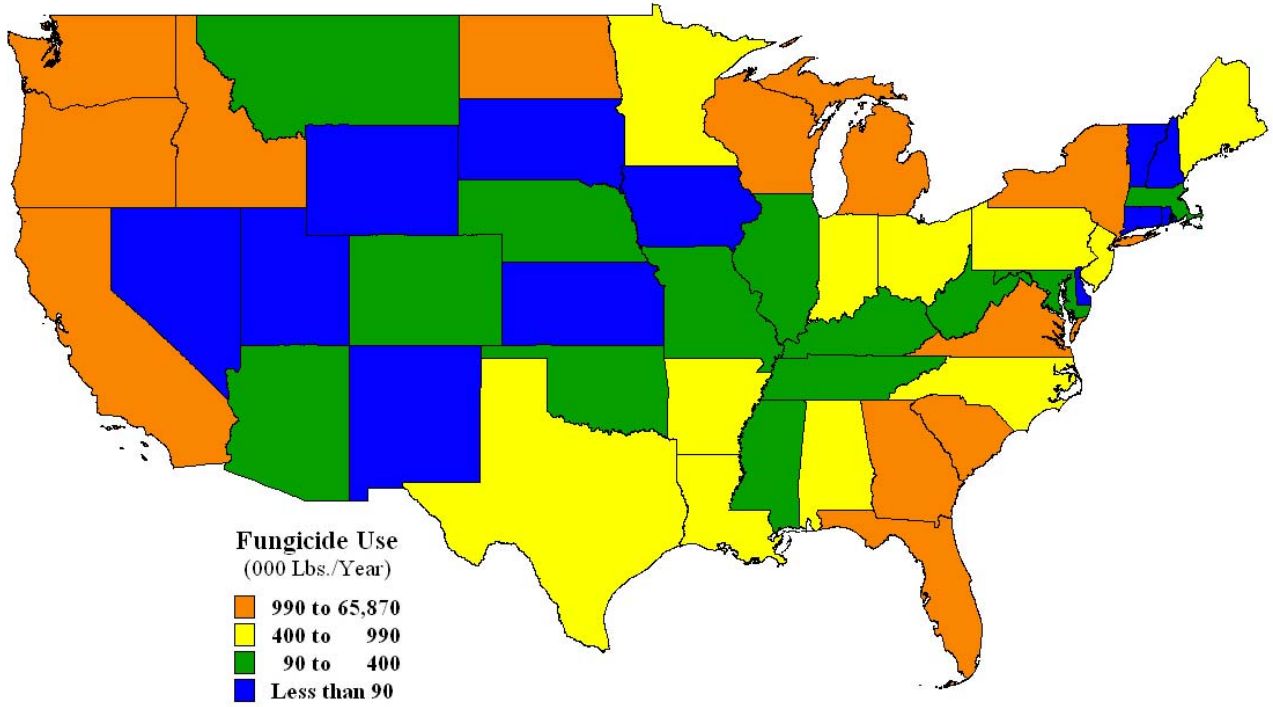
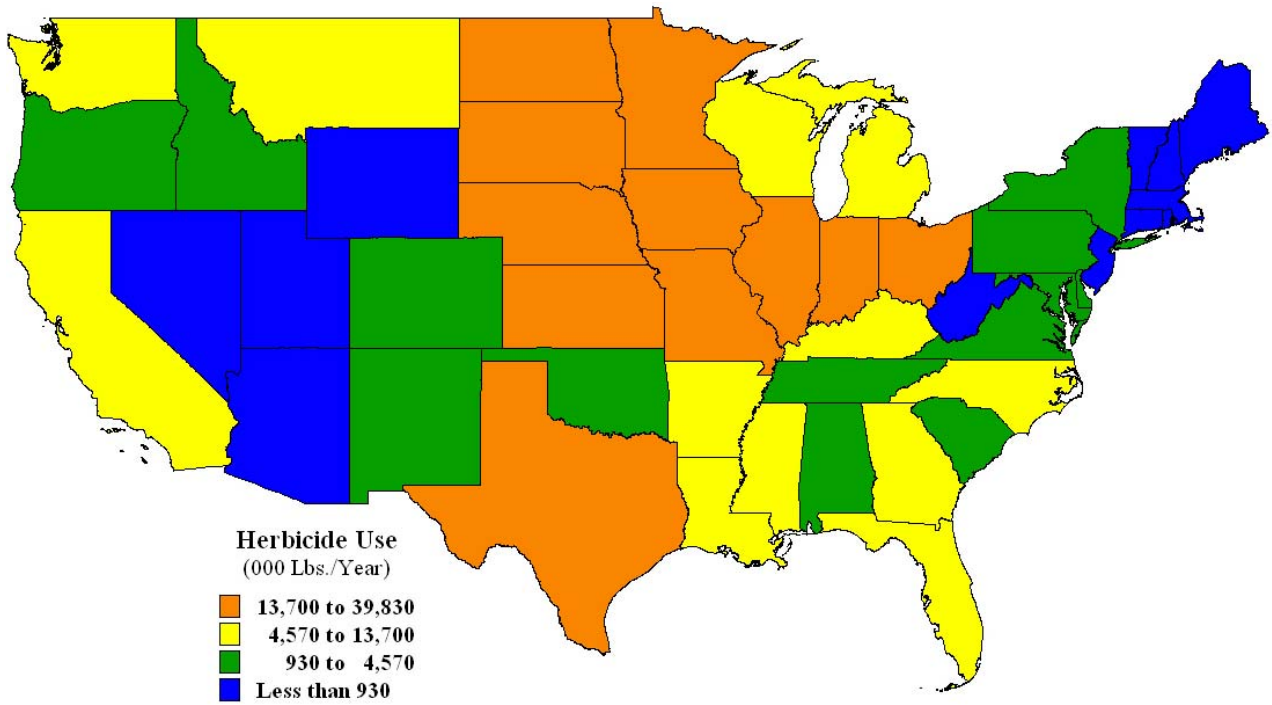


