Farmers' Use of Pesticides in 1976

U.S. Department
of Agriculture

Economics, Statistics,
and Cooperatives Service

Agricultural Economic
Report No. 418

Theodore R. Eichers
Paul A. Andrilenas
Thelma W. Anderson

FARMERS' USE OF PESTICIDES IN 1976. By Theodore R. Eichers, Paul A. Andrilenas, and Thelma W. Anderson. National Economic Analysis Division, Economics, Statistics, and Cooperatives Service, U.S. Department of Agricultural. Agricultural Economic Report No. 418.

ABSTRACT

Pesticides have been responsible for much of the yield gains in modern farm production. Farmers used 661 million pounds of pesticides in 1976, up 38 percent from 1971. Crops accounted for 98 percent of farm pesticide use, and herbicides accounted for 60 percent of the crop use. Herbicides also accounted for most of the overall rise in pesticide use between 1971 and 1976, increasing 76 percent. A slowdown in the pesticide growth rate can be expected, however, because of concern over possible adverse effects and because of greater use of such alternatives as biological controls and integrated pest management.

Keywords: Pesticides, Insecticides, Herbicides, Fungicides, Other pesticides, Crops, Livestock.

Washington, D.C. 20250 December 1978

PREFACE

In 1964, Congress authorized an expanded research program on the use of pesticides in agriculture. One phase of this program was a periodic farm survey to obtain information on the use of pesticides in different areas and on different crops and classes of livestock. These data were to provide a basis for estimating the costs and benefits of pesticides and to serve as a measure of change in pesticide use.

To meet this need for information, the Economic Research Service, in early 1977, obtained its fourth measure of the extent of pesticide use by farmers. (On January 1, 1978, the Economic Research Service, the Statistical Reporting Service, and the Farmer Cooperative Service were merged into the Economics, Statistics, and Cooperatives Service, ESCS.) The 1977 survey obtained information on farm pesticide use in 1976 for 12 crops or crop groups: corn, cotton, wheat, sorghum, rice, other grain, soybeans, tobacco, peanuts, alfalfa, other hay and forage, and pasture and rangeland. The 1977 survey also obtained information on farm use of livestock insecticides. Earlier surveys reporting on use in 1964, 1966, and 1971 also included data for sugar beets, fruits, vegetables (including potatoes), and other minor crops as well as the crop uses cited above. In addition, the earlier surveys obtained data on summer fallow, nursery and greenhouse use, stored crop and seed bed treatments, and miscellaneous uses, such as roadside and ditchbank treatments.

The Statistical Reporting Service designed the nationwide sample from which farmers were selected for interview, assisted in developing the final format of the questionnaire, supervised collection of information through their State offices, and processed and tabulated the data. Special acknowledgment is made to Ralph Gann, Jerry McCall, Wade Adams, and others of the Survey Division of ESCS for their efforts in conducting the survey and tabulating the data. We are also indebted to the thousands of farmers who provided the data. Without their interest and cooperation, this publication would not have been possible.

CONTENTS

Text Tables

Continued--

Text Tables--Continued

Appendix Tables

Continued--

Appendix Tables--Continued

SUMMARY

Farmers used an estimated 661 million pounds of pesticides in 1976, a 38-percent increase over 1971. Crops accounted for 650 million pounds, or 98 percent of the farm pesticide total, and livestock accounted for the other 2 percent. Nearly 85 percent of the crop pesticides were applied to 12 major crops: corn, cotton, wheat, sorghum, rice, other grain, soybeans, tobacco, peanuts, alfalfa, other hay and forage, and pasture and rangeland.

Farmers used about 394 million pounds of herbicides in 1976, up 76 percent from 1971. Herbicides accounted for a major share of the farm pesticides used in 1976, about 60 percent of the total. They also accounted for most of the increase in pesticide use between 1971 and 1976. Increased herbicide use is attributed to applying herbicides more frequently, using more herbicide combinations, and treating a larger share of the crop acreage.

About 162 million pounds of insecticides were applied to crops in 1976. Crop insecticide use has been relatively stable, and increased only 5 percent between 1971 and 1976. A significant drop in the use of organochlorine insecticides between 1971 and 1976 (35 percent) has helped reduce residue problems, but increased use of organophosphate and carbamate insecticides is posing more of a personal hazard to pesticide applicators.

Only 11 million pounds of insecticides were used on livestock in 1976, a drop of about 27 percent from 1971. The decrease is largely attributed to a shift from organochlorines to carbamate and organophosphate insecticides which are generally used at lower rates.

About 43 million pounds of crop fungicides and 50 million pounds of other crop pesticides (miticides, fumigants, defoliants and desiccants, and plant growth regulators) were used in 1976, up 9 percent and 8 percent, respectively, over 1971.

Farmers' Use of Pesticides in 1976

*Theodore R. Eichers**
Paul A. Andrilenas
Thelma W. Anderson

INTRODUCTION

The use of pesticides in U.S. agricultural production systems has resulted in intensified crop production by controlling pests that would otherwise cause serious damage. Pesticide use has permitted the production of high quality fruits, vegetables, cotton, and other crops that are very susceptible to insect, disease, and other pest damage. Due to the rapid growth in pest control technology and pesticide use, there is a continuing need for current information on use patterns.

This report provides information on farm pesticide use to aid policymakers, researchers, extension specialists, and industry personnel in making decisions concerning the production, use, and control of these products. Information is presented on: (1) quantities of pesticides used by farmers in 1976, (2) crop acres treated with pesticides in 1976, and (3) changes in pesticide use patterns from 1971 to 1976.

METHODOLOGY

This study is based primarily on a personal interview survey of about 6,200 farmers throughout the 48 contiguous States. The interviews provided detailed information for 1976 on quantities of specific pesticides used, acreage treated, methods of application, and pests controlled for 12 major crops: corn, cotton, wheat, sorghum, rice, other grain, soybeans, tobacco, peanuts, alfalfa, other hay and forage, and pasture and rangeland.

