

PESTICIDE USE IN U.S. CROP PRODUCTION: 1997

National Summary Report

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Table of Contents

- 1.0 Acknowledgements
- 2.0 Introduction
- 3.0 Database Parameters
- 4.0 Data Sources
- 5.0 Review Procedures
- 6.0 Results/Summaries
- 7.0 Caveats/Disclaimers
- 8.0 1992 Database Adjustments
- 9.0 Internet File Description
- 10.0 References – 1997 Database
- 11.0 References – 1992 Database

1.0 Acknowledgements

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Kathryn Kimble-Day and Dennis Kopp provided timely access to pesticide use reports funded by USDA's CSREES. Larry Wilhoit of CALDPR and Norm Bennett of USDA-NASS provided electronic versions of databases that greatly facilitated our project's completion.

Several hundred extension service specialists provided us data for this project. This project could not have been completed without their cooperation. They are all listed in the reference list. The database was reviewed by industry specialists in the agricultural chemical industry and by University pesticide information specialists; these individuals are listed in Tables 6 and 7.

Of all of the individuals who helped us with this database, several were particularly noteworthy for the efforts which they made in assembling and reviewing data for this project: Jere Downing of the Cranberry Institute, Rocky Lundy of the Mint Industry Research Council, Ann George of the U.S. Hop Industry Plant Protection Committee, Dudley Smith of Texas A&M University and William Spencer of Tomen Agro.

2.0 Introduction

In 1995, the National Center for Food and Agricultural Policy (NCFAP) issued Pesticide Use in U.S. Crop Production: National Summary Report, which summarized the national use of 200 active ingredients on 87 crops. The 1995 report was compiled from a state-level usage database that quantified the use of each active ingredient by crop and state.¹ The 1995 NCFAP report quantified pesticide usage based on crop acreage for 1992 and usage patterns for the years 1990-93. The 1995 NCFAP report is referred to as the “1992 Report” in the following discussion. NCFAP has prepared a more recent version of the national pesticide usage database. This database is representative of usage patterns for the years of 1995-98 and is keyed to crop acreage data for 1997. The more recent NCFAP report is referred to as the “1997 Report” in the following discussion. All of the 1992 data records and summaries are included in the 1997 Report and database for comparison purposes.

The same basic methodology was used by NCFAP in assembling the 1997 Report as was used in assembling the 1992 Report: NCFAP has organized state and crop pesticide use data from publicly available reports into a national database of pesticide use in U.S. crop production. For states and crops not covered completely by the available surveys and reports, NCFAP conducted a survey of extension service specialists for pesticide use profile information. For some states and crops for which there are no published surveys or reports and no expert opinions from extension service specialists, imputations were made by assuming that the state’s pesticide use profile is identical to that of a neighboring state.

A separate report analyzes differences between the 1992 and 1997 estimates: Gianessi, L.P., and Cressida Silvers, Trends in Crop Pesticide Use: Comparing 1992 and 1997 Pesticide Use, National Center for Food and Agricultural Policy, November 2000.

Available at www.ncfap.org

¹ Pesticide Use in U.S. Crop Production: National Data Report, National Center for Food and Agricultural Policy, February 1995.

3.0 Database Parameters

NCFAP's 1997 pesticide usage database contains estimates for 220 active ingredients. These active ingredients and their product names are listed in Table 1A. Their manufacturers/registrants are listed in Table 1B. Fifteen active ingredients that had been included in the 1992 database are not included in the 1997 database due to their cancellation, withdrawal or minimal use in crop production: anilazine, carboxin, dinocap, thiabendazole, chloramben, diethatyl ethyl, diphenamid, isopropalin, methazole, siduron, tridiphane, fenvalerate, mevinphos, trichlorfon and trimethacarb. Thirty-five new active ingredients have been added to the 1997 usage database. These active ingredients can be identified in Tables 1A and 1B. (They have been assigned a triple asterisk: "***")

The 1997 database includes four active ingredients that have been withdrawn, canceled or for which production has ceased since 1997. These active ingredients have been assigned a single asterisk: "*" or a double asterisk: "**" in Tables 1A and 1B.

Thirty-seven of the active ingredients have been classified as fungicides; 66 are classified as insecticides; 96 are classified as herbicides; and 21 are classified in the "other" category, that includes fumigants, growth regulators and defoliant. Each active ingredient is assigned to a single use category even though some active ingredients are used for multiple purposes. For example, although paraquat is used as both an herbicide and as a defoliant, all of paraquat's uses are included in the herbicide category. Active ingredients that have some use as nematicides are included either in the insecticide category (such as fenamiphos, oxamyl and aldicarb) or in the "other" category (the fumigants 1,3-D, methyl bromide, etc.).

The NCFAP database (both 1992 and 1997 versions) includes applications to cropland only (foliar, soil and in furrow applications). Non-cropland applications are not included. Seed treatments, greenhouse uses, ornamental uses, livestock uses, rodenticides,

mushrooms, beekeeping, animal repellants and postharvest uses also are not included. Applications to non-bearing orchards or vineyards are not included. Pesticide usage in governmental Areawide Eradication programs (such as boll weevil, Med-fly) are not included.

Some crop uses of particular active ingredients for which usage has been estimated in the 1997 database have been canceled or withdrawn subsequently. For example, propargite use is quantified in the 1997 report for apricots, green beans peaches and plums even though these crops had been removed from labels prior to 1997. They are included since there was legally labeled material still available for farmers to use in 1997. In some cases the 1997 database shows usage for crops that have been canceled for active ingredients since 1997. For example, the 1997 database includes 16 crops for methamidophos; subsequent to 1997, 13 of these crop uses were canceled. In some cases, some crop uses for an active ingredient included in the 1997 database are not labeled; However, usage was permitted in 1997 under a Section 18 emergency registration.

Not all active ingredients used in U.S. crop production are included in the 1997 database. Active ingredients used on a very small number of acres are not included (such as rotenone, sabadilla). Active ingredients that have been introduced since 1997 also are not included (such as imazamox, glufosinate, carfentrazone, isoxaflutole and cloransulam).

Eighty-seven crops are included in the 1997 database. These are the same 87 crops included in the 1992 database. Several minor changes have been made. The names of several crops have been changed. In the 1992 database the designation was “filberts” and “plums”; these crop names have been changed to “hazelnuts” and “plums/prunes” in the 1997 report. The crop category “sod” refers to sod farms.

Estimates of crop acreage by state were drawn from the 1997 Census of Agriculture.² In some cases, the Census reports several categories for a crop, such as “sorghum for grain,” “sorghum for dry forage,” and “sorghum for silage.” In these cases, NCFAP has added

² Available on line at www.nass.usda.gov/census/

the acreage estimates from the separate categories together into a single category for “sorghum.” Table 2 lists the 87 crops included in the NCFAP database and identifies the corresponding Census categories. NCFAP does not include all states with acreage of these 87 crops. Generally, NCFAP includes states that account for at least 90% of U.S. acreage. Table 2 lists for each crop the national Census acreage total and the total for the states included in the NCFAP database. As can be seen, the 1997 NCFAP database includes more than 90% of the national acreage for most crops. In the summary tables of pesticide use, NCFAP uses the national crop acreage total for only those states included in its database.

There are some differences in the acreage estimates included for some crops in the 1992 and 1997 NCFAP databases. The 1992 database included several states with extremely small acreage for certain crops because pesticide use data was readily available (for example, 72 acres of cauliflower in Ohio). However, pesticide use data for these minor acreage crops were not available for the 1997 database and no estimates were made. There are 48 crop/state combinations (such as cauliflower/Ohio) for which estimates were made in the 1992 database and not in the 1997 database. These dropped crop/state combinations accounted for 42,533 total acres that were included in the 1992 database. The dropped state/crop combinations are listed in Table 3. On the other hand, NCFAP has added 19 crop/state combinations to the 1997 database that were not included in the 1992 database (such as cotton/Virginia). These newly included crop/state combinations account for 7.6 million acres. The state/crop combinations added to the database are listed in Table 4.

In the 1992 database, NCFAP used crop acreage estimates for fallowland and pasture that were developed independently of the Census of Agriculture. In the 1997 database, the acreage estimates for pasture and fallowland are drawn from the 1997 Census.

The 1997 Census did not publish or release state acreage totals in those cases for which there are three or fewer growers of the crop in the state. In these cases the Census suppresses the state acreage total and lists a “D” instead. For 14 crop/state combinations,

the 1997 NCFAP database uses the 1992 crop/state acreage estimates due to suppression of the Census total for 1997. Those 14 state/crop combinations are listed in Table 5.

Many crops included in the Census of Agriculture are not included in the NCFAP database: Chinese cabbage, mustard greens, chicory, endive, etc.

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

4.0 Data Sources

The NCFAP 1997 pesticide use database is not specific for any particular year. While the crop acreage data in the database represents 1997, the use surveys compiled for the database cover the years 1994-1998.

The 1997 national database consists of 17,098 records that delineate the use of a specific active ingredient on a crop in a specified state. Each line of data contains a reference code that identifies the source of the data. These references are listed in section “10.0 References: 1997 Database” of this document. The sources of information are categorized as follows:

- Surveys Conducted by the National Agricultural Statistics Service (NASS)
(4,080 records)

The following 10 NASS Agricultural Chemical Usage surveys were used in assembling the 1997 NCFAP database: Field Crops (1994, 1995, 1996, 1997, 1998), Vegetables (1994, 1996, 1998) and Fruits (1995, 1997).³ NCFAP uses the NASS estimates for the following two parameters: rate per crop year (lbs/A) and area applied (%). The NCFAP record for a particular active ingredient/crop/state combination is drawn directly from a particular NASS report that is referenced. In some cases it was necessary for NCFAP to create a weighted average for a particular crop/state/active ingredient combination when NASS reports separate estimates for “processed tomatoes” and “fresh tomatoes” or “tart cherries” and “sweet cherries,” etc.

The use coefficients drawn from the NASS surveys were used in the 1997 NCFAP database by multiplication times the estimate of crop acreage from the 1997 Census of Agriculture. With this method, estimates of total

³ These reports are available on the worldwide web at usda.gov/nass/.

pounds applied are calculated. There is not an exact agreement between the acreage estimates in the 1997 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 NCFAP's – even though both sets of estimates rely on the same usage coefficients.

- Reports for individual states and selected crops funded by USDA's Cooperative State Research, Education and Extension Service (CSREES) and national pesticide benefit assessments conducted by USDA's National Agricultural Pesticide Impact Assessment Program (NAPIAP) (1,646 records)

CSREES has funded university specialists to prepare pesticide use surveys for many crops.⁴ These reports were prepared in a variety of ways. Some are based on surveys of farmers; some are based on expert opinions from extension service specialists. NCFAP's 1997 pesticide use database includes estimates from 46 of the CSREES funded reports.

Since 1995, USDA's NAPIAP issued nine national assessment reports of pesticides used, by state, in the production of particular crops (citrus, tomatoes, alfalfa, strawberries, carrots, onions, asparagus, rice and potatoes). The NAPIAP reports include estimates of the usage of individual active ingredients for these crops on a state-by-state basis. These estimates are based on expert opinions of university specialists.

- USDA Crop Profiles (1,256 records)

For the past several years, the USDA has funded university specialists to develop documents known as "crop profiles," that include descriptions of

⁴ For information on the CSREES and NAPIAP reports, contact Kathy Kimble-Day or Dennis Kopp at CSREES.

pest problems and control alternatives for a specific crop and state.⁵ Many of the crop profiles include pesticide usage data that are based either on growers' surveys or expert opinion of extension specialists. For California crop profiles, pesticide usage data are drawn from the CALDPR's full use reporting system (described below). NCFAP drew pesticide use estimates from 135 crop profiles.

- State of California Department of Pesticide Regulation (DPR) Annual Report (1997) (1,312 records) The DPR records have been assigned reference code 444.

The State of California requires full reporting of agricultural uses of pesticides. The California DPR compiles the individual use records into a statewide summary of the use of individual active ingredients by crop.⁶ The published report includes estimates of pounds applied and acres treated.

The published acres treated estimates represent cumulative acres treated, meaning that if an acre of a crop is treated more than once with the same active ingredient, it is counted as many times as it is treated. The CALDPR has prepared an unpublished summary of the crop acreage treated data including totals of "Base Acres Treated," that counts an acre treated with an active ingredient only once, even if it is treated multiple times with the same active ingredient. The CALDPR also estimated the total number of base acres of the crop in the state. By dividing the estimate of the number of base acres treated by an active ingredient by the number of base acres of the crop in the state, the DPR calculated estimates of "Percent Base Acres Treated," that is definitionally similar to NASS's parameter, "Area Applied, Percent." By dividing DPR's estimates of total

⁵ Crop Profiles are available on the internet at <http://ipmwww.ncsu.edu/opmppiap>.

⁶ The CALDPR annual summary reports are available on the worldwide web at www.cdpr.ca.gov.

pounds applied by the estimates of base acres treated, estimates of the annual average application (lbs/AI/A/YR) are calculated.