Figure 2: Herbicide Use by State 2002



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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- 601 Dave Buntin GA University of Georgia
- 602 Larry Bledsoe IN Purdue University
- 603 Daniel Egel IN Purdue University
- 604 Larry Trevathan MS Mississippi State University
- 605 David Ingram MS Mississippi State University
- 606 Don Parker MS Mississippi State University
- 607 Tom Zitter NY Cornell University

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609	Mark	Loux	OH	Ohio State University
610	Patrick	Lipps	OH	Ohio State University
611	Dearl	Sanders	LA	Louisiana State University
612	George	Clough	OR	Oregon State University
613	Raymond	Taylorson	RI	University of Rhode Island
614	Guido	Schnabel	SC	Clemson University
615	Arthur	Antonelli	WA	Washington State University
616	Timothy	Smith	WA	Washington State University
617	Rakesh	Chandran	WV	West Virginia University
618	Dallas	Peterson	KS	Kansas State University
619	Gerald	Holmes	NC	North Carolina State University
620	Timothy	Brenneman	GA	University of Georgia
628	Joseph	Yenish	WA	Washington State University
633	Joyce	Tredaway Ducor	FL	University of Florida
634	Lewis	Jett	MO	University of Missouri
638	Frank	Louws	NC	North Carolina State University
641	Gregory	English-Loeb	NY	Cornell University
642	Ward	Tingey	NY	Cornell University
644	James	Griffin	LA	Louisiana State University
645	James	Boudreaux	LA	Louisiana State University
646	Kenneth	Smith	AR	University of Arkansas
650	Mark	Ferrell	WY	University of Wyoming
656	Mark	Black	TX	Texas A&M University
659	Phillip	Sloderbeck	KS	Kansas State University
660	Phillip	Stahlman	KS	Kansas State University
666	Sandra	McDonald	CO	Colorado State University
667	Charles	Luper	OK	Oklahoma State University
668	Michael	Williams	MS	Mississippi State University
669	Wayne	Mitchem	NC	North Carolina State University
670	Barry	Cunfer	GA	University of Georgia
671	David	Langston, Jr.	GA	University of Georgia
672	Edward	Brown	GA	University of Georgia
673	Chris	Tingle	AR	University of Arkansas
674	Ross	Byers	VA	Virginia Polytechnic University
675	Douglas	Doohan	OH	Ohio State University
676	Stephen	Herbert	MA	University of Massachusetts