Detailed estimates in the appendix of this report are confined to the survey findings concerning pesticide use on major field crops, hay, pasture

* Eichers and Andrilenas are agricultural economists and Anderson is a statistical assistant with the National Economic Analysis Division, Economics, Statistics, and Cooperatives Service, U.S. Department of Agriculture.

and rangeland, and on livestock. In 1971, these uses accounted for 92 percent of the herbicides, 82 percent of the insecticides, 70 percent of the miscellaneous pesticides, and 16 percent of the fungicides used by farmers.

Selection of farmers to be interviewed was based on a random sample designed to represent all U.S. farms. Data are reported for 10 economic farm regions (figure 1). Data for individual farms in the survey were expanded to reflect all farms by multiplying the sample data by the inverse of the sample ratio for each region. Crop pesticide use data were then adjusted by a factor that reflected the ratio of the number of acres of each crop grown in a region to the number of expanded sample acres for each crop grown on the sample farms. Each of the 12 crops or crop groups had an adjustment factor for each of the 10 production regions.

Livestock data were expanded only by the expansion factor related to the primary sampling unit. The nature of the data did not permit an additional adjustment as was made for crops.

Regional data were added to obtain U.S. estimates for each of the 12 crops or crop groups and for the five classes of livestock.

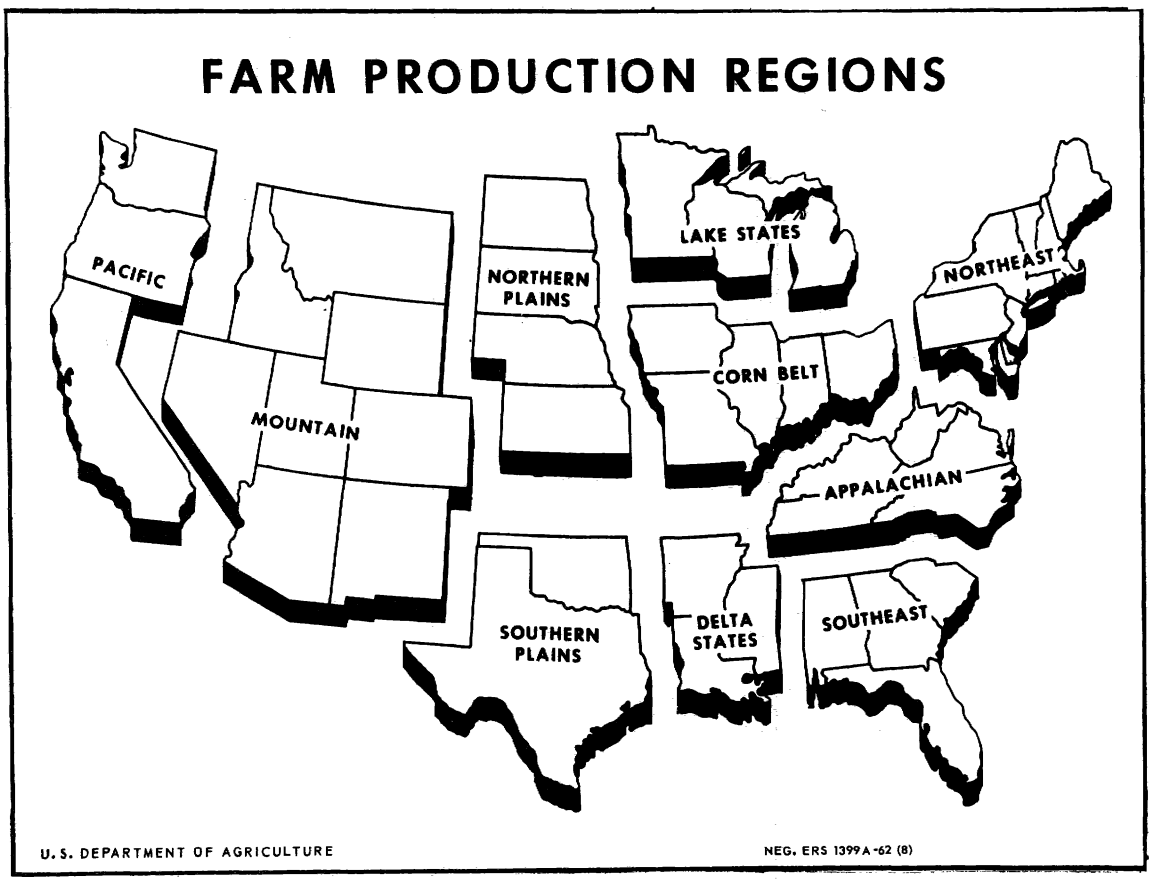

Figure 1

Text tables also include aggregate estimates of pesticide use on sugar beets, potatoes, other vegetables, fruits, and other minor crops not included in the survey. Annual use rates for these minor crops were calculated to reflect the proportion of acreage treated and the intensity of use. Use rates were based on: (1) use on minor crops in 1966 and 1971, (2) trends in use on minor crops from 1966 to 1971, and (3) trends in use on major crops from 1971 to 1976. Separate rates were determined for sugar beets, potatoes, other vegetables, fruits, and other minor crops. These rates were then multiplied by acres grown in 1976 for each of the minor crops or crop groups listed.

Data in this report refer to pesticide use on crops and livestock and on livestock premises only. They do not include use for summer fallow, nursery and greenhouse protection, seed treatment, fence-row and ditch-bank treatments, or any other noncrop or nonlivestock uses.

Pesticides discussed in this report do not include disinfectants or any kind of livestock medicine used internally. Pesticides are grouped into the following categories of chemicals: (1) fungicides (used to control diseases by killing or inhibiting fungi), (2) herbicides (used to kill plants or inhibit their growth), and (3) insecticides (used to kill or inhibit insects). Additionally, fumigants (used to kill or inhibit organisms in soil), defoliants and desiccants (used as harvesting aids), growth regulators (used to influence plant growth), and miticides (used to kill mites) are briefly discussed.

Each pesticide is classified by what is considered its major use. For example, chlorates and borates are classified as defoliants or desiccants, although these ingredients can be used as herbicides. Pentachlorophenol is classified as a fungicide, though it can be used as an insecticide, herbicide, or defoliant.