NCFAP obtained an electronic version of the 1997 CALDPR statewide summary report, that includes the estimates of base acres treated and percent base acres treated.⁷ NCFAP integrated the DPR data into the 1997 national database by assigning NCFAP's standard names for crops and active ingredients in place of CALDPR's. In some cases, NCFAP totaled DPR records by combining separate records for various crop subgroups (such as lemons, grapefruit, etc.) to conform with NCFAP's crop definition (i.e. citrus). NCFAP also totaled DPR's separate estimates for different salts of active ingredients (such as 2,4-D) into a single active ingredient total.

NCFAP recomputed the estimates of percent base acres treated by dividing the DPR estimates of number of base acres treated by the Census of Agriculture's crop acreage estimates. In some cases, there is considerable discrepancy between the Census and the DPR statewide acreage estimates.⁸ As a result, NCFAP's estimates of percent acres treated are not in exact agreement with the unpublished DPR estimates. NCFAP recomputes the estimates of acres treated and pounds applied by multiplying the Census acreage estimates times the estimates of percent acres treated and annual application amounts (lbs/AI/A/YR). Generally, there is close agreement between NCFAP's and CALDPR's estimates of total pounds of active ingredient applied by crop. In some cases, NCFAP has drawn pesticide use coefficients for California crops from NASS surveys and from crop profiles.

⁷ The database was provided by Larry Wilhoit of DPR.

⁸ This discrepancy is discussed at length in several crop profiles from California, such as strawberries.

For methyl bromide, the statewide DPR summaries include several large subtotals that are not disaggregated by crop, such as “uncultivated agricultural areas” and “soil applications, preplant – outdoors.” An examination of the detailed California usage file that contains the individual application records revealed that much of the unspecified methyl bromide usage is in three counties: Fresno, Madera and Tulare. The agricultural commissioners in those three counties were contacted and provided percentage estimates of the unspecified methyl bromide usage by crop. These percentages were used to distribute the estimates of unspecified methyl bromide usage in these counties to the individual crops identified by the county commissioners.⁹ Usage records for methyl bromide that were developed with this adjustment procedure are assigned a reference code of 503.

- Survey of Extension Service Specialists (4,662 records)

Survey forms were sent to university extension service specialists asking for profiles of active ingredient usage by crop for 1997. The survey forms included the 1992 usage estimates. Survey forms were sent for crops and states not included in the sources listed above (NASS, CSREES, Crop Profiles, CALDPR).

The surveys were sent to specialists who were identified as having participated in previous NCFAP surveys and NAPIAP assessments. In addition, extension specialists were identified by discipline from the published pest management handbooks issued by state university extension services.

⁹ This procedure is discussed in more detail in the report [The Economic Impact of the Scheduled U.S. Phaseout of Methyl Bromide](#) available on NCFAP’s website: www.ncfap.org

277 extension service specialists responded to the survey request. They are all listed individually in the reference list.

- Other Sources (821 records)

Several commodity organizations provided estimates of the use of individual active ingredients by state: the Mint Industry Research Council [344], the Cranberry Institute [336], the U.S. Hop Plant Protection Committee [253], the Oregon Hop Commission [254], the Minnesota Canola Council [347], and the Florida Fruit and Vegetable Association [380]. In addition, several commodity groups' publications include pesticide use data that has been included in the 1997 database: the Michigan Potato Commission [027] [514], the Mint Industry Research Council [063] [064], the National Cotton Council [437], and Cotton Inc. [460]. Two independent crop consultants [290] [314] and five pest management specialists at food corporations [121] [186] [228] [373] [384] profiled usage patterns. Usage profiles for sugarbeets in Montana, North Dakota and Minnesota were drawn from an annual publication of the North Dakota State University Extension Service [436]. Usage records for Wisconsin were drawn from a report funded by the Wisconsin State Legislature [054]. Two states with pesticide use reporting requirements provided estimates for certain pesticides and crops for which statewide aggregations had been tabulated: New Hampshire [445] and Arizona [009]. One state provided estimates of use under Section 18 registrations [518]. Identification of acreage planted with herbicide tolerant cotton varieties came from a USDA/AMS publication [519].

During the review procedure (outlined below), six individuals from agricultural chemical manufacturers provided estimates of the usage of individual active ingredients that are included in the 1997 database [378] [379] [381] [493] [504] [506].

- Assignments (3,321 records)

In certain cases (91 records), it was determined that the pesticide usage data for 1992 characterized the 1997 time period as well. In these cases the same references that had been included in the 1992 database are included as sources in the 1997 database: [475] [484] [492] [494] [495] [496] [497] [505] [515].

In certain cases (43 records), usage profiles provided by the above sources listed methyl bromide usage without listing a corresponding use amount for chloropicrin. Since methyl bromide is always applied in combination with chloropicrin, it was assumed that chloropicrin was used on the same percentage of acres as methyl bromide. Chloropicrin records that are based on this procedure are identified with a reference code of “900.”

In many cases (3,187 records), usage profiles were not available from the above sources for a crop in certain states. In these instances, usage estimates have been assigned by assuming that the state’s pesticide use profile for a particular active ingredient/crop combination is identical to that of a nearby state. Usage records that have been assigned based on the profile for a nearby state have been assigned a reference code of “999.”

5.0 Review Procedures

A preliminary version of the 1997 usage database was sent out for review by contacts at university extension services and at agricultural chemical companies. The state university contacts are identified in Table 6. These individuals traditionally have been identified as State Liaison Representatives (SLRs) to CSREES's NAPIAP. As such their responsibilities have included maintaining information on pesticide usage in their states. Accordingly, they were asked to review the preliminary usage estimates for their states in terms of accuracy and completeness. Several of these state contacts provided extensive comments on the preliminary database; others did not respond to this request.

The industry contacts listed in Table 7 were sent the preliminary usage estimates for their companies' active ingredients. In some cases, no response was received regarding the review requests. In other cases extensive comments were made regarding the accuracy and completeness of the preliminary 1997 usage estimates. In six cases, the industry contacts were willing to serve as sources for particular usage estimates for their products. They are identified as references [378] [379] [381] [493] [504] and [506].

In those cases for which the industry or university contacts reported large discrepancies between the preliminary 1997 usage estimates and industry or university data, an effort was made to resolve the discrepancies. In some cases, the preliminary 1997 estimates were revised by substitution of data sources. For example, a preliminary estimate may have been based on the 1997 NASS Field Crop Survey, but, subsequently, was revised to the 1996 Field Crop Survey if that helped to resolve discrepancies. In other cases, usage estimates from crop profiles were substituted for NASS data that may have been utilized initially in the preliminary database. In some cases, follow-up surveys were made with extension service specialists to try to resolve discrepancies. In some cases, these procedures were successful and permitted revision of the preliminary data which resulted in estimates closer to those of industry or universities. However, in other cases, these

procedures were not successful in resolving such differences and the preliminary estimates were not revised.

The listing of an individual or an organization in Tables 6 and 7 does not imply any endorsement of the accuracy of the 1997 national pesticide use database. These names are provided for informational purposes only: these are the individuals who were contacted for the purpose of reviewing the preliminary 1997 data.

6.0 Results/Summaries

Tables 8, 9, 10 and 11 list the estimates of national usage in terms of pounds for individual active ingredients according to pesticide type (fungicides, herbicides, insecticides and other). These national estimates are sums of the individual records by state and crop. These tables include the national sums by active ingredient for both 1992 and 1997. It should be noted that the insecticide Bt is not reported in terms of pounds of active ingredient, due to its nature. Therefore, its totals are listed as blanks in Table 10. Table 12 lists the top 10 active ingredients in each pesticide category in terms of pounds of national usage in 1997.

Table 13 compares NCFAP's 1997 national usage totals with EPA's estimates of the national usage of the 25 largest volume "conventional" pesticide active ingredients used in agriculture. As can be seen, the NCFAP totals are within EPA's range for 19 of the active ingredients. NCFAP's 1997 estimates are lower than EPA's usage range for 1 active ingredient while being higher than EPA's usage range for 5 active ingredients.

It should be noted that since EPA's ranking excludes certain pesticides (such as sulfuric acid, oil and sulfur), there is a discrepancy between EPA's listing of the top 25 largest volume pesticides used in agriculture and NCFAP's. The three active ingredients noted above (sulfuric acid, oil and sulfur) are all included in NCFAP's highest volume 10 active ingredients listing (Table 12).

In the aggregate, there is rough agreement between the NCFAP national pesticide use estimates for agricultural uses and estimates made by USEPA's Office of Pesticide Programs. Table 14 compares NCFAP's and USEPA's aggregate usage estimates for 1992 and 1997 by agricultural use category. The NCFAP totals for insecticides, fungicides and other pesticides have been adjusted so that they are definitionally the same as EPA's: certain active ingredients are included in a category called "other chemicals". (See the note for Table 14.)

Eighty-seven crops are profiled for one or more of the 48 coterminous states. Table 15 lists the 87 crops and shows the total national usage amount for each crop. Table 16 lists the 48 States and shows the total usage for each state. Table 17 lists the 10 crops and states that rank the highest in terms of total volume of pesticide active ingredients applied in 1997.

7.0 Caveats/Disclaimers

The NCFAP national pesticide use database 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. Some of the estimates are based on surveys of farmers, others are expert opinions from knowledgeable extension service specialists. Because of the absence of data for many states and crops, many records have been assigned based on the data from a nearby state. It is unclear as to how accurate this procedure is. No claims of statistical accuracy are made with regard to the NCFAP national pesticide use database.

The NCFAP database is limited to cropland uses of pesticides only. Seed treatments, greenhouse uses, ornamental uses, livestock uses, rodenticides, postharvest uses and animal repellants are not included.

Although references made to the years 1992 and 1997 as the benchmark years for the database, the data records are drawn from the years 1990-1993 and 1994-1998. The NCFAP databases are more accurately described as circa 1992 and circa 1997.

Note: The active ingredient Bt is not estimated in terms of pounds of use. The only usage parameter included for Bt is acres treated.

8.0 1992 Database Adjustments

In assembling the 1997 estimates and comparing them to the 1992 estimates, the need to adjust several of the 1992 records became necessary. The rate of azinphos-methyl on apples in Washington had been included, inadvertently, in the 1992 database as “2.02.” Upon review of the original data source, the estimate was converted to “3.02.” In the 1997 database, in all instances, when a crop is treated with methyl bromide a companion estimate for chloropicrin has been made. (See discussion above in Section 4.0.) This procedure was not used for the 1992 database. Consequently, there are several instances in the original 1992 database where methyl bromide’s use is included without a corresponding estimate for chloropicrin. To remedy this oversight, 23 records for chloropicrin have been added to the 1992 database so that in every instance where methyl bromide is used, a companion chloropicrin estimate exists. In addition, three chloropicrin estimates originally made in the 1992 database have been revised because of a significant discrepancy between the estimates for percent crop treated between chloropicrin and methyl bromide. In addition, to being used wherever methyl bromide is used, it also is assumed that the same percentage of acres would be treated with both methyl bromide and chloropicrin. In these three instances, chloropicrin had been estimated to have been used on significantly fewer acres than had methyl bromide. In these three instances, as in the 23 new records for chloropicrin, the estimate of percent acreage treated for chloropicrin is assumed to be the same as for methyl bromide. An additional reference code of “900” has been added to the 1992 database to identify those instances in which chloropicrin usage has been assumed to have been applied in combination with previously identified use of methyl bromide.

With these exceptions, for chloropicrin and azinphos-methyl, there is exact agreement between the usage estimates for 1992 in this report and those previously released. Since the 1992 database is included in its entirety on the NCFAP website, the list of references used in the 1992 database is included in this report as Section 11.0.

9.0 Internet File Description

The entire NCFAP 1992 and 1997 pesticide use databases are available on NCFAP's website: www.ncfap.org A visitor to the website has several options:

- (1) View this National Summary report Pesticide Use in U.S. Crop Production: 1997.
- (2) View National Summary Reports for Active Ingredients by Crop. These reports are available for both 1992 or 1997 by active ingredient. After selecting an active ingredient and year, a national summary of use is displayed. This national summary adds up the estimates of acres treated and pounds used from the individual database records to national totals. The computer routine accesses a file that contains estimates of the national acreage planted for each crop. These estimates are displayed in this report as "NCFAP Acres" in Table 2. The routine divides the national acreage of a crop treated with an active ingredient by the national estimate of acres planted to compute an estimate of "% Acres Treated" that represents the percent of the nation's acres of the crop treated with the active ingredient. The routine also adds up the estimates of pounds of active ingredient applied to a national total by crop. By dividing the estimate of pounds of active ingredient applied by crop by the estimate of acres treated, the routine computes a value for the average annual national rate of application (Lbs AI/A) for the active ingredient on the crop. These estimates are displayed in this report in two summary tables for each active ingredient: Table 18A and Table 18B, the national summaries for 1992 and 1997, respectively.
- (3) View Reports for Active Ingredients by Crop and State. These reports format the individual data records for either 1992 or 1997. The selection can be made by either active ingredient, crop or state. Thus, all of the records can be previewed for any individual active ingredient. Likewise, all of the records can be previewed for a particular crop or state. The routine allows the user to apply filters by state, crop or active ingredient. However, there is no guarantee that a search will produce any

records that meet the specified combination. It is advised to use the option “All pesticides” or “All crops” or “All states” initially in order to see which states or crops or active ingredients are included for the area of interest. These tables are included as Tables 1A and 1B in this report, including records from 1992 and 1997, respectively.