677	Jere	Downing	MA	Cranberry Institute
678	Jon	Clements	MA	University of Massachusetts
679	Ronald	Strahan	LA	Louisiana State University
680	Bruce	Pinkerton	SC	Clemson University
681	Kathleen	Demchak	PA	Pennsylvania State University
682	Andrew	Plant	ME	University of Maine
683	Ralph	Whitesides	UT	Utah State University
684	Daniel	Waldstein	MO	Southwest Missouri State University
685	William	Turechek	NY	Cornell University
686	Alan	Schreiber	WA	Washington Asparagus Commission
687	James	Gill	OR	Norpac Foods
688	Robert	Hunger	OK	Oklahoma State University
689	George	Bird	MI	Michigan State University
693	Annemiek	Schilder	MI	Michigan State University
698	Mary	Olsen	AZ	University of Arizona
700	Norman	Lalancette	NJ	Rutgers University
701	Steve	Hart	NJ	Rutgers University
703	Larry	Hull	PA	Pennsylvania State University
707	Michael	Saunders	PA	Pennsylvania State University
710	Lynn	Jensen	OR	Oregon State University
711	Joseph	DeFrancesco	OR	Oregon State University
715	Stephen	Weller	IN	Purdue University
721	Martin	Draper	SD	South Dakota State University
722	Mike	Ellis	OH	Ohio State University
724	Alex	Martin	NE	University of Nebraska
725	Ted	Gastier	OH	Ohio State University
728	Charles	Johnson	VA	Virginia Polytechnic University
729	Roger	Williams	OH	Ohio State University
730	Erik	Stromberg	VA	Virginia Polytechnic University
731	Roger	Youngman	VA	Virginia Polytechnic University
732	Ron	Becker	OH	Ohio State University
736	Henry	Wilson	VA	Virginia Polytechnic University
745	Gary	Pelter	WA	Washington State University
758	Jeffrey	Wyman	WI	University of Wisconsin
760	Patricia	McManus	WI	University of Wisconsin
761	Joseph	Krausz	TX	Texas A&M University
797	Dudley	Smith	TX	Texas A&M University

798 Russell Hahn NY Cornell University

799 Eric Prostko GA University of Georgia

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901	Ron	Talbert	AR	University of Arkansas
913	Phil	Schwallier	MI	Michigan State University
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925	Alan	Blaine	MS	Mississippi State University
926	Walter	Stevenson	WI	University of Wisconsin
928	Thomas	Kucharek	FL	University of Florida
930	Ian	Merwin	NY	Cornell University
936	Clifford	Coker	AR	University of Arkansas
939	Richard	Ashley	CT	University of Connecticut
940	Paul	Bertrand	GA	University of Georgia
943	Mohammad	Babadoost	IL	University of Illinois
964	Reeves	Petroff	MT	Montana State University
966	Glen	Koehler	ME	University of Maine
967	Galen	Dively	MD	University of Maryland
971	Sonia	Schloemann	MA	University of Massachusetts
981	Phillip	Glogoza	ND	North Dakota State University
984	Phillip	Mulder	OK	Oklahoma State University
986	Thomas	Melton	NC	North Carolina State University
987	William	Cline	NC	North Carolina State University
988	David	Ritchie	NC	North Carolina State University
989	Sterling	Southern	NC	North Carolina State University
990	Turner	Sutton	NC	North Carolina State University
991	William	Lord	NH	University of New Hampshire
995	Shidhar	Polavarapu	NJ	Rutgers University
997	Gerald	Ghidiu	NJ	Rutgers University
999	Assigned from a neighboring state.			



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