References to pesticide quantities in this report are always in terms of active pesticide ingredients and do not include emulsifiers, solvents, gypsum, or other materials used in formulating products.

INTERPRETING THE DATA

Statistical reliability of the data is directly related to the sample size, the quantity of pesticides used, the number of acres treated, and the importance of the crop in a region. For example, data for corn in the Corn Belt is more reliable than that for tobacco in the Northeast, due to the respective importance of the crops in the areas. In interpreting the data, several factors should be considered.

The amount of land area treated with a single ingredient is overstated when different commercial products with the same ingredient are applied on the same acreage in separate treatments. For example, the number of acres treated with toxaphene will be overstated if more than one commercial product containing toxaphene has been used on the same acreage during the same season. For crops normally receiving only a single treatment of pesticides, the overstatement is slight. However, for cotton, peanuts, or tobacco

receiving multiple treatments, overstatements of the amount of land area are greater since these crops could be treated during a season with several different commercial pesticides that contain the same ingredient.

The number of acres treated with different ingredients in a group or class of pesticide products should not be added together, since two or more of these ingredients may have been used on the same acre. For example, one acre of cotton treated with two organophosphate insecticides (such as methyl parathion and EPN) would be counted twice, once for each organophosphate. Primarily because these acreages have been treated with more than one ingredient in a group, they cannot be added to estimate the total land area treated with herbicides, insecticides, and so forth.

The number of acres treated with different ingredients, groups of ingredients, or classes of pesticide products cannot be related to quantities of pesticides to determine the rate per acre for a single application, because a pesticide may be applied more than once on the same acreage. Such a comparison would represent the total quantity used per acre during the season rather than that for a single application.

USE ON FARMS

Total pesticide use for farm and nonfarm purposes in 1976 was estimated at over 1 billion pounds (table 1). Farmers applied 661 million pounds, or about 65 percent of all pesticides used. Farmers accounted for 74 percent of all herbicides, 59 percent of all insecticides, and 39 percent of all fungicides used in the United States in 1976.

Total farm pesticide use in 1976 was 38 percent greater than in 1971 (table 2). Farmers used 394 million pounds of herbicides in 1976, an increase of 76 percent over 1971. They also used 173 million pounds of insecticides, (162 million pounds on crops and 11 million pounds on livestock), 43 million pounds of fungicides, and 50 million pounds of miscellaneous pesticides. Increased use of insecticides, fungicides, and miscellaneous pesticides on crops ranged from 5 to 10 percent over 1971.

The overall growth rate between 1971 and 1976 was up about the same as it was in the previous 5-year period (1966-71 when use increased 40 percent). However, a slowdown in the growth rate is expected, because of extensive current use, concern over possible environmental problems, and the continuing implementation of alternatives such as biological controls and integrated pest management (IPM).

Crops

Crops accounted for 98 percent of all farm pesticides used in 1976. Pesticides were applied one or more times on more than 60 percent of the land used for major field crops and hay (table 3). From 90 to 99 percent of the peanut, tobacco, corn, soybean, and cotton acreage received some type of

Table 1--Domestic and farm use of pesticides (active ingredients) in the United States, 1976 1/ 2/

Type of pesticide	Quantity used		Farm share of total
	Total domestic	Farm	
	--Million pounds--		Percent
Fungicides	110	43	39
Herbicides, plant hormones defoliants, and desiccants	555	410	74
Insecticides, miticides, and fumigants	350	208	59
Total pesticides	1,015	661	65

1/ Total domestic use based on, Pesticide Review 1976, U.S. Dept. of Agr., Agr. Stab. and Cons. Serv. Estimates calculated by subtracting exports from production and adding imports to production. For pesticide formulations other than DDT, assumed exports averaged 50 percent active ingredients.
2/ Does not include sulfur or petroleum.

pesticide treatment. On the other hand, pesticides were used on only 2 percent of the pasture and rangeland and only 4 percent of the hay land (excluding alfalfa).

Herbicides

Initially, the use of herbicides was confined mostly to major row crops in major producing areas such as corn in the Corn Belt. Now, however, weeds in nearly all row crops throughout the nation are controlled with herbicides. In addition, herbicides at first were generally applied in band treatments covering only the row and a narrow space on each side. Chemical treatments were usually supplemented with mechanical cultivation to provide weed control between the rows. Many row-crop producers now rely entirely on herbicides for weed control by treating the entire soil area. Herbicides also are currently used on a large share of the close-grown or drilled crops. Changes in the use patterns for herbicides on corn and cotton demonstrate the rapid growth in the use of these products. Between 1952 and 1976, corn acreage treated with herbicides increased from 11 percent to 90 percent of the acreage grown (table 4). During the same period, the proportion of cotton acreage treated with herbicides increased from 5 to 84 percent.

Table 2--Farm use of pesticides on crops and livestock, 1971 and 1976

Type of pesticide	Quantity (active ingredients)			Acres treated		
	1971	1976	Percentage change	1971	1976	Percentage change
	Million pounds		Percent	Million acres		Percent
Major crops: 1/						
Herbicides	207.2	373.9	80	151.0	189.3	25
Insecticides	126.3	130.3	3	49.2	66.3	35
Fungicides	6.4	8.1	27	3.8	5.7	50
Other pesticides	32.5	35.3	9	7.6	9.1	20
Total	372.4	547.6	47	2/161.9	2/205.1	27
Other crops: 3/						
Herbicides	16.8	20.4	21	6.8	7.3	7
Insecticides	27.5	31.8	16	7.5	8.6	15
Fungicides	33.2	35.1	6	4.7	4.8	2
Other pesticides	13.8	14.9	8	2.4	2.5	4
Total	91.3	102.2	12	NA	NA	NA
All crops:						
Herbicides	224.0	394.3	76	157.8	196.6	25
Insecticides	153.8	162.1	5	56.7	74.9	32
Fungicides	39.6	43.2	9	8.5	10.5	24
Other pesticides	46.3	50.2	8	10.0	11.6	16
Total crop use	463.7	649.8	40	NA	NA	NA
Livestock insecticides	14.8	10.8	-27	NA	NA	NA
Total pesticides 4/	478.5	660.6	38	NA	NA	NA

NA = Not available.