Each record in the database is specific by active ingredient, crop and state. The following description applies to the individual fields displayed on each record:

(a) Pesticide: 235 Unique Active Ingredient Names

There are 200 active ingredients included in the 1992 database and 220 in the 1997. One hundred eighty-five ingredients are included for both years. Fifteen active ingredients that were included in the 1992 file are not included in the 1997 file. Thirty-five new active ingredients have been added to the 1997 file.

(b) Crop: 87 Unique Crop Names

The crop names are identical for the 1992 and 1997 databases.

(c) State: 48 State Names

(d) Acres Planted: From the Census of Agriculture (either 1992 or 1997)

(e) % Acres Treated: The percentage of the crop in the state treated with the active ingredient on an annual basis

(f) LBS AI/Acre: The amount of the active ingredient used on a treated acre on an annual basis

(g) Acres Treated: Acres Planted x % Acres Treated x 0.01

(h) LBS AI Applied: Acres Treated x LBS AI/A

(i) REF: The Reference Code

The reference code identifies the source of the usage parameters. These “REF’s” are identified in Sections 10.0 and 11.0 of this report for 1997 and 1992, respectively.

Note: The active ingredient Bt is not estimated in terms of pounds of use. The only usage parameter included for Bt is acres treated.

(4) Download Records from the Database

The user has the option of downloading the entire database or selected records from the database. The entire database may be downloaded in either Microsoft Excel, Microsoft Access or common delimited text (.csv) format. Selected records may be downloaded in comma delimited text (.csv) format only.

The entire file contains 20886 records. Each record contains fields for data for 1992 and 1997. There are records for crop uses and active ingredients that are included for 1992 and for which usage was not tabulated for 1997. This is the result of three factors: (1) the active ingredient used was canceled subsequent to 1992; (2) the state/crop combination is no longer tracked by NCFAP (See Table 3 for a list of state/crop combinations not included in the 1997 database.); and (3) the active ingredient is not reported as having been used on the crop in the state in 1997. Likewise there are records for which the 1997 parameters are filled in while the 1992 fields are blank. These situations arise because of three factors: (1) the active ingredient was newly introduced subsequent to 1992; (2) NCFAP added the state/crop combination to its database subsequent to the 1992 compilation (See Table 4 to identify state/crop combinations that were added to the 1997 database.); and (3) the active ingredient was not reported as being used on the crop in the state in 1992 but was reported as being used in 1997.

The format of the downloaded records is as follows:

- a. Pesticide Name: 235 unique active ingredient names
- b. Type: Each active ingredient is classified into one of four categories:
 - Herbicides
 - Insecticides
 - Fungicides
 - Other Pesticides
- c. Crop: 87 Unique Crop Names
- d. State: 48 State Names
- e. AC92: Acres Planted (1992 Census)
- f. PCT92: Percent Acres Treated (1992)

- g. Rate92: Annual Application Amount (LBS AI/A) (1992)
- h. REF92: Reference Code for 1992 Estimates (See Section 11.0)
- i. ACTRT92: Acres Treated (1992) $PCT92 \times AC92 \times 0.01$
- j. LBS92: LBS AI Applied (1992) $ACTRT92 \times Rate92$
- k. AC97: Acres Planted (1997 Census)
- l. PCT97: Percent Acres Treated (1997)
- m. Rate97: Annual Application Amount (LBS AI/A) (1997)
- n. REF97: Reference Code for 1997 Estimates (See Section 10.0)
- o. ACTRT97: Acres Treated (1997) $PCT97 \times AC97 \times 0.01$
- p. LBS97: LBS AI Applied (1997) $ACTRT97 \times Rate97$

TABLE 1A: Active Ingredients Included in the 1997 National Pesticide Use Database

A. FUNGICIDES

<u>Active Ingredient</u>	<u>Trade Names</u>		
Azoxystrobin***	Abound	Quadris	
Benomyl	Benlate		
Captan			
Chlorothalonil	Bravo	Echo	Thalonil
Copper	Kocide	Nucop	Champ
Cymoxanil***	Curzate		
DCNA	Dicloran	Botran	
Dimethomorph***	Acrobat		
Dodine	Syllit		
Etridiazole	Terraguard		
Fenarimol	Rubigan		
Fenbuconazole***	Enable	Indar	
Ferbam	Carbamate		
Flutolanil***	Prostar	Moncut	
Fosetyl-AL	Aliette		
Iprodione	Rovral		
Mancozeb	Dithane	Manzate	Penncozeb
Maneb	Manex		
Mefenoxam***	Ridomil Gold	Apron XL	
Metalaxyl	Apron	Ridomil	
Metiram	Polyram		
Myclobutanil	Nova	Rally	
Oxytetracycline	Mycoshield		
PCNB	Terraclor		
Propamocarb***	Tattoo		
Propiconazole	Orbit	Tilt	Break
Streptomycin	Agrimycin		
Sulfur	Thiolux	Microthiol	
Tebuconazole***	Folicur	Elite	
Thiophanate Methyl	Topsin		
Thiram			
Triadimefon	Bayleton		
Triflumizole***	Procure		
Triforine	Funginex		
Triphenyltin Hyd	Supertin	Du-Ter	
Vinclozolin	Ronilan		
Ziram			

* Active Ingredient canceled or withdrawn

** Active Ingredient no longer manufactured

*** New Active Ingredient

TABLE 1A: Active Ingredients Included in the 1997 National Pesticide Use Database (Cont.)

B. HERBICIDES

<u>Active Ingredient</u>	<u>Trade Names</u>		
2,4-D	Hi-Dep	Formula 40	Weedar 64
2,4-DB	Butyrac	Butoxone	
Acetochlor***	Harness	Surpass	
Acifluorfen	Blazer		
Alachlor	Lasso	Micro-Tech	Partner
Ametryn	Evik		
Asulam	Asulox		
Atrazine	Aatrex		
Benfen	Balan		
Bensulfuron	Londax		
Bensulide	Prefar		
Bentazon	Basagran		
Bromacil	Hyvar		
Bromoxynil	Buctril	Bromox	
Butylate	Sutan		
Chlorimuron	Classic		
Chlorsulfuron	Glean		
Clethodim	Select	Prism	
Clomazone	Command		
Clopyralid	Stinger		
Cyanazine	Bladex	Cy-Pro	
Cycloate	Ro-Neet		
DCPA**	Dacthal		
Desmedipham	Betanex		
Dicamba	Banvel	Clarity	
Dichlobenil	Casoron	Dyclomec	
Diclofop	Hoelon		
Difenzoquat	Avenge		
Dimethenamid***	Frontier		
Diquat	Reglone		
Diuron	Direx	Karmex	
DSMA	Ansar 8100		
Endothall	Accelerate	Des-I-Cate	Herbicide 273
EPTC	Eptam	Eradicane	
Ethalfuralin	Curbit	Sonalan	
Ethofumesate	Nortron	Progress	
Fenoxaprop	Option II	Whip	Acclaim
Fluazifop	Fusilade		
Flumetsulam***	Broadstrike		
Flumiclorac***	Resource		

TABLE 1A: Active Ingredients Included in the 1997 National Pesticide Use Database

B. HERBICIDES (Cont.)

<u>Active Ingredient</u>	<u>Trade Names</u>		
Fluometuron	Cotoran	Meturon	Flo-Met
Fomesafen	Reflex	Flexstar	
Glyphosate	Roundup		Glyphos
Halosulfuron***	Permit		
Hexazinone	Velpar	Pronone	
Imazapic***	Cadre		
Imazamethabenz	Assert		
Imazaquin	Scepter		
Imazethapyr	Pursuit		
Lactofen	Cobra		
Linuron	Linex	Lorox	
MCPA	Chiptox	Rhonox	
MCPB	Thistrol		
MCPP	Mecoprop		
Metolachlor	Dual		
Metribuzin	Lexone	Sencor	
Metsulfuron	Ally	Escort	
Molinate	Ordram		
MSMA	Bueno 6	Ansar 6-6	
Napropamide	Devrinol		
Naptalam	Alanap		
Nicosulfuron	Accent		
Norflurazon	Evital	Solicam	Zorial
Oryzalin	Surflan		
Oxyfluorfen	Goal		
Paraquat	Cyclone	Gramoxone	Starfire
Pebulate	Tillam		
Pendimethalin	Prowl		
Phenmedipham	Spin-Aid	Betanal	
Picloram	Tordon		
Primisulfuron	Beacon		
Prometryn	Caparol	Cotton-Pro	
Pronamide	Kerb		
Propachlor	Ramrod		
Propanil	Stam		
Prosulfuron***	Peak		
Pyrazon	Pyramin		
Pyridate	Tough		
Pyriithiobac***	Staple		
Quinclorac	Facet		
Quizalofop	Assure		

TABLE 1A: Active Ingredients Included in the 1997 National Pesticide Use Database

B. HERBICIDES (Cont.)

<u>Active Ingredient</u>	<u>Trade Names</u>		
Rimsulfuron***	Matrix	Basis****	
Sethoxydim	Poast	Conclude G	Torpedo
Simazine	Princep		
Sulfentrazone***	Authority	Spartan	
Tebuthiuron	Spike		
Terbacil	Sinbar		
Thifensulfuron	Pinnacle	Basis****	
Thiobencarb	Bolero	Abolish	
Triallate	Far-Go		
Triasulfuron	Amber		
Tribenuron	Express		
Triclopyr	Garlon		
Trifluralin	Treflan	Tri-4	Trilin
Triflusulfuron***	Upbeet		
Vernolate*	Vernam		

* Active Ingredient canceled or withdrawn

** Active Ingredient no longer manufactured

*** New Active Ingredient

**** Basis contains two active ingredients: rimsulfuron and thifensulfuron.

TABLE 1A: Active Ingredients Included in the 1997 National Pesticide Use Database (Cont.)

C. INSECTICIDES

<u>Active Ingredient</u>	<u>Trade Names</u>		
Abamectin	Agri-Mek	Avid	Zephyr
Acephate	Orthene	Payload	
Aldicarb	Temik		
Amitraz	Mitac	Ovasyn	
Azadirachtin***	Neemix	Trilogy	Azatin
Azinphos-Methyl	Guthion	Sniper	
Bifenthrin	Brigade	Capture	
Bt	Novodor	Condor	Dipel
Buprofezin***	Applaud		
Carbaryl	Sevin		
Carbofuran	Furadan		
Chlorethoxyfos***	Fortress		
Chlorpyrifos	Lorsban	Chlorfos	Nufos
Clofentezine	Apollo		
Cryolite	Kryocide	Prokil	
Cyfluthrin	Baythroid		
Cypermethrin	Ammo	Cymbush	Fury/ Mustang
Cyromazine	Trigard		
Deltamethrin***	Decis		
Diazinon	D-Z-N		
Dicofol	Kelthane		
Dicrotophos	Bidrin		
Diflubenzuron	Dimilin	Micromite	
Dimethoate	Cygon		
Disulfoton	Di-Syston		
Endosulfan	Thiodan	Phaser	Golden Leaf
Esfenvalerate	Asana		
Ethion			
Ethoprop	Mocap		
Ethyl Parathion			
Fenamiphos	Nemacur		
Fenbutatin Oxide	Vendex	Hexakis	
Fenpropathrin	Danitol		
Fonofos*	Dyfonate		
Formetanate HCL	Carzol		
Hexythiazox***	Savey		
Imidacloprid***	Admire	Provado	
Lambdacyhalothrin	Karate	Warrior	
Lindane			
Malathion	Cythion		
Metaldehyde	Deadline		

TABLE 1A: Active Ingredients Included in the 1997 National Pesticide Use Database (Cont.)