1/ Includes corn, cotton, wheat, sorghum, rice, other grain, soybeans, tobacco, peanuts, alfalfa, other hay and forage, and pasture and rangeland.

2/ Items in column do not add to totals, because some acreage received treatments with more than one type of pesticide.

3/ Estimated for 1976 for sugar beets, potatoes, other vegetables, fruits, and other minor crops based on use on these crops in 1966 and 1971 and on trends in use on major crops from 1971 to 1976.

4/ Does not include sulfur or petroleum.

Table 3--Acres of major field crops, hay, and pasture and rangeland grown and percentage treated with pesticides, by type of pest control, 1976 1/

Crop	Acres grown 2/	Percentage of acres on which pesticides were used				
		Herbicides	Insecticides	Fungicides	Other pesticides 3/	Any pesticides
	Million			Percent		
Corn	84.1	90	38	1	1	92
Cotton	11.7	84	60	9	34	95
Wheat	80.2	38	14	1	4/	48
Sorghum	18.7	51	27	--	4/	58
Rice	2.5	83	11	--	--	83
Other grain 5/	29.8	35	5	2	--	41
Soybeans	50.3	88	7	3	1	90
Tobacco	1.0	55	76	30	86	97
Peanuts	1.5	93	55	76	6	99
Alfalfa	26.6	3	13	--	--	14
Other hay and forage	34.4	2	2	--	--	4
Pasture and rangeland 6/	488.2	1	4/	--	--	2
Total/average	829.0	22	9	1	1	24
Total average, excluding pasture and rangeland	340.8	56	18	2	2	61

-- = None reported.

1/ Excludes pesticides used for seed treatment and stored crops and in farmyards and gardens.

2/ Estimate based on Crop Production, U.S. Dept. of Agr., Stat. Rptg. Serv., Cr Pr 2-1 (77), Jan. 17, 1977.

3/ Other pesticides include defoliants, desiccants, growth regulators, and miticides.

4/ Less than 0.5 percent.

5/ Includes oats, rye, and barley.

6/ Estimate based on 1974 Census of Agriculture.

Table 4--Herbicides: Percentage of crop acres treated for selected crops and years

Crop	Percentage of acres treated				
	1952 1/	1958 1/	1966 2/	1971 3/	1976
	Percent				
Corn	11	27	57	79	90
Small grain 4/	12	20	29	36	37
Cotton	5	7	52	82	84
Pasture and rangeland	5/	1	1	1	2

1/ Based on, "Extent of Spraying and Dusting on Farms, 1958, With Comparisons," U.S. Dept. Agr., SB-314, May 1962.
2/ Based on, "Extent of Farm Pesticide Use on Crops in 1966," U.S. Dept. Agr., AER-147, Oct. 1968.
3/ Based on, "Farmers' Use of Pesticides in 1971--Extent of Crop Use," U.S. Dept. Agr., AER-268, Sept. 1975.
4/ Includes wheat, oats, rye, and barley.
5/ Less than 0.5 percent.

Herbicides account for 60 percent of farm crop pesticide use. In 1976, herbicides were applied one or more times on nearly 200 million acres, or 56 percent of the farm crop acreage, exclusive of pasture and rangeland (tables 3 and 5). Between 1971 and 1976, herbicide use increased 76 percent, from 224 million pounds to 394 million pounds (table 6). During the same period, the acreage treated increased about 25 percent. Herbicides were applied at an average annual rate of 2 pounds per acre, up from 1.4 pounds per acre in 1971 (table 5). Farmers are using herbicides more frequently. In addition they are using more herbicide combinations and broadcast treatments, all of which result in higher annual active ingredient usage rates.

Nearly all herbicides are used on major field crops, pasture, and rangeland. In 1976, 374 million pounds of herbicides were applied on about 190 million acres (table 5). In addition, an estimated 20 million pounds were applied on slightly over 7 million acres of sugar beets, fruits, vegetables, and other minor crops not included in the 1976 survey.

Corn is the major crop on which herbicides are used. In 1976, 207 million pounds of herbicides were used on corn, accounting for 55 percent of the major crop herbicides and 53 percent of all herbicides used. Herbicide use on corn more than doubled between 1971 and 1976. This growth was the combined result of a 29-percent rise in the acreage treated and 59-percent

Table 5--Herbicides: Farm use, by crop, 1971 and 1976 1/

Crop	Herbicides (active ingredients)		Acres treated		Use per acre	
	1971	1976	1971	1976	1971	1976
	Million pounds		Million acres		Pounds	
Major crops:						
Corn	101.1	207.1	58.5	75.7	1.7	2.7
Soybeans	36.5	81.1	29.6	44.3	1.2	1.8
Wheat	11.6	21.9	22.1	30.5	.5	.7
Cotton	19.6	18.3	10.1	9.8	1.9	1.9
Sorghum	11.5	15.7	9.5	9.5	1.2	1.7
Rice	8.0	8.5	1.7	2.1	4.7	4.0
Other grain 2/	5.4	5.5	11.8	10.4	0.5	0.5
Peanuts	4.4	3.4	1.4	1.4	3.1	2.4
Alfalfa, other hay and forage	.6	1.6	.6	1.5	1.0	1.1
Tobacco	.2	1.2	.1	.6	2.0	2.0
Pasture and rangeland	8.3	9.6	5.6	3.5	1.5	2.7
Total	207.2	373.9	151.0	189.3	1.4	2.0
Other crops 3/	16.8	20.4	6.8	7.3	2.5	2.8
Total	224.0	394.3	157.8	196.6	1.4	2.0

1/ Does not include petroleum.
2/ Includes oats, rye, and barley.
3/ Estimated for 1976 for sugar beets, potatoes, other vegetables, fruits, and other minor crops based on use on these crops in 1966 and 1971 and on trends in use on major crops from 1971 to 1976.

increase in the average annual application rate. The higher use rates are attributed to using more multiple treatments and more herbicide mixtures. Soybeans ranked second in the use of herbicides with 81 million pounds, accounting for more than 20 percent of all herbicides used. In 1976, 22 million pounds of herbicides were applied on wheat land, 18 million pounds on cotton, and 16 million pounds on sorghum. A major share of the peanut, corn, soybeans, cotton, and rice acreage (93, 90, 88, 84, and 83 percent respectively) received one or more herbicide applications in 1976 (table 3).

The leading major crop herbicides used by farmers in 1976 were atrazine, 90 million pounds, and alachlor, 89 million pounds (table 6). Between 1971 and 1976, the use of atrazine on major crops and pastureland increased 68

Table 6--Herbicides (active ingredients): Quantity used by farmers, 1971 and 1976 1/

Herbicides used on major crops 2/	1971		1976		Percentage change 1971 to 1976
	Quantity	Share of total	Quantity	Share of total	
	Million pounds	Percent	Million pounds	- - -Percent- - -	
Inorganic	1.5	0.7	0.7	0.2	-53
Organic herbicides	205.7	99.3	373.2	99.8	81
Arsenicals	7.4	3.6	3.5	.9	-53
Phenoxys:					
2,4-D	30.5	14.7	38.4	10.3	26
Others	4.8	2.3	3.4	.9	-29
Total phenoxy	35.3	17.0	41.8	11.2	18
Phenyl ureas:					
Diuron	1.1	.5	.9	.3	-18
Fluometuron	3.1	1.5	5.3	1.4	71
Linuron	1.7	.8	8.4	2.2	394
Others	.1	.1	.2	.1	100
Total phenyl ureas	6.0	2.9	14.8	4.0	147
Amides:					
Alachlor	14.0	6.8	88.5	23.7	532
Alanap	3.1	1.5	4.3	1.2	39
Propachlor	22.3	10.8	11.0	2.9	-51
Propanil	6.3	3.0	6.9	1.8	10
Others	.9	.4	.1	4/	-89
Total amides	46.6	22.5	110.8	29.6	138
Carbamates:					
Butylate	5.6	2.7	24.4	6.5	336
EPTC	3.4	1.6	8.6	2.3	153
Pebulate	.9	.4	.3	.1	-67
Others	5.3	2.6	4.7	1.3	-11
Total carbamates	15.2	7.3	38.0	10.2	150
Dinitro group	4.7	2.3	4.4	1.2	-6
Triazines:					
Atrazine	53.9	26.0	90.3	24.1	68
Propazine	3.0	1.4	3.9	1.0	30
Simazine	1.1	.5	2.5	.7	127
Others	6.4	3.2	17.5	4.7	1,734
Total triazines	64.4	31.1	114.2	30.5	77
Benzoics:					
Amiben	9.1	4.4	4.4	1.2	-52
Dicamba	.4	.2	3.6	.9	800
Others	--	--	--	--	--
Total benzoics	9.5	4.6	8.0	2.1	-16
Other organics:					
Trifluralin	10.3	5.0	28.3	7.6	175
Others	6.3	3.0	9.4	2.5	49
Total other organics	16.6	8.0	37.7	10.1	126
Total used on major crops	207.2	100.0	373.9	100.0	80
Herbicides used on other crops 3/	16.8	NA	20.4	NA	21
Total herbicides	224.0	NA	394.3	NA	76

-- = None reported. NA = Not available. 1/ Does not include petroleum. 2/ May include quantities for purposes other than as herbicides. Includes corn, cotton, wheat, sorghum, rice, other grain, soybeans, tobacco, peanuts, alfalfa, other hay and forage, and pasture and rangeland. 3/ Estimated for 1976 for sugar beets, potatoes, other vegetables, fruits, and other minor crops based on use on these crops in 1966 and 1971 and on trends in use for major crops from 1971 to 1976. 4/ Less than 0.5 percent.

percent (table 6). The use of alachlor on these crops increased more than five times in the 1971-76 period. Atrazine accounted for 41 percent and alachlor for 28 percent of the corn herbicides (table 7). Alachlor also accounted for 37 percent of the soybean herbicides used in 1976. Other leading herbicides used on major crops, pasture, and rangeland in 1976 were 2,4-D (38 million pounds), used mostly on wheat, other small grains, pasture, and rangeland, and trifluralin (28 million pounds), used primarily on soybeans and cotton (table 6).

Regionally, the Corn Belt accounted for a substantial share of the herbicide use, 155 million pounds or more than 40 percent of the U.S. total (table 8). Corn accounted for over two-thirds of the herbicide use in the Corn Belt. Approximately equal amounts of herbicides were used in the Lake States and Northern Plains--44 million and 43 million pounds, respectively. In these regions, herbicides were also used primarily to control weeds in corn. The Corn Belt, Lake States, and Northern Plains accounted for nearly two-thirds of all herbicides used in the United States in 1976.

Insecticides

The use of chemicals to control insects has been a common practice for many years. Inorganic insecticides such as lead arsenate have been used throughout much of the history of modern agriculture. Until recently, insecticide use was largely confined to fruits, vegetables, cotton, tobacco, and a few other specialized crops. Currently, however, a large share of the corn and other field crops also receive insecticide treatments. Between 1952 and 1976, the proportion of corn land treated with insecticides increased from 1 percent to 38 percent of the acreage grown (table 9).

In 1976, 130 million pounds of insecticides were used on 66 million acres of major field crops, hay, and pasture and rangeland (table 10). In addition, an estimated 32 million pounds were used on about 9 million acres of sugar beets, fruits, vegetables, and other minor crops.

Insecticide use on major field crops in 1976 was up 4 million pounds, or 3 percent, over use in 1971 (table 11). However, for the major field crops surveyed, acreage treated with insecticides was up more than one-third, increasing from 49 million to 66 million acres (table 10). Corn and wheat accounted for most of the increased acreage. Cotton acreage treated with insecticides declined by 500,000 acres, while farmers grew 670,000 fewer acres of cotton. Due to relatively greater acreage of less heavily treated crops in 1976, the average annual insecticide use rate for major crops dropped from 2.6 pounds per acre in 1971 to 2 pounds in 1976. It is also likely that greater emphasis on IPM helped to reduce the average insecticide use rate.