C. INSECTICIDES (Cont.)

<u>Active Ingredient</u>	<u>Trade Names</u>		
Methamidophos	Monitor		
Methidathion	Supracide		
Methomyl	Lannate		
Methoxychlor	Marlate		
Methyl Parathion	Pennacap-M		
Naled	Dibrom		
Oil	Volck Supreme	Sunspray	Citri Oil
Oxamyl	Vydate		
Oxydemeton-Methyl	Metasystox		
Oxythioquinox	Morestan	Joust	
Permethrin	Ambush	Pounce	
Phorate	Thimet		
Phosmet	Imidan		
Profenofos	Curacron		
Propargite	Comite	Omite	
Pyridaben ^{***}	Pyramite	Nexter	Sanmite
Pyriproxyfen ^{***}	Knack		
Spinosad ^{***}	Conserve	Success	Tracer
Sulprofos [*]	Bolstar		
Tebufenozide ^{***}	Confirm		
Tebupirimphos ^{***}	Aztec		
Tefluthrin	Force		
Terbufos	Counter		
Thiodicarb	Larvin		
Tralomethrin	Scout		

* Active Ingredient canceled or withdrawn

** Active Ingredient no longer manufactured

*** New Active Ingredient

TABLE 1A: Active Ingredients Included in the 1997 National Pesticide Use Database (Cont.)

D. OTHER PESTICIDES

<u>Active Ingredient</u>	<u>Trade Names</u>		
1,3-D	Telone		
Benzyladenine***	Accel	RiteSize	
Butenoic Acid***	Retain		
Cacodylic Acid	Cotton-Aide	Montar	
Chloropicrin			
Cyclanilide***	Finish		
Cytokinins	Burst	Promalin****	Triggr
Dimethipin	Harvade		
Ethephon	Cerone	Ethrel	Prep
Flumetralin***	Prime		
Gibberellic Acid	Provide	Progibb	Promalin****
Maleic Hydrazide	Royal MH-30	Sprout Stop	
Mepiquat Chloride	Pix	Mepichlor Pill	
Metam Sodium	Vapam		
Methyl Bromide			
NAA	Fruitone	Liqui-Stik	Fruit Fix
NAD	Amid-Thin		
Sodium Chlorate	Defol		
Sulfuric Acid			
Thidiazuron	Dropp		
Tribufos	Def	Folex	

* Active Ingredient canceled or withdrawn

** Active Ingredient no longer manufactured

*** New Active Ingredient

**** Promalin contains two active ingredients: cytokinins and gibberellic acid

TABLE 1B: Active Ingredients Included in the 1997 National Pesticide Use Database

A. FUNGICIDES

Active Ingredient	Producers/Registrants		
Azoxystrobin***	Zeneca		
Benomyl	Dupont		
Captan	Micro Flo	Drexel	UAP
Chlorothalonil	Zeneca	Sipcam	
Copper	Griffin	Agtrol	Micro Flo
Cymoxanil***	Dupont		
DCNA	Gowan	Wilbur Ellis	
Dimethomorph***	American Cyanamid		
Dodine	UAP		
Etridiazole	Uniroyal		
Fenarimol	Dow Agro		
Fenbuconazole***	Rohm and Haas		
Ferbam	UCB		
Flutolanil***	Agrevo	Gowan	
Fosetyl-AL	Rhone-Poulenc		
Iprodione	Rhone-Poulenc		
Mancozeb	Rohm and Haas	Griffin	Atochem
Maneb	Atochem	Griffin	
Mefenoxam***	Novartis		
Metalaxyl	Novartis	Gustafson	
Metiram	UAP		
Myclobutanil	Rohm and Haas		
Oxytetracycline	Novartis		
PCNB	Uniroyal	Amvac	
Propamocarb***	Agrevo		
Propiconazole	Novartis		
Streptomycin	Novartis		
Sulfur	Atochem	Drexel	Platte
Tebuconazole***	Bayer		
Thiophanate Methyl	Atochem	Cleary	
Thiram	UCB		
Triadimefon	Bayer		
Triflumizole***	Uniroyal		
Triforine	Novartis		
Triphenyltin Hyd	Griffin		
Vinclozolin	BASF		
Ziram	Atochem	UCB	

* Active Ingredient canceled or withdrawn

** Active Ingredient no longer manufactured

*** New Active Ingredient

TABLE 1B: Active Ingredients Included in the 1997 National Pesticide Use Database (Cont.)

B. HERBICIDES

<u>Active Ingredient</u>	<u>Producers/Registrants</u>	
2,4-D	Dow Agro	Albaugh
2,4-DB	Albaugh	Cedar
Acetochlor***	Monsanto	Zeneca
Acifluorfen	BASF	
Alachlor	Monsanto	
Ametryn	Novartis	
Asulam	Rhone-Poulenc	
Atrazine	Novartis	Drexel
Benefin	Dow Agro	Platte
Bensulfuron	Dupont	
Bensulide	Gowan	Platte
Bentazon	BASF	
Bromacil	Dupont	
Bromoxynil	Rhone-Poulenc	Micro Flo
Butylate	Micro Flo	
Chlorimuron	Dupont	
Chlorsulfuron	Dupont	
Clethodim	Valent	
Clomazone	FMC	
Clopyralid	Dow Agro	
Cyanazine	Dupont	Griffin
Cycloate	Zeneca	
DCPA**	Zeneca	
Desmedipham	Agrevo	
Dicamba	BASF	
Dichlobenil	Uniroyal	
Diclofop	Agrevo	
Difenzoquat	American Cyanamid	
Dimethenamid***	BASF	
Diquat	Zeneca	
Diuron	Griffin	Drexel
DSMA	Drexel	Zeneca
Endothall	Atochem	
EPTC	Zeneca	
Ethalfuralin	UAP	Dow Agro
Ethofumesate	Agrevo	
Fenoxaprop	Agrevo	
Fluazifop	Zeneca	
Flumetsulam***	Dow Agro	
Flumiclorac***	Valent	

TABLE 1B: Active Ingredients Included in the 1997 National Pesticide Use Database (Cont.)

B. HERBICIDES (Cont.)

<u>Active Ingredient</u>	<u>Producers/Registrants</u>		
Fluometuron	Novartis	Griffin	Micro Flo
Fomesafen	Zeneca		
Glyphosate	Monsanto		Cheminova
Halosulfuron***	Monsanto		
Hexazinone	Dupont	Proserve	
Imazapic***	American Cyanamid		
Imazamethabenz	American Cyanamid		
Imazaquin	American Cyanamid		
Imazethapyr	American Cyanamid		
Lactofen	Valent		
Linuron	Griffin	Drexel	
MCPA	Albaugh	Nufarm	
MCPB	Rhone-Poulenc		
MCPP	Riverdale		
Metolachlor	Novartis		
Metribuzin	Dupont	Bayer	
Metsulfuron	Dupont		
Molinate	Zeneca		
MSMA	Drexel	Zeneca	Helena
Napropamide	United Phosphorus		
Naptalam	Uniroyal		
Nicosulfuron	Dupont		
Norflurazon	Novartis		
Oryzalin	Dow Agro		
Oxyfluorfen	Rohm and Haas		
Paraquat	Zeneca		
Pebulate	Zeneca		
Pendimethalin	American Cyanamid		
Phenmedipham	Agrevo		
Picloram	Dow Agro		
Primisulfuron	Novartis		
Prometryn	Novartis	Griffin	Gowan
Pronamide	Rohm and Haas		
Propachlor	Monsanto		
Propanil	Rohm and Haas	Cedar	
Prosulfuron***	Novartis		
Pyrazon	BASF		
Pyridate	Novartis		
Pyriithiobac***	Dupont		
Quinclorac	BASF		
Quizalofop	Dupont		

TABLE 1B: Active Ingredients Included in the 1997 National Pesticide Use Database (Cont.)

B. HERBICIDES (Cont.)

<u>Active Ingredient</u>	<u>Producers/Registrants</u>		
Rimsulfuron***	Dupont		
Sethoxydim	BASF		
Simazine	Novartis	Drexel	
Sulfentrazone***	Dupont	FMC	
Tebuthiuron	Dow Agro		
Terbacil	Dupont		
Thifensulfuron	Dupont		
Thiobencarb	Valent		
Triallate	Monsanto		
Triasulfuron	Novartis		
Tribenuron	Dupont		
Triclopyr	Dow Agro		
Trifluralin	Dow Agro	Griffin	Albaugh
Triflusulfuron***	Dupont		
Vernolate*	Drexel		

- * Active Ingredient canceled or withdrawn
- ** Active Ingredient no longer manufactured
- *** New Active Ingredient

TABLE 1B: Active Ingredients Included in the 1997 National Pesticide Use Database (Cont.)

C. INSECTICIDES

<u>Active Ingredient</u>	<u>Producers/Registrants</u>		
Abamectin	Novartis		
Acephate	Valent	Micro Flo	
Aldicarb	Rhone-Poulenc		
Amitraz	Agrevo		
Azadirachtin***	Olympic	Thermo Trilogy	Amvac
Azinphos-Methyl	Bayer	Gowan	UAP
Bifenthrin	FMC		
Bt	Abbott	Ecogen	Mycogen
Buprofezin***	Agrevo		
Carbaryl	Rhone-Poulenc	Drexel	
Carbofuran	FMC		
Chlorethoxyfos***	Dupont	Amvac	
Chlorpyrifos	Dow Agro	Griffin	Cheminova
Clofentezine	Agrevo		
Cryolite	Atochem	Gowan	
Cyfluthrin	Bayer		
Cypermethrin	FMC		
Cyromazine	Novartis		
Deltamethrin***	Agrevo		
Diazinon	Novartis	Gowan	Drexel
Dicofol	Rohm and Haas		
Dicrotophos	Amvac		
Diflubenzuron	Uniroyal		
Dimethoate	Cheminova	UAP	Drexel
Disulfoton	Bayer		
Endosulfan	FMC	Agrevo	
Esfenvalerate	Dupont		
Ethion	FMC	Micro Flo	Cheminova
Ethoprop	Rhone-Poulenc		
Ethyl Parathion	Cheminova		
Fenamiphos	Bayer		
Fenbutatin Oxide	Griffin		
Fenpropathrin	Valent		
Fonofos*	Zeneca		
Formetanate HCL	Agrevo		
Hexythiazox***	Gowan		
Imidacloprid***	Bayer		
Lambdacyhalothrin	Zeneca		
Lindane	Drexel		
Malathion	Cheminova	Helena	UAP
Metaldehyde	Pace	Amvac	

TABLE 1B: Active Ingredients Included in the 1997 National Pesticide Use Database (Cont.)

C. INSECTICIDES (Cont.)

<u>Active Ingredient</u>	<u>Producers/Registrants</u>		
Methamidophos	Bayer	Valent	
Methidathion	Gowan		
Methomyl	Dupont	Terra	
Methoxychlor	Kincaid		
Methyl Parathion	Atochem	Cheminova	Wilbur Ellis
Naled	Amvac		
Oil	Valent	Sun	Wilbur Ellis
Oxamyl	Dupont		
Oxydemeton-Methyl	Gowan		
Oxythioquinox	Olympic		
Permethrin	Zeneca	FMC	
Phorate	American Cyanamid	UAP	Terra
Phosmet	Gowan		
Profenofos	Novartis		
Propargite	Uniroyal		
Pyridaben ^{***}	BASF		
Pyriproxyfen ^{***}	Valent		
Spinosad ^{***}	Dow Agro		
Sulprofos [*]	Bayer		
Tebufenozide ^{***}	Rohm and Haas		
Tebupirimphos ^{***}	Bayer		
Tefluthrin	Zeneca		
Terbufos	American Cyanamid		
Thiodicarb	Rhone-Poulenc		
Tralomethrin	Agrevo		

- * Active Ingredient canceled or withdrawn
- ** Active Ingredient no longer manufactured
- *** New Active Ingredient

TABLE 1B: Active Ingredients Included in the 1997 National Pesticide Use Database (Cont.)

D. OTHER PESTICIDES

<u>Active Ingredient</u>	<u>Producers/Registrants</u>		
1,3-D	Dow Agro		
Benzyladenine***	Abbott	Agtrol	
Butenoic Acid***	Abbott		
Cacodylic Acid	Monterey		
Chloropicrin	Great Lakes		
Cyflanilide***	Rhone-Poulenc		
Cytokinins	Abbott	Westbridge	
Dimethipin	Uniroyal		
Ethephon	Agrevo	Rhone-Poulenc	Griffin
Flumetralin***	Novartis		
Gibberellic Acid	Abbott	Micro Flo	
Maleic Hydrazide	Uniroyal	Drexel	
Mepiquat Chloride	BASF	Micro Flo	
Metam Sodium	Amvac	UCB	
Methyl Bromide	Albemarle	Great Lakes	Trical
NAA	Amvac		
NAD	Amvac		
Sodium Chlorate	Drexel		
Sulfuric Acid	Asarco	Kennecott	Noranda
Thidiazuron	Agrevo		
Tribufos	Rhone-Poulenc	Bayer	

* Active Ingredient canceled or withdrawn

** Active Ingredient no longer manufactured

*** New Active Ingredient

TABLE 2: Crops Included in the 1997 National Pesticide Use Database

<u>Crop</u> <u>(Census Definition)</u>	<u>Census Acres</u>	<u>NCFAP Acres</u>	<u>%</u>
Alfalfa (Alfalfa Hay)	21,309,784	21,301,399	99
Almonds (Almonds)	540,276	540,222	99
Apples (Apples)	570,320	563,655	99
Apricots (Apricots)	25,776	23,454	91
Artichokes (Artichokes)	10,821	10,678	99
Asparagus (Asparagus)	78,088	73,225	94
Avocados (Avocados)	77,144	74,404	96
Barley (Barley for Grain)	5,944,951	5,887,826	99
Beets (Beets)	10,993	9,005	82
Blackberries (Blackberries)	7,611	5,629	74
Blueberries (Tame Blueberries, Wild Blueberries)	69,679	62,011	89
Broccoli (Broccoli)	143,661	140,078	98
Brussel Sprouts (Brussels Sprouts)	3,315	3,185	96
Cabbage (Head Cabbage)	82,407	77,470	94
Canola (Canola and Other Rapeseed)	533,343	526,941	99
Cantaloupes (Cantaloupes)	108,099	100,993	93
Carrots (Carrots)	135,898	133,337	98
Cauliflower (Cauliflower)	45,516	44,673	98
Celery (Celery)	33,215	31,791	96
Cherries (Cherries, Total)	120,649	118,942	99

TABLE 2: Crops Included in the 1997 National Pesticide Use Database (Cont.)

<u>Crop</u> (Census Definition)	<u>Census Acres</u>	<u>NCFAP Acres</u>	<u>%</u>
Citrus (All Citrus Fruit)	1,345,352	1,343,919	99
Collards (Collards)	15,703	11,587	74
Corn (Corn for Silage or Green Chop, Corn for Grain or Seed)	75,524,310	75,522,035	99
Cotton (Cotton)	13,235,235	13,227,053	99
Cranberries (Cranberries)	35,250	35,090	99
Cucumbers (Cucumbers and Pickles)	144,606	133,959	93
Dates (Dates)	6,611	6,302	95
Dry Beans (Dry Edible Beans (Excluding Dry Limas), Dry Lima Beans, Lentils)	1,939,311	1,893,661	98
Dry Peas (Dry Edible Peas, Dry Cowpeas and Dry Southern Peas)	317,864	233,385	73
Eggplant (Eggplant)	7,903	5,001	63
Fallowland (Cropland in Cultivated Summer Fallow)	20,905,910	19,333,869	92
Figs (Figs)	20,301	20,007	99
Flax (Flaxseed)	139,776	135,474	97
Garlic (Garlic)	33,227	32,412	98
Grapes (Grapes)	1,004,545	999,579	99
Green Beans (Green Lima Beans, Snap Beans)	323,756	316,793	98
Green Onions (Green Onions)	14,588	9,111	62
Green Peas (Green Cowpeas, Green Southern Peas, Green Peas (Excluding Green Cowpeas))	307,672	302,138	98
Hazelnuts (Filberts and Hazelnuts)	32,721	32,235	99

TABLE 2: Crops Included in the 1997 National Pesticide Use Database (Cont.)

<u>Crop</u> (Census Definition)	<u>Census Acres</u>	<u>NCFAP Acres</u>	<u>%</u>
Hops (Hops)	43,996	43,996	100
Hot Peppers (Hot Peppers)	45,032	38,651	86
Kiwi (Kiwi Fruit)	6,037	5,854	97
Lettuce (Lettuce and Romaine)	308,501	306,875	99
Melons (Honeydew Melons)	37,386	37,088	99
Millet (Proso Millet)	353,885	348,256	98
Mint (Mint for Oil)	169,847	166,691	98
Nectarines (Nectarines)	43,937	40,427	92
Oats (Oats for Grain)	2,680,958	2,666,972	99
Okra (Okra)	3,323	2,018	61
Olives (Olives)	37,714	37,714	100
Onions (Dry Onions)	165,266	163,950	99
Other Hay (Hay – Other Tame, Small Grain, Wild, Grass Silage, Green Chop (Alfalfa Hay Subtracted))	39,490,004	29,539,565	75
Parsley (Parsley)	5,430	3,062	56
Pasture (Pastureland, All Types)	491,045,004	489,332,861	99
Peaches (Peaches)	180,223	172,937	96
Peanuts (Peanuts for Nuts)	1,352,155	1,345,916	99
Pears (Pears)	77,917	74,962	96
Pecans (Pecans)	519,054	509,000	98

TABLE 2: Crops Included in the 1997 National Pesticide Use Database (Cont.)

<u>Crop</u> (Census Definition)	<u>Census Acres</u>	<u>NCFAP Acres</u>	<u>%</u>
Pistachios (Pistachios)	94,893	91,395	96
Plums/Prunes (Plums and Prunes)	155,625	154,097	99
Pomegranates (Pomegranates)	4,242	4,198	99
Potatoes (Potatoes, Excluding Sweet Potatoes)	1,355,241	1,353,108	99
Pumpkins (Pumpkins)	74,354	56,422	76
Radishes (Radishes)	24,168	20,709	86
Raspberries (Raspberries)	17,328	14,941	86
Rice (Rice)	3,122,120	3,110,864	99
Rye (Rye for Grain)	268,452	209,150	78
Safflower (Safflower)	195,100	145,576	75
Seed Crops (Field Seed and Grass Seed Crops)	1,327,579	1,249,301	94
Sod (Sod Harvested)	302,930	231,744	76
Sorghum (Sorghum Cut for Dry Forage or Hay, Sorghum for Silage or Green Chop, Sorghum for Grain or Seed)	8,936,684	8,846,903	99
Soybeans (Soybeans for Beans)	66,147,726	66,143,049	99
Spinach (Spinach)	41,360	35,902	87
Squash (Squash)	67,458	60,100	89
Strawberries (Strawberries)	53,477	52,310	98
Sugarbeets (Sugarbeets for Sugar)	1,453,824	1,435,052	99

**TABLE 2: Crops Included in the 1997 National Pesticide Use Database
(Cont.)**

<u>Crop</u> (Census Definition)	<u>Census Acres</u>	<u>NCFAP Acres</u>	<u>%</u>
Sugarcane (Sugarcane for Sugar, Sugarcane for Seed)	919,125	885,527	96
Sunflowers (Sunflower Seed)	2,534,708	2,515,133	99
Sweet Corn (Sweet Corn)	723,023	714,381	99
Sweet Peppers (Sweet Peppers)	61,581	58,849	96
Sweet Potatoes (Sweet Potatoes)	77,384	76,966	99
Tobacco (Tobacco)	838,530	838,159	99
Tomatoes (Tomatoes)	414,624	412,078	99
Walnuts (English Walnuts)	235,175	234,408	99
Watermelons (Watermelons)	177,469	169,563	95
Wheat (Wheat for Grain, Total)	58,836,344	58,835,105	99
Wild Rice (Wild Rice)	28,753	28,493	99

TABLE 3: State/Crop Combinations Not Included in the 1997 NCFAP Database

<u>State/Crop</u>	<u>1992 Acreage</u>
Alabama: Grapes	280
Arkansas: Sweet Peppers	69
Colorado: Cauliflower	145
Delaware: Apples	1,029
Delaware: Carrots	680
Delaware: Strawberries	118
Delaware: Sweet Peppers	142
Florida: Broccoli	435
Florida: Cauliflower	863
Florida: Onions	121
Florida: Peaches	1,468
Florida: Pumpkins	299
Illinois: Onions	302
Louisiana: Grapes	103
Maryland: Carrots	394
Massachusetts: Carrots	250
Massachusetts: Onions	53
Mississippi: Alfalfa	26,632
Nebraska: Onions	199
New Hampshire: Raspberries	70
New Jersey: Cauliflower	168
New Jersey: Onions	249
New York: Celery	320
North Carolina: Carrots	116
North Carolina: Eggplant	300
North Carolina: Green Peas	1,009
North Carolina: Onions	300
Ohio: Asparagus	124
Ohio: Broccoli	388
Ohio: Cauliflower	72
Ohio: Celery	200
Ohio: Eggplant	44
Ohio: Green Peas	91
Ohio: Plums	136
Ohio: Spinach	213
Oklahoma: Sweet Peppers	65
Pennsylvania: Carrots	196
Pennsylvania: Celery	129
Pennsylvania: Eggplant	86
Pennsylvania: Onions	400
Rhode Island: Strawberries	112
Rhode Island: Sweet Peppers	63
South Carolina: Onions	300
Texas: Cauliflower	900
Texas: Celery	1,400
Virginia: Spinach	1,000
West Virginia: Strawberries	100
Wisconsin: Celery	400
Total	42,533

TABLE 4: State/Crop Combinations Added to the 1997 NCFAP Database

<u>State/Crop</u>	<u>1997 Acreage</u>
Alabama: Canola	3,148
Arizona: Hot Peppers	4,072
Arizona: Sweet Corn	2,554
California: Mint	417
California: Other Hay	754,717
California: Wild Rice	10,501
Delaware: Pasture	19,722
Florida: Okra	1,098
Georgia: Canola	4,766
Indiana: Cantaloupes	2,686
Indiana: Grapes	428
Nevada: Pasture	5,503,307
New Mexico: Peanuts	16,132
New York: Blueberries	797
New York: Raspberries	362
Oregon: Canola	5,672
Rhode Island: Sod	2,591
Texas: Fallowland	1,139,194
Virginia: Cotton	98,244
Total	7,570,408

**TABLE 5: State/Crop Combinations for Which
1992 Acreage Data Used in 1997 Database**

<u>State/Crop</u>	<u>Acreage</u>
Delaware: Asparagus	248
Delaware: Cabbage	680
Kentucky: Seed Crops	17,798
Maine: Broccoli	2,367
Michigan: Seed Crops	14,596
Minnesota: Seed Crops	72,637
New Hampshire: Sod	944
New Mexico: Sweet Peppers	1,717
Ohio: Onions	500
Oklahoma: Potatoes	1,352
Rhode Island: Corn	2,000
Tennessee: Spinach	885
Washington: Broccoli	623
Washington: Cauliflower	2,176

TABLE 6: State Contacts for Pesticide Use Data Review		
Alabama	Jesse LaPrade	Auburn University
Arkansas	Ples Spradley	University of Arkansas
Arizona	Ken Agnew	University of Arizona
Arizona	Paul Baker	University of Arizona
California	Rick Melnicoe	University of California
Colorado	Sandra McDonald	Colorado State University
Connecticut	Candace Bartholomew	University of Connecticut
Delaware	Susan Whitney	University of Delaware
Florida	Norman Nesheim	University of Florida
Georgia	Paul Guillebeau	University of Georgia
Iowa	Sorrel Brown	Iowa State University
Idaho	Ronda Hirnyck	University of Idaho
Illinois	David Pike	University of Illinois
Indiana	Fred Whitford	Purdue University
Kansas	Donald Cress	Kansas State University
Kentucky	Monte Johnson	University of Kentucky
Louisiana	Mary Grodner	Louisiana State University
Massachusetts	Patricia Vittum	University of Massachusetts
Maryland	Amy Brown	University of Maryland
Maine	James Dill	University of Maine
Michigan	Lynnae Jess	Michigan State University
Minnesota	William Hutchison	University of Minnesota
Missouri	George Smith	University of Missouri
Mississippi	Ruth Morgan	Mississippi State University
Montana	Reeves Petroff	Montana State University
North Carolina	Stephen Toth	North Carolina State University
North Dakota	Phillip Glogoza	North Dakota State University
Nebraska	Shripat Kamble	University of Nebraska
Nevada	Glenn Miller	University of Nevada
New Hampshire	William Lord	University of New Hampshire
New Jersey	George Hamilton	Rutgers University
New Mexico	Richard Lee	New Mexico State University
New York	George Good	Cornell University
New York	Lee Stivers	Cornell University
Ohio	Joseph Kovach	Ohio State University
Oklahoma	Jim Criswell	Oklahoma State University
Oregon	Jeff Jenkins	Oregon State University
Pennsylvania	Win Hock	Pennsylvania State University
Rhode Island	Steven Alm	University of Rhode Island
South Carolina	Robert Bellinger	Clemson University
South Dakota	Brad Ruden	South Dakota State University
Tennessee	Darrell Hensley	University of Tennessee
Texas	Rodney Holloway	Texas A&M University
Texas	Dudley Smith	Texas A&M University
Utah	Howard Deer	Utah State University
Virginia	Michael Weaver	Virginia Polytechnic University
Vermont	Alan Gotlieb	University of Vermont
Washington	Catherine Daniels	Washington State University
Wisconsin	Jeffrey Wyman	University of Wisconsin
West Virginia	John Baniecki	West Virginia University
Wyoming	Mark Ferrell	University of Wyoming