Major field crops accounted for about 80 percent of the insecticide materials used and nearly 90 percent of the land treated with insecticides in 1976. In terms of quantities of insecticides used, cotton was the leading crop, accounting for 64 million pounds, or about half of the insecticides used on major crops (table 10). Corn ranked second in amount used with 32 million pounds or one-fourth of the major crop insecticides. Thus, cotton and corn accounted for three-fourths of the major crop insecticides and about 60 percent of all crop insecticides used in 1976.

Table 7--Herbicides (active ingredients): Leading products used on selected major field crops, 1976

Crop and herbicide	Million pounds	Percentage of total	Crop and herbicide	Million pounds	Percentage of total
Corn:			Rice:		
Atrazine	83.8	40.5	Propanil	6.9	81.2
Alachlor	58.2	28.1	Others	1.6	18.8
Butylate	24.3	11.7	Total	8.5	100.0
Others	40.8	19.7			
Total	207.1	100.0	Other grain: 1/		
			2,4-D	3.8	69.1
Cotton:			Others	1.7	30.9
Trifluralin	7.0	38.3	Total	5.5	100.0
Fluometuron	5.3	29.0			
MSMA	1.8	9.8	Sorghum:		
DSMA	1.5	8.2	Atrazine	6.5	41.4
Others	2.7	14.7	Propazine	3.9	24.8
Total	18.3	100.0	Propachlor	3.1	19.8
			Others	2.2	14.0
Wheat:			Total	15.7	100.0
2,4-D	15.5	70.8			
Dicamba	1.5	6.8	Pasture and		
Others	4.9	22.4	rangeland:		
Total	21.9	100.0	2,4-D	9.0	93.8
			Others	.6	6.2
Soybeans:			Total	9.6	100.0
Alachlor	29.6	36.5			
Trifluralin	21.1	26.0			
Linuron	6.2	7.6			
Others	24.2	29.9			
Total	81.1	100.0			

1/ Includes oats, rye, and barley.

Table 8--Herbicides (active ingredients): Quantity used on major field crops, hay, and pasture and rangeland, by use and region, 1976 1/

Crop	Northeast	Appalachian	Southeast	Delta States	Lake States	Corn Belt	Northern Plains	Southern Plains	Mountain	Pacific	United States
					1,000 pounds						
Corn	10,931	19,086	8,126	387	33,914	108,037	22,811	1,664	1,191	914	207,061
Cotton	--	750	1,039	11,562	--	--	--	2,761	1,302	898	18,312
Wheat	6	84	--	55	2,408	58	6,221	983	3,919	8,145	21,879
Sorghum	127	1,502	53	420	16	1,300	7,941	4,097	216	47	15,719
Rice	--	--	--	6,163	--	--	--	2,289	--	55	8,507
Other grain 2/	405	131	13	--	1,504	157	1,248	77	1,431	510	5,476
Soybeans	1,323	8,211	6,371	15,241	6,052	41,505	2,349	11	--	--	81,063
Tobacco	--	821	311	--	61	16	--	--	--	--	1,209
Peanuts	--	999	2,073	--	--	--	--	285	9	--	3,366
Alfalfa	50	--	--	--	2	20	--	--	56	790	918
Other hay and forage	25	10	54	9	3	41	111	285	22	164	724
Pasture and rangeland	--	207	11	84	79	4,143	2,538	1,952	324	306	9,644
Total	12,867	31,801	18,051	33,921	44,039	155,277	43,219	14,404	8,470	11,829	373,878

-- = None reported.

1/ Does not include Alaska or Hawaii. Does not include petroleum.
2/ Includes oats, rye, and barley.

Table 9--Insecticides: Percentage of crop acres treated for selected crops and years

Crop	Percentage of acres treated				
	1952 1/	1958 1/	1966 2/	1971 3/	1976
	Percent				
Corn	1	6	33	35	38
Cotton	48	66	54	61	60
Fruits and nuts	82	81	87	90	NA
Potatoes	75	80	91	84	NA
Other vegetables	61	74	58	58	NA
Tobacco	47	58	82	78	76

NA = Not available.

1/ Based on, Extent of Spraying and Dusting on Farms, 1958, with Comparisons. U.S. Dept. Agr., SB-314, May 1962.
2/ Based on, Extent of Farm Pesticide Use on Crops in 1966. U.S. Dept. Agr., AER-147, Oct. 1968.
3/ Based on, Farmers' Use of Pesticides in 1971--Extent of Crop Use. U.S. Dept. Agr., AER-268, Sept. 1975.

Corn was the leading crop in terms of land area treated with insecticides in 1976. Insecticides were applied on 32 million acres, accounting for nearly half of major crop land area treated with insecticides (table 10). Eleven million acres of wheat, 7 million acres of cotton, and 4 million acres of alfalfa and other hay were treated with insecticides. Eighteen percent of the major crop land area (not including pasture and rangeland) was treated with insecticides (table 3). Crops with intensive insecticide use were tobacco with 76 percent of the acres treated, cotton with 60 percent, peanuts with 55 percent, and corn with 38 percent. Only 2 percent of the hay (other than alfalfa) and 7 percent of the soybean acreage was treated with insecticides.

There are three major types of insecticides used by farmers: organochlorines, organophosphates, and carbamates. Due to residue problems, restrictive actions, and changes in efficacy, there has been a significant shift in the types of pesticide materials used. As recently as 1966, organochlorines accounted for 60 percent of all farm crop insecticides used. They accounted for 46 percent of the major crop insecticides in 1971, and dropped to 29 percent (table 11) by 1976. The organochlorine drop was offset by

Table 10--Insecticides: Farm use, by crop, 1971 and 1976 1/

Crop	Insecticides (active ingredients)		Acres treated		Use per acre	
	1971	1976	1971	1976	1971	1976
	-Million pounds-		-Million acres-		-Pounds-	
Cotton	73.4	64.1	7.5	7.0	9.8	9.2
Corn	25.5	32.0	20.5	32.0	1.2	1.0
Soybeans	5.6	7.9	3.5	3.5	1.6	2.3
Wheat	1.7	7.2	3.8	11.2	.4	.6
Alfalfa and other hay	2.5	6.4	2.2	4.2	1.1	1.5
Sorghum	5.7	4.6	8.1	5.0	.7	.9
Tobacco	4.0	3.3	.7	.8	5.7	4.1
Peanuts	6.0	2.4	1.3	.8	4.6	3.0
Other grain 2/	.8	1.8	1.1	1.5	.7	1.2
Rice	.9	.5	.6	.3	1.5	1.7
Pasture and rangeland	.2	.1	NA	NA	NA	NA
Total	126.3	130.3	49.3	66.3	2.6	2.0
Other crops 3/	27.5	31.8	7.5	8.6	3.7	3.7
Total	153.8	162.1	56.8	74.9	2.7	2.2

NA = Not available.

1/ Does not include petroleum.
2/ Includes oats, rye, and barley.
3/ Estimated for 1976 for sugar beets, potatoes, other vegetables, fruits, and other minor crops based on use on these crops in 1966 and 1971 and on trends in use on major crops from 1971 to 1976.

increases in organophosphate and carbamate use. Organophosphate use increased from 50 million pounds in 1971 to 64 million pounds in 1976. The drop in the use of organochlorines has helped reduce residue problems, but increased use of organophosphates and carbamates is posing more of a personal hazard to pesticide applicators and handlers.

Although there has been a substantial shift away from organochlorine insecticides, toxaphene was still the leading insecticide product used on major field crops in 1976. Thirty-one million pounds of toxaphene were applied on major field crops, accounting for nearly one-fourth of all major crop insecticides.

Table 11--Insecticides (active ingredients): Quantity used by farmers, 1971 and 1976 1/

Insecticides used on major crops 2/	1971		1976		Percentage change 1971 to 1976
	Quantity	Share of total	Quantity	Share of total	
	Million pounds	Percent	Million pounds	Percent	
Inorganic	0.2	0.1	3/	4/	NA
Botanicals and biologicals	3/	4/	3/	4/	NA
Synthetic organics:					
Organochlorines:					
Aldrin	7.8	6.2	.9	.7	-88
Chlordane	.9	.7	1.4	1.1	56
DDT	13.5	10.7	--	--	-100
Endosulfan	.2	.1	.8	.6	300
Endrin	1.2	1.0	.6	.5	-50
Heptachlor	1.1	.9	1.6	1.2	45
Methoxychlor	.7	.6	1.4	1.1	100
Toxaphene	31.9	25.2	30.7	23.5	-4
Others	.5	.4	.1	.1	-80
Total organochlorines	57.8	45.8	37.5	28.8	-35
Organophosphorous:					
Azinphosmethyl	.6	.5	.3	.2	-50
Bidrin	.8	.6	.3	.2	-62
Diazinon	2.4	1.9	1.6	1.2	-33
Disulfoton	2.8	2.2	5.5	4.2	96
Malathion	1.7	1.3	1.7	1.3	0
Methyl parathion	27.1	21.5	22.8	17.5	-16
Parathion	7.0	5.5	6.6	5.1	-6
Phorate	3.6	2.9	6.3	4.9	75
Trichlorfon	.3	.2	.1	.1	-67
Others	4.1	3.3	19.0	14.6	363
Total organophosphorous	50.4	39.9	64.2	49.3	27
Carbamates:					
Carbaryl	11.2	8.9	9.3	7.1	-17
Carbofuran	2.8	2.2	11.6	8.9	314
Methomyl	.3	.2	2.5	1.9	733
Others	3.6	2.9	.7	.6	-81
Total carbamates	17.9	14.2	24.1	18.5	35
Other synthetics:					
Chlordimeform	--	NA	4.5	3.4	NA
Others	3/	NA	--	--	NA
Total other synthetics	3/	NA	4.5	3.4	NA
Total synthetics	126.1	99.9	130.3	100.0	3
Total used on major crops:	126.3	100.0	130.3	100.0	3
Insecticides used on other crops: 5/	27.5	NA	31.8	31.8	16
Total insecticides	153.8	NA	162.1	162.1	5

-- = None reported.
NA = Not available.

1/ Does not include petroleum. 2/ May include quantities for purposes other than as insecticides. Includes use on corn, cotton, wheat, sorghum, rice, other grain, soybeans, tobacco, peanuts, alfalfa, other hay and forage, and pasture and rangeland. 3/ Less than 50,000 pounds. 4/ Less than 0.5 percent. 5/ Estimated for 1976 for sugar beets, potatoes, other vegetables, fruits, and other minor crops based on use on these crops in 1966 and 1971 and on trends in use for major crops from 1971 to 1976.

Other leading insecticides used on major field crops in 1976 were methyl parathion (23 million pounds), carbofuran (12 million pounds), and carbaryl (9 million pounds). Nearly all of the toxaphene and methyl parathion was used for cotton insect control in 1976, 26 million pounds and 20 million pounds, respectively (table 12). Most of these products were probably applied in combination. A common practice is to use 2 pounds of toxaphene and 1 pound of methyl parathion. Cotton accounted for over 80 percent of the use of these two products. Most of the carbofuran (9.9 million pounds, or 85 percent) was used for corn insect control. The major share of the phorate (92 percent, or 5.8 million pounds) also was used on corn.

Frequently, one or two insecticides dominate the market for a given crop. In 1976, toxaphene accounted for 41 percent and methyl parathion for 31 percent of the cotton insecticides (table 12). The major product used to control corn insects was carbofuran, accounting for 31 percent of the corn insecticide total. As recently as 1971, aldrin and other organochlorines were the major corn soil insecticides. Carbaryl accounted for 47 percent of the soybean insecticides and parathion for 43 percent of the wheat insecticides in 1976.