TABLE 7: Industry Contacts for Pesticide Use Data Review

<u>Company</u>	<u>Contact</u>
ABBOTT	Ryan Solberg, Ricardo Menendez
AGREVO	Roger Boatman
ALBAUGH	Spencer Vance
AMERICAN CYANAMID	Randy Boomgaarden
AMVAC	Eric Wintemute
ATOCHEM	Beth Sears
BASF	Chris Jarrett
BAYER	Dave Crank, Guido Hommelsheim
CHEMINOVA	Diane Allemang (JSC)
DOW AGRO	Jack Mitenbuler
DREXEL	Gerald Manley
DUPONT	Steve Ball
FMC	Ruben Villasante
GOWAN	Cindy Baker
GRIFFIN	Jim Bone
HY-YIELD BROMINE	Cal Lewis
MICROFLO	Morris Gaskins
MONSANTO	Mike Hilton
MONTEREY	Lynn Georges
NOVARTIS	Gene Hill, Arn Vogt, Beth Carroll
PACE	Don Claeys
RHONE POULENC	Spencer Cohen
RIVERDALE	Curtis Clark
ROHM AND HAAS	Jay Holmdal, Jan Ollinger, Steve Longacre, Richard Costlow, Michel Castagner
SIPCAM	John French
TOMEN AGRO	William Spencer
UAP	James Sell
UCB	John Kelly
UNIROYAL	John Wescott, Kevin Kelley, David Cote, Richard Caliberté
UNITED PHOSPHOROUS	Buzz Spaulding
VALENT	Gail Santoro
ZENECA	Gary Gries

**TABLE 8: NATIONAL PESTICIDE USE BY ACTIVE INGREDIENT
PESTICIDE TYPE: FUNGICIDES**

LBS AI APPLIED PER YEAR

ACTIVE INGREDIENT	1992	1997
ANILAZINE	168,835	
AZOXYSTROBIN		228,614
BENOMYL	1,198,371	675,500
CAPTAN	3,197,989	3,992,782
CARBOXIN	46,968	
CHLOROTHALONIL	11,566,092	11,916,713
COPPER	8,270,289	13,682,409
CYMOXANIL		45,886
DCNA	169,333	188,683
DIMETHOMORPH		51,536
DINOCAP	10,902	
DODINE	264,664	151,538
ETRIDIAZOLE	193,896	91,669
FENARIMOL	47,600	46,272
FENBUCONAZOLE		32,818
FERBAM	219,486	317,125
FLUTOLANIL		24,960
FOSETYL-AL	533,646	904,718
IPRODIONE	873,547	689,648
MANCOZEB	8,062,374	9,585,777
MANEB	3,525,322	3,039,930
MEFENOXAM		210,101
METALAXYL	855,400	659,997
METIRAM	539,206	1,385,330
MYCLOBUTANIL	136,849	174,482
OXYTETRACYCLINE	30,163	33,536
PCNB	1,662,371	819,086
PROPAMOCARB		173,885
PROPICONAZOLE	281,355	493,998
STREPTOMYCIN	100,029	50,434
SULFUR	82,883,332	77,788,188
TEBUCONAZOLE		478,568
THIABENDAZOLE	155,403	
THIOPHANATE METHYL	498,283	453,792
THIRAM	199,251	179,809
TRIADIMEFON	135,112	53,098
TRIFLUMIZOLE		92,481
TRIFORINE	73,644	23,625
TRIPHENYLTIN HYD	424,910	660,971
VINCLOZOLIN	135,035	121,959
ZIRAM	2,804,087	1,992,552
FUNGICIDES TOTAL	129,263,743	131,512,471

**TABLE 9: NATIONAL PESTICIDE USE BY ACTIVE INGREDIENT
PESTICIDE TYPE: HERBICIDES**

LBS AI APPLIED PER YEAR

ACTIVE INGREDIENT	1992	1997
2,4-D	41,938,491	40,589,955
2,4-DB	980,980	603,975
ACETOCHLOR		32,591,175
ACIFLUORFEN	1,477,973	1,846,789
ALACHLOR	51,591,633	15,159,641
AMETRYN	321,656	445,571
ASULAM	726,577	551,775
ATRAZINE	72,315,295	74,560,407
BENEFIN	478,205	161,983
BENSULFURON	30,134	31,884
BENSULIDE	449,951	545,406
BENTAZON	7,171,284	7,749,130
BROMACIL	1,333,728	614,219
BROMOXYNIL	3,444,727	2,920,222
BUTYLATE	8,468,938	2,251,426
CHLORAMBEN	1,335,274	
CHLORIMURON	236,871	190,345
CHLORSULFURON	46,013	59,745
CLETHODIM	80,003	670,721
CLOMAZONE	1,801,776	2,531,160
CLOPYRALID	89,112	891,662
CYANAZINE	32,189,859	20,233,056
CYCLOATE	938,925	877,657
DCPA	1,746,892	596,723
DESMEDIPHAM	152,864	205,144
DICAMBA	9,064,161	10,447,441
DICHLOBENIL	65,424	43,711
DICLOFOP	1,597,585	974,268
DIETHATYL ETHYL	454,336	
DIFENZOQUAT	175,042	346,308
DIMETHENAMID		5,991,003
DIPHENAMID	105,009	
DIQUAT	161,449	266,858
DIURON	3,994,531	4,370,448
DSMA	1,257,802	842,665
ENDOTHALL	134,016	86,622
EPTC	14,457,278	8,791,984
ETHALFLURALIN	2,738,309	2,422,198
ETHOFUMESATE	378,488	409,666
FENOXAPROP	390,976	984,697
FLUAZIFOP	897,988	608,520
FLUMETSULAM		308,892
FLUMICLORAC		43,158
FLUOMETURON	3,907,191	5,313,290
FOMESAFEN	425,657	1,100,341
GLYPHOSATE	16,793,371	34,817,639
HALOSULFURON		53,919

**TABLE 9: NATIONAL PESTICIDE USE BY ACTIVE INGREDIENT
PESTICIDE TYPE: HERBICIDES (CONT.)**

LBS AI APPLIED PER YEAR

ACTIVE INGREDIENT	1992	1997
HEXAZINONE	460,058	332,116
IMAZAMETHABENZ	231,898	458,875
IMAZAPIC		19,002
IMAZAQUIN	924,799	756,915
IMAZETHAPYR	914,090	1,253,046
ISOPROPALIN	129,287	
LACTOFEN	227,475	389,388
LINURON	2,026,683	516,133
MCPA	4,540,632	5,360,932
MCPB	42,475	27,542
MCPP	32,584	13,415
METHAZOLE	510,692	
METOLACHLOR	59,383,910	67,336,211
METRIBUZIN	3,440,715	3,320,231
METSULFURON	18,576	45,336
MOLINATE	4,886,748	3,669,398
MSMA	6,021,679	4,867,366
NAPROPAMIDE	500,695	448,400
NAPTALAM	162,366	185,376
NICOSULFURON	169,743	211,881
NORFLURAZON	2,670,328	2,459,703
ORYZALIN	822,759	899,044
OXYFLUORFEN	457,644	705,255
PARAQUAT	4,658,597	6,884,630
PEBULATE	673,046	343,322
PENDIMETHALIN	20,281,766	27,284,718
PHENMEDIPHAM	183,311	196,442
PICLORAM	2,042,016	1,322,430
PRIMISULFURON	47,013	133,171
PROMETRYN	1,448,310	1,675,421
PRONAMIDE	239,773	206,779
PROPACHLOR	4,316,315	904,932
PROPANIL	9,132,883	8,035,946
PROSULFURON		73,076
PYRAZON	340,501	118,294
PYRIDATE	84,556	161,697
PYRITHIOBAC		208,136
QUINCLORAC	111,656	287,704
QUIZALOFOP	216,204	340,818
RIMSULFURON		19,774
SETHOXYDIM	1,350,566	1,717,271
SIDURON	745	
SIMAZINE	3,978,487	5,224,439
SULFENTRAZONE		69,073
TEBUTHIURON	111,215	115,712
TERBACIL	298,026	342,277
THIFENSULFURON	93,563	105,145

**TABLE 9: NATIONAL PESTICIDE USE BY ACTIVE INGREDIENT
PESTICIDE TYPE: HERBICIDES (CONT.)**

LBS AI APPLIED PER YEAR

ACTIVE INGREDIENT	1992	1997
THIOBENCARB	1,473,511	1,925,093
TRIALATE	1,590,727	2,178,254
TRIASULFURON	6,942	57,320
TRIBENURON	33,126	63,114
TRICLOPYR	115,514	590,366
TRIDIPHANE	262,516	
TRIFLURALIN	25,686,076	22,263,693
TRIFLUSULFURON		23,023
VERNOLATE	520,412	181,789
HERBICIDES TOTAL	454,218,983	461,432,823

**TABLE 10: NATIONAL PESTICIDE USE BY ACTIVE INGREDIENT
PESTICIDE TYPE: INSECTICIDES**

LBS AI APPLIED PER YEAR

ACTIVE INGREDIENT	1992	1997
ABAMECTIN	8,642	14,932
ACEPHATE	3,389,865	2,462,354
ALDICARB	4,022,468	4,277,552
AMITRAZ	79,473	137,097
AZADIRACHTIN		556
AZINPHOS-METHYL	2,548,867	2,091,014
BIFENTHRIN	116,716	110,246
BT		
BUPROFEZIN		20,598
CARBARYL	4,570,414	4,857,542
CARBOFURAN	5,101,406	3,398,067
CHLORETHOXYFOS		252,792
CHLORPYRIFOS	14,764,535	13,463,879
CLOFENTEZINE	1,537	21,467
CRYOLITE	4,053,299	2,560,365
CYFLUTHRIN	124,360	177,782
CYPERMETHRIN	228,082	187,991
CYROMAZINE	16,997	14,297
DELTAMETHRIN		27,045
DIAZINON	1,265,739	918,087
DICOFOL	1,391,691	786,805
DICROTOPHOS	666,136	359,726
DIFLUBENZURON	16,470	57,112
DIMETHOATE	2,619,437	1,896,947
DISULFOTON	1,806,527	1,196,066
ENDOSULFAN	1,796,726	1,601,195
ESFENVALERATE	331,522	228,885
ETHION	990,706	504,535
ETHOPROP	1,449,743	1,010,807
ETHYL PARATHION	2,318,251	529,379
FENAMIPHOS	614,937	726,675
FENBUTATIN OXIDE	414,195	265,275
FENPROPATHRIN	63,368	31,839
FENVALERATE	66,281	
FONOFOS	3,233,797	417,372
FORMETANATE HCL	290,467	134,527
HEXYTHIAZOX		12,802
IMIDACLOPRID		272,207
LAMBDA-CYHALOTHRIN	205,329	321,284
LINDANE	61,188	39,366
MALATHION	3,377,678	5,809,943
METALDEHYDE	47,587	53,977
METHAMIDOPHOS	1,088,479	965,584
METHIDATHION	372,953	314,091
METHOMYL	2,754,907	1,997,489
METHOXYCHLOR	88,906	77,957
METHYL PARATHION	5,961,740	5,918,849

**TABLE 10: NATIONAL PESTICIDE USE BY ACTIVE INGREDIENT
PESTICIDE TYPE: INSECTICIDES (CONT.)**

LBS AI APPLIED PER YEAR

ACTIVE INGREDIENT	1992	1997
MEVINPHOS	283,887	
NALED	230,244	605,456
OIL	51,104,310	102,336,882
OXAMYL	945,861	938,838
OXYDEMETON-METHYL	241,288	154,227
OXYTHIOQUINOX	149,657	35,231
PERMETHRIN	1,068,598	1,066,056
PHORATE	4,452,622	3,218,465
PHOSMET	941,175	1,333,468
PROFENOFOS	2,062,744	879,776
PROPARGITE	3,628,217	2,538,969
PYRIDABEN		17,719
PYRIPROXYFEN		13,284
SPINOSAD		117,315
SULPROFOS	852,352	308,039
TEBUFENOZIDE		104,413
TEBUPIRIMPHOS		272,177
TEFLUTHRIN	238,429	576,865
TERBUFOS	8,690,363	6,515,603
THIODICARB	1,705,528	821,267
TRALOMETHRIN	60,105	23,767
TRICHLORFON	13,974	
TRIMETHACARB	156,800	
INSECTICIDES TOTAL	149,147,575	182,402,176

**TABLE 11: NATIONAL PESTICIDE USE BY ACTIVE INGREDIENT
PESTICIDE TYPE: OTHER PESTICIDES**

LBS AI APPLIED PER YEAR

ACTIVE INGREDIENT	1992	1997
1,3-D	40,083,611	34,717,237
BENZYLADENINE		518
BUTENOIC ACID		1,475
CACODYLIC ACID	135,915	47,571
CHLOROPICRIN	11,086,567	13,882,188
CYCLANILIDE		177,086
CYTOKININS	2,970	2,518
DIMETHIPIN	212,365	282,458
ETHEPHON	2,701,284	5,407,986
FLUMETRALIN		352,742
GIBBERELIC ACID	30,636	35,964
MALEIC HYDRAZIDE	2,073,238	2,143,154
MEPIQUAT CHLORIDE	123,081	182,576
METAM SODIUM	29,095,179	60,023,092
METHYL BROMIDE	44,196,554	32,803,943
NAA	13,146	10,486
NAD	3,527	2,187
SODIUM CHLORATE	8,293,087	7,261,557
SULFURIC ACID	17,240,871	47,994,188
THIDIAZURON	325,241	326,239
TRIBUFOS	3,963,864	4,918,265
OTHER PESTICIDES TOTAL	159,581,136	210,573,430

**TABLE 12: Highest Volume Pesticide Active Ingredients Used in U.S. Agriculture:
1997**

<u>Fungicides</u>	<u>000 LBS AI/YR</u>
Sulfur	77,788
Copper	13,682
Chlorothalonil	11,917
Mancozeb	9,586
Captan	3,993
Maneb	3,040
Ziram	1,993
Metiram	1,385
Fosetyl-Al	905
PCNB	819
<u>Herbicides</u>	
Atrazine	74,560
Metolachlor	67,336
2,4-D	40,590
Glyphosate	34,818
Acetochlor	32,591
Pendimethalin	27,285
Trifluralin	22,264
Cyanazine	20,233
Alachlor	15,160
Dicamba	10,447
<u>Insecticides</u>	
Oil	102,337
Chlorpyrifos	13,464
Terbufos	6,516
Methyl Parathion	5,918
Malathion	5,809
Carbaryl	4,857
Aldicarb	4,278
Carbofuran	3,398
Phorate	3,218
Cryolite	2,560
<u>Other Pesticides</u>	
Metam Sodium	60,023
Sulfuric Acid	47,994
1,3-D	34,717
Methyl Bromide	32,804
Chloropicrin	13,882
Sodium Chlorate	7,262
Ethephon	5,408
Tribufos	4,918
Maleic Hydrazide	2,143
Flumetralin	353

TABLE 13: Comparison of NCFAP and USEPA National Agricultural Pesticide Use Estimates (1997)

<u>EPA Rank</u>	<u>Million lbs AI/Year</u>	
	<u>EPA</u>	<u>NCFAP</u>
1. Atrazine	75-82	75
2. Metolachlor	63-69	67
3. Metam Sodium	53-58	60
4. Methyl Bromide	38-45	33
5. Glyphosate	34-38	35
6. 1,3-D	32-37	35
7. Acetochlor	31-36	33
8. 2,4-D	29-33	41
9. Pendimethalin	24-28	27
10. Trifluralin	21-25	22
11. Cyanazine	18-22	20
12. Alachlor	13-16	15
13. Copper	10-13	14
14. Chlorpyrifos	9-13	13
15. Chlorothalonil	7-10	12
16. Dicamba	7-10	10
17. Mancozeb	7-10	10
18. EPTC	7-10	9
19. Terbufos	6-9	7
20. Dimethenamid	6-9	6
21. Bentazon	6-8	8
22. Propanil	6-8	8
23. Simazine	5-7	5
24. MCPA	5-6	5
25. Chloropicrin	5-6	14

EPA's ranking includes "conventional" pesticides only. Sulfur, oil, and sulfuric acid are excluded from the EPA ranking.

Source for EPA estimates: Aspelin, Arnold L., and Arthur H. Grube, Pesticide Industry Sales and Usage: 1996 and 1997 Market Estimates, USEPA, OPP, November 1999. Available on the Internet at:

<http://www.epa.gov/oppbead1/pesticides/>

TABLE 14: Comparison of NCFAP's and USEPA's National Agricultural Pesticide Usage Estimates: 1992 and 1997

	1992		1997	
	<u>NCFAP</u>	<u>USEPA</u>	<u>NCFAP</u>	<u>USEPA</u>
Fungicides	46	45	53	53
Herbicides	454	450	461	470
Insecticides	98	90	80	82
Other Conventional	143	150	163	165
Other Chemicals	<u>151</u>	<u>161</u>	<u>228</u>	<u>174</u>
Total	892	896	985	944

Note: USEPA totals are from : Aspelin, Arnold L., and Arthur H. Grube, Pesticide Industry Sales and Usage: 1996 and 1997 Market Estimates, USEPA, OPP, November 1999. Available on the Internet at:
<http://www.epa.gov/oppbead1/pesticides/>

The NCFAP totals for insecticides, fungicides and other pesticides have been adjusted from Tables 8, 10 and 11 by assigning the following active ingredients to the "other chemicals" category for compatibility with USEPA's definition: sulfur, oil, and sulfuric acid.

TABLE 15: NATIONAL PESTICIDE USE BY CROP

LBS AI APPLIED PER YEAR

CROP	1992	1997
ALFALFA	10,852,632	7,404,788
ALMONDS	14,296,776	12,083,354
APPLES	23,445,680	24,345,398
APRICOTS	517,747	341,356
ARTICHOKES	70,003	83,667
ASPARAGUS	620,381	555,563
AVOCADOS	631,488	267,402
BARLEY	3,222,240	3,502,153
BEETS	91,549	78,660
BLACKBERRIES	112,625	119,713
BLUEBERRIES	647,346	542,157
BROCCOLI	934,459	919,487
BRUSSEL SPROUTS	207,315	214,362
CABBAGE	818,819	462,361
CANOLA	5,960	377,566
CANTALOUPE	1,227,397	1,794,800
CARROTS	6,086,432	11,047,489
CAULIFLOWER	511,501	208,643
CELERY	718,012	691,379
CHERRIES	2,686,743	4,519,442
CITRUS	33,582,067	85,851,908
COLLARDS	113,794	90,773
CORN	239,613,819	225,439,648
COTTON	71,511,601	75,998,748
CRANBERRIES	380,723	572,644
CUCUMBERS	1,728,962	1,898,305
DATES	128,109	731,074
DRY BEANS	5,427,799	4,828,907
DRY PEAS	483,050	652,027
EGGPLANT	337,357	405,387
FALLOWLAND	7,845,090	9,861,689
FIGS	59,890	36,565
FLAX	60,382	57,869
GARLIC	111,266	72,486
GRAPES	56,015,421	53,037,195
GREEN BEANS	1,939,696	1,918,824
GREEN ONIONS	91,641	61,643
GREEN PEAS	409,300	327,900

TABLE 15: NATIONAL PESTICIDE USE BY CROP (CONT.)

LBS AI APPLIED PER YEAR

CROP	1992	1997
HAZELNUTS	117,931	134,143
HOPS	211,725	2,338,779
HOT PEPPERS	73,812	1,199,079
KIWI	26,482	43,477
LETTUCE	2,624,568	2,459,644
MELONS	336,917	446,490
MILLET	60,005	15,907
MINT	1,156,766	725,079
NECTARINES	2,038,464	2,656,953
OATS	861,782	438,749
OKRA	4,248	4,520
OLIVES	345,866	333,555
ONIONS	2,776,047	7,214,925
OTHER HAY	5,350,399	2,809,490
PARSLEY	70,680	77,068
PASTURE	25,003,334	21,678,185
PEACHES	11,483,337	11,222,650
PEANUTS	24,164,438	16,893,042
PEARS	6,696,530	6,923,475
PECANS	3,331,670	2,294,582
PISTACHIOS	721,732	1,977,611
PLUMS/PRUNES	3,984,683	5,199,259
POMEGRANATES	52,719	109,592
POTATOES	59,607,034	110,681,406
PUMPKINS	312,554	524,823
RADISHES	33,811	25,246
RASPBERRIES	182,776	296,141
RICE	18,825,615	19,617,495
RYE	45,232	22,544
SAFFLOWER	112,213	164,767
SEED CROPS	1,944,526	1,796,500
SOD	541,955	475,209
SORGHUM	18,885,319	17,587,271
SOYBEANS	74,434,680	84,745,198
SPINACH	240,988	210,956
SQUASH	733,857	730,801
STRAWBERRIES	9,075,467	11,819,073
SUGARBEETS	20,308,646	12,780,980

TABLE 15: NATIONAL PESTICIDE USE BY CROP (CONT.)**LBS AI APPLIED PER YEAR**

CROP	1992	1997
SUGARCANE	4,401,888	6,136,189
SUNFLOWERS	2,329,725	2,127,132
SWEET CORN	4,634,798	3,169,404
SWEET PEPPERS	5,644,789	6,622,611
SWEET POTATOES	3,096,686	2,148,333
TOBACCO	24,400,552	26,974,241
TOMATOES	29,273,419	26,646,709
WALNUTS	2,297,422	2,985,886
WATERMELONS	9,716,868	3,215,142
WHEAT	22,083,205	25,763,707
WILD RICE	8,203	53,544
TOTAL:	892,211,437	985,920,900

TABLE 16: NATIONAL PESTICIDE USE BY STATE

LBS AI APPLIED PER YEAR

STATE	1992	1997
ALABAMA	12,362,576	7,169,606
ARIZONA	7,495,849	5,510,314
ARKANSAS	21,675,555	20,113,989
CALIFORNIA	153,789,664	165,716,348
COLORADO	15,311,977	16,681,429
CONNECTICUT	401,297	262,299
DELAWARE	1,502,474	1,275,603
FLORIDA	58,056,649	104,603,868
GEORGIA	31,514,492	23,748,011
IDAHO	24,360,905	56,750,995
ILLINOIS	54,198,727	48,718,048
INDIANA	30,296,854	28,320,221
IOWA	53,103,261	55,817,215
KANSAS	17,876,378	23,547,235
KENTUCKY	10,396,935	9,070,118
LOUISIANA	17,243,305	15,751,541
MAINE	1,453,094	2,874,571
MARYLAND	3,706,163	3,564,086
MASSACHUSETTS	795,150	780,929
MICHIGAN	22,151,069	21,366,385
MINNESOTA	31,380,104	26,868,073
MISSISSIPPI	20,402,732	16,270,442
MISSOURI	20,659,490	20,778,070
MONTANA	5,210,478	7,384,915
NEBRASKA	33,366,324	35,579,535
NEVADA	168,939	177,247
NEW HAMPSHIRE	212,011	177,859
NEW JERSEY	2,492,427	2,287,699
NEW MEXICO	2,907,980	2,636,829
NEW YORK	10,551,734	10,731,293
NORTH CAROLINA	32,784,472	36,199,426
NORTH DAKOTA	15,020,330	17,872,188
OHIO	20,274,252	18,225,623
OKLAHOMA	6,736,877	6,379,936
OREGON	13,187,960	21,602,557
PENNSYLVANIA	8,114,917	8,882,478
RHODE ISLAND	74,327	37,727
SOUTH CAROLINA	11,450,688	12,187,739

TABLE 16: NATIONAL PESTICIDE USE BY STATE (CONT.)**LBS AI APPLIED PER YEAR**

STATE	1992	1997
SOUTH DAKOTA	15,709,041	15,816,099
TENNESSEE	7,938,654	8,106,645
TEXAS	29,264,359	39,357,607
UTAH	2,379,746	1,025,953
VERMONT	534,388	507,648
VIRGINIA	8,195,353	9,725,332
WASHINGTON	37,761,753	37,744,667
WEST VIRGINIA	1,175,546	815,423
WISCONSIN	14,180,755	15,852,242
WYOMING	2,383,423	1,046,838
TOTAL:	892,211,437	985,920,900

TABLE 17: Highest Volume Pesticide Active Ingredient Usage Overall and by State and Crop: 1997

<u>Crops</u>	<u>Million LBS AI/YR</u>
Corn	225
Potatoes	111
Citrus	86
Soybeans	85
Cotton	76
Grapes	53
Tobacco	27
Tomatoes	27
Wheat	26
Apples	24
<u>States</u>	
California	166
Florida	105
Idaho	57
Iowa	56
Illinois	49
Texas	39
Washington	38
North Carolina	36
Nebraska	36
Indiana	28
<u>Overall</u>	
Oil	102
Sulfur	78
Atrazine	75
Metolachlor	67
Metam Sodium	60
Sulfuric Acid	48
2,4-D	41
1,3-D	35
Glyphosate	35
Methyl Bromide	33

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019. Crop Profile for Pumpkins in New York.

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102. Bean Brent Texas A&M University
103. Bessin Ricardo University of Kentucky
104. Bhowmik Prasanta University of Massachusetts
105. Boerboom Chris University of Wisconsin
106. Bonanno Richard University of Massachusetts
107. Bost Steven University of Tennessee
108. Brecke Barry University of Florida
109. Bristow Peter Washington State University
110. Brown Steve L. University of Georgia
111. Byrd, Jr. John Mississippi State University
112. Cannon Mike Louisiana State University
113. Chapin Jay Clemson University
114. Derr Jeffrey Virginia Polytechnic University
115. Doll Jerry University of Wisconsin

116.	Drye	Charles	Clemson University
117.	Edelson	Jonathan	Oklahoma State University
118.	English	Michael	New Mexico State University
119.	Everest	John	Auburn University
120.	Flanders	Kathy	Auburn University
121.	Flood	Brian	Del Monte
122.	Forster	Robert	University of Idaho
123.	Fortnum	Bruce	Clemson University
124.	Freeman	Barry	Auburn University
125.	Gallian	John	University of Idaho
126.	Griffin	Randall	Clemson University
127.	Hagan	Austin	Auburn University
128.	Hale	Frank	University of Tennessee
129.	Hammond	Abner	Louisiana State University
130.	Harris	Pat	Mississippi State University
131.	Hausbeck	Mary	Michigan State University
132.	Hayes	Robert	University of Tennessee
133.	Hein	Gary	University of Nebraska
134.	Hershman	Donald	University of Kentucky
135.	Hoelscher	Clifford	Texas A&M University
136.	Hollier	Clayton	Louisiana State University
137.	Horton	Dan	University of Georgia
138.	Hull	Jerome	Michigan State University

139.	Jackson	Kenneth	Oklahoma State University
140.	Jacobsen	Barry	Montana State University
141.	Jardine	Douglas	Kansas State University
142.	Johnson	Douglas	University of Kentucky
143.	Jones	Roger	University of Minnesota
144.	Karner	Miles	Oklahoma State University
145.	Kee	Ed	University of Delaware
146.	Keinath	Anthony	Clemson University
147.	Kendig	Andy	University of Missouri
148.	Klosterboer	Arlen	Texas A&M University
149.	Lamey	Arthur	North Dakota State University
150.	Latin	Richard	Purdue University
151.	Legaspi	Jesusa	Texas A&M University
152.	Lencse	Reed	Louisiana State University
153.	Lewis	Donald	Iowa State University
154.	Lyon	Drew	University of Nebraska
155.	Manley	Donald	Clemson University
156.	Masiunas	John	University of Illinois
157.	Matheron	Michael	University of Arizona
158.	McMullen	Marcia	North Dakota State University
159.	Miller	Robert	Clemson University
160.	Miller	Stephen	University of Wyoming
161.	Miller	Travis	Texas A&M University

162.	Milus	Eugene	University of Arkansas
163.	Mizell	Russell	University of Florida
164.	Mohan	Krishna	University of Idaho
165.	Moore	Michael	University of Georgia
166.	Mueller	John	Clemson University
167.	Mullins	Charles	University of Tennessee
168.	Mulrooney	Robert	University of Delaware
169.	Murphy	Tim	University of Georgia
170.	Murray	Timothy	Washington State University
171.	Musick	Joe	Louisiana State University
172.	Nesmith	William	University of Kentucky
173.	Obermeyer	John	Purdue University
174.	Palumbo	John	University of Arizona
175.	Patrick	Carl	Texas A&M University
176.	Patrick	Charles	University of Tennessee
177.	Patterson	Mike	Auburn University
178.	Pedersen	Wayne	University of Illinois
179.	Pike	David	University of Illinois
180.	Pritts	Marvin	Cornell University
181.	Rawlinson	Jeff	University of Nebraska
182.	Reding	Michael	Utah State University
183.	Reighard	Gregory	Clemson University

184.	Renner	Karen	Michigan State University
185.	Roof	Mitchell	Clemson University
186.	Rozeff	Norman	Rio Grande Sugar Growers
187.	Sanders	Dearl	Louisiana State University
188.	Schroeder	Jill	New Mexico State University
189.	Semtner	Paul	Virginia Polytechnic University
190.	Sikora	Edward	Auburn University
191.	Smith	Ronald	Auburn University
192.	Spradley	Ples	University of Arkansas
193.	Stewart	Scott	Mississippi State University
194.	Strickne	Charles	Texas A&M University
195.	Stoltz	Robert	University of Idaho
196.	Street	Joe	Mississippi State University
197.	Studebaker	Glenn	University of Arkansas
198.	Taber	Hank	Iowa State University
199.	Townsend	Lee	University of Kentucky
200.	Umeda	Kai	University of Arizona
201.	Waldron	Keith	Cornell University
202.	Weeks	James	Auburn University
203.	Weinzierl	Richard	University of Illinois
204.	Whalen	Joanne	University of Delaware
205.	Whitam	Kenneth	Louisiana State University
206.	Wilson	Robert	University of Nebraska

207.	Wrather	Allen	University of Missouri
208.	Wrage	Leon	South Dakota State University
209.	Wright	David	University of Florida
210.	Yarborough	David	University of Maine
211.	Zandstra	Bernie	Michigan State University
212.	Zollinger	Richard	North Dakota State University
213.	Mason	Lonnie	Purdue University
214.	Sorensen	Kenneth	North Carolina State University
215.	Becker	Roger	University of Minnesota
216.	Morgan	Ruth	Mississippi State University
217.	Orzolek	Michael	Pennsylvania State University
218.	Johnston	Stephen	Rutgers University
219.	Shaner	Gregory	Purdue University
220.	Foster	Rick	Purdue University
221.	Robinson	James	Texas A&M University
222.	Isakeit	Tom	Texas A& M University
223.	McVay	John	Auburn University
224.	Lewis	Brad	New Mexico State University
225.	Catangui	Mike	South Dakota State University
226.	Royer	Tom	Oklahoma State University
227.	Thomson	Sherman	Utah State University
228.	Smith	Duane	Agripac, Inc.
229.	Stacey	Bill	Oklahoma State University

230.	Maynard	Elizabeth	Purdue University
231.	Ree	Bill	Texas A&M University
232.	Baldwin	Ford	University of Arkansas
233.	Baird	Craig	University of Idaho
234.	Parker	Robert	Washington State University
235.	Jordan	Thomas	Purdue University
236.	Van Gessel	Mark	University of Delaware
237.	Petroff	Reeves	Montana State University
238.	William	Ray	Oregon State University
239.	Karren	Jay	Utah State University
240.	Seward	Ron	University of Tennessee
241.	Oelke	Ervin	University of Minnesota
242.	Herbert	Ames	Virginia Polytechnic University
243.	Morishita	Don	University of Idaho
244.	Stall	William	University of Florida
245.	Reagan	Gene	Louisiana State University
246.	Curran	William	Pennsylvania State University
247.	Zehnder	Geoffrey	Auburn University
248.	Swann	Charles	Virginia Polytechnic University
249.	Hollingsworth	Craig	University of Massachusetts
250.	Higgins	Randall	Kansas State University
251.	Hamilton	George	Rutgers University
252.	Sweets	Laura	University of Missouri

253.	George	Ann	U.S. Hop Industry Plant Protection Committee
254.	Palacios	Michelle	Oregon Hop Commission
255.	Reynolds	Robert	Oregon State University
256.	Fisher	Glenn	Oregon State University
257.	Adams	David	University of Georgia
258.	Handley	David	University of Maine
259.	Walker	Derby	University of Delaware
260.	Raid	Richard	University of Florida
261.	Sprenkel	Richard	University of Florida
262.	Durgan	Beverly	University of Minnesota
263.	Riesselman	Jack	Montana State University
264.	Mitchell	James	University of New Hampshire
265.	Lord	William	University of New Hampshire
266.	Gorsuch	Clyde	Clemson University
267.	Cook	Wilton	Clemson University
268.	Murdock	Edward	Clemson University
269.	Ferrell	Mark	University of Wyoming
270.	Martin	James	University of Kentucky
271.	Pollet	Dale	Louisiana State University
272.	Collins	Daniel	Auburn University
273.	Hazzard	Ruth	University of Massachusetts
274.	Becker	Susan	University of Missouri

275.	Jarman	James	University of Missouri
276.	O'Day	Maureen	University of Missouri
277.	Howell	John	University of Massachusetts
278.	Felland	Carl	Pennsylvania State University
279.	Welty	Celeste	Ohio State University
280.	Van Duyn	John	North Carolina State University
281.	Brandenburg	Rick	North Carolina State University
282.	York	Alan	North Carolina State University
283.	Monks	David	North Carolina State University
284.	Yelverton	Fred	North Carolina State University
285.	Bailey	Jack	North Carolina State University
286.	Pscheidt	Jay	Oregon State University
287.	Smith	William	North Carolina State University
288.	Bachelor	Jack	North Carolina State University
289.	Walgenbach	James	North Carolina State University
290.	Morin	Glenn	New England Fruit Consultants
291.	McEachern	George	Texas A&M University
292.	Ogg	Alex	Washington State University
293.	Ferro	Dave	University of Massachusetts
294.	Regehr	David	Kansas State University
295.	Olsen	Jeff	Oregon State University
296.	Sauls	Julian	Texas A&M University
297.	French	Victor	Texas A&M University

298.	Johnson	Jarrel	Texas A&M University
299..	Salisbury	Clay	Texas A&M University
300.	Roper	Teryl	University of Wisconsin
301.	Michaelis	Bruce	University of Wisconsin
302.	Hopen	Herbert	University of Wisconsin
303.	Drilias	Michael	University of Wisconsin
304.	Kells	James	Michigan State University
305.	Grafius	Ed	Michigan State University
306.	DiFonzo	Christina	Michigan State University
307.	Jones	Alan	Michigan State University
308.	Ramsdell	Donald	Michigan State University
309.	Ruden	Brad	South Dakota State University
310.	Murray	Don	Oklahoma State University
311.	Deer	Howard	Utah State University
312.	Hagood	Scott	Virginia Polytechnic University
313.	Phipps	Patrick	Virginia Polytechnic University
314.	Spitko	Roberta	New England Fruit Consultants
315.	Gay	Danny	University of Georgia
316.	MacDonald	Gregory	University of Georgia
317.	Hudson	Randall	University of Georgia
318.	Brown	Steven M.	University of Georgia
319.	Roberts	Phillip	University of Georgia
320.	Ellis	H. C.	University of Georgia

321.	Bellinder	Robin	Cornell University
322.	Agnello	Arthur	Cornell University
323.	Martinson	Timothy	Cornell University
324.	Ellerbrock	Leroy	Cornell University
325.	Bergstrom	Gary	Cornell University
326.	Yoder	Keith	Virginia Polytechnic University
327.	Majek	Brad	Rutgers University
328.	Ritter	Ronald	University of Maryland
329.	Beste	Edward	University of Maryland
330.	Linduska	James	University of Maryland
331.	Everts	Kathryne	University of Maryland
332.	Grybauskas	Arvydas	University of Maryland
333.	Jarratt	James	Mississippi State University
334.	Layton	Blake	Mississippi State University
335.	Andrews	Gordon	Mississippi State University
336.	Downing	Jere	Cranberry Institute
337.	Jemison	John	University of Maine
338.	Williams	Mat	University of Maine
339.	Bartholomew	Candace	University of Connecticut
340.	Boucher	T. Jude	University of Connecticut
341.	Gotlieb	Alan	University of Vermont
342.	Calvin	Dennis	Pennsylvania State University
343.	Nissen	Scott	Colorado State University
344.	Lundy	Rocky	Mint Industry Research Council

345.	Lee	Thomas A., Jr.	Texas A&M University
346.	Grichar	James	Texas A&M University
347.	Dockter	John	Minnesota Canola Council
348.	Baniecki	John	West Virginia University
349.	Biggs	Alan	West Virginia University
350.	Hogmire	Henry	West Virginia University
351.	Cartwright	Richard	University of Arkansas
352.	Hartman	John	University of Kentucky
353.	Lockwood	David	University of Tennessee
354.	Baker	Marvin	Texas A & M University
355.	Rutledge	Alvin	University of Tennessee
356.	Hensley	Darrell	University of Tennessee
357.	Bledsoe	Larry	Purdue University
358.	Koehler	Glen	University of Maine
359.	Griffin	Tom	University of Maine
360.	Stivers	Lee	Cornell University
361.	MacNab	Alan	Pennsylvania State University
362.	Larson	Erick	Mississippi State University
363.	Raspberry	Freddie	Mississippi State University
364.	McCarthy	Will	Mississippi State University
365.	Dwyer	James	University of Maine
366.	Minner	David	Iowa State University

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| 367. | New | Marty | Oklahoma State University |
| 368. | Newman | Melvin | University of Tennessee |
| 369. | Smith | George | University of Missouri |
| 370. | Smith | Dudley | Texas A & M University |
| 371. | Kamas | J. | Texas A & M University |
| 372. | Anciso | Juan | Texas A & M University |
| 373. | Taylor | Jim | C.T. Smith Company |
| 374. | Bade | David | Texas A & M University |
| 375. | Roquette | Monty | Texas A & M University |
| 376. | Taylor | Gene | Texas A & M University |
| 377. | Winter | Steve | Texas A & M University |
| 378. | Caliberté | Richard | Uniroyal |
| 379. | Holmdal | Jay | Rohm and Haas |
| 380. | Aerts | Mike | Florida Fruit and Vegetable Association |
| 381. | Bone | Jim | Griffin |
| 382. | Treadaway | Joyce | University of Florida |
| 383. | Whitty | E.B. | University of Florida |
| 384. | Moore | Guy | Larriland Farm |
| 385. | Fournier | Al | University of Maryland |
| 386. | Guillebeau | Paul | University of Georgia |
| 387. | Culpepper | Stan | University of Georgia |
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393. Crop Profile for Cotton in Arizona.
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