Geographically, a large share of the major crop insecticides were used in the Delta (34 million pounds) and Southeast (30 million pounds) regions in 1976 (table 13). These two regions accounted for nearly half of all the major crop insecticide use. In both the Delta and Southeast, cotton accounted for the major share of insecticide use: 97 percent and 66.7 percent, respectively. The Corn Belt ranked third, with corn accounting for nearly 90 percent of the insecticides applied. The 2.4 million pounds of cotton insecticides reported for the Southern Plains is probably low because of inadequate sample size.

Fungicides

Fungicides, like insecticides, have been in common use for many years, particularly in fruit production. The development of synthetic pesticides in the 1940's and 1950's resulted in many new fungicide products; however, inorganic materials such as copper compounds are still popular.

Fungicides are not extensively used on major field crops. These crops accounted for less than 20 percent of the total fungicide use in 1976. About 8 million pounds were used for major field crop disease control (table 14), compared with an estimated 35 million pounds applied on sugar beet, fruit, vegetable and other minor crops.

The major share of the field crop fungicides applied in 1976 were used for peanut disease control--6.8 million pounds. Another 860,000 pounds were used on wheat. Fungicides were used at rather low rates on other crops.

Leading products used for major field crop disease control were chlorothalonil and copper compounds, accounting for 54 percent and 15 percent, respectively, of all major crop fungicides (table 15).

Geographically, major crop fungicides were used most extensively in the Southeast in 1976. About 4.8 million pounds were applied on major crops, mostly peanuts, in that region (table 16). The Southeast accounted for nearly 60 percent of all major crop fungicides used.

Table 12--Insecticides (active ingredients): Leading products used on selected major field crops, 1976

Crop and insecticide	Million pounds	Percentage of total	Crop and insecticide	Million pounds	Percentage of total
Cotton:			Alfalfa:		
Toxaphene	26.3	41.0	Methoxychlor	1.4	25.9
Methyl parathion	20.0	31.2	Malathion	.8	14.8
EPN	6.1	9.5	Diazinon	.6	11.1
Chlordimeform	4.4	6.9	Others	2.6	48.2
Others	7.3	11.4	Total	5.4	100.0
Total	64.1	100.0			
			Sorghum:		
Corn:			Parathion	1.2	26.1
Carbofuran	9.9	30.9	Disulfoton	1.1	23.9
Phorate	5.8	18.1	Toxaphene	1.0	21.7
Fonofos	5.0	15.6	Others	1.3	28.3
Carbaryl	2.1	6.6	Total	4.6	100.0
Others	9.2	28.8			
Total	32.0	100.0	Tobacco:		
			Ethoprop	.8	25.0
Soybeans:			Methomyl	.7	21.9
Carbaryl	3.7	46.8	Carbaryl	.5	15.6
Toxaphene	2.2	27.9	Others	1.2	37.5
Others	2.0	25.3	Total	3.2	100.0
Total	7.9	100.0			
			Peanuts:		
Wheat:			Methomyl	.6	25.0
Parathion	3.1	43.1	Carbofuran	.5	20.8
Disulfoton	1.8	25.0	Toxaphene	.4	16.7
Methyl parathion	1.2	16.7	Carbaryl	.3	12.5
Others	1.1	15.2	Others	.6	25.0
Total	7.2	100.0	Total	2.4	100.0

Other (Miscellaneous) Pesticides

In addition to the major pesticide products (herbicides, insecticides, and fungicides), there are a number of other pesticide products. Included among these materials are miticides, fumigants, defoliants and desiccants, and plant growth regulators.

Miticides are used primarily on fruits and vegetables. Only about 1 million pounds of miticides were used on major field crops in 1976--mostly on corn and cotton (table 17). An estimated 1.7 million pounds were used on fruits, vegetables, and other minor crops.

Table 13--Insecticides (active ingredients): Quantity used on major field crops, hay, and pasture and rangeland, by use and region, 1976 1/

Crop	Northeast	Appalachian	Southeast	Delta States	Lake States	Corn Belt	Northern Plains	Southern Plains	Mountain	Pacific	United States
					1,000 pounds						
Corn	1,018	940	974	22	5,003	14,091	8,172	1,246	369	144	31,979
Cotton 2/	--	4,092	20,581	32,653	--	--	--	2,461	3,337	1,015	64,139
Wheat	16	165	--	--	14	481	395	4,485	408	1,272	7,236
Sorghum	--	--	100	487	--	300	2,199	1,366	61	91	4,604
Rice	--	--	--	82	--	--	--	426	--	--	508
Other grain 3/	232	--	31	--	--	--	48	1,428	1	83	1,823
Soybeans	350	874	6,179	173	22	115	2	151	--	--	7,866
Tobacco	9	2,259	900	--	51	21	--	--	--	--	3,240
Peanuts	--	1,133	1,049	--	--	--	--	257	--	--	2,439
Alfalfa	953	85	--	--	100	725	196	782	352	2,198	5,391
Other hay crops and forage	21	--	310	236	11	3	1	291	11	75	959
Pasture and rangeland	--	1	1	57	--	3	--	50	1	1	114
Total	2,599	9,549	30,125	33,710	5,201	15,738	11,013	12,944	4,540	4,879	130,298

-- = None reported.

1/ Does not include Alaska or Hawaii. Does not include petroleum.
2/ Includes chlordimeform.
3/ Includes oats, rye, and barley.

Table 14--Fungicides: Farm use, by crop, 1971 and 1976 1/

Crop	Fungicides (active ingredients)		Acres treated		Use per acre	
	1971	1976	1971	1976	1971	1976
	Million pounds		Million acres		Pounds	
Major crops:						
Tobacco	0.01	0.15	0.06	0.31	0.2	0.5
Soybeans	.04	.18	.87	1.51	.1	.1
Wheat	--	.86	--	.80	--	1.1
Peanuts	4.43	6.83	1.30	1.17	3.4	5.8
Other major crops 2/	1.90	.08	1.61	1.90	1.2	.4
Total	6.38	8.10	3.84	5.69	1.7	1.4
Other crops 3/	33.18	35.10	4.70	4.80	7.1	7.3
Total fungicides	39.56	43.20	8.54	10.49	4.6	4.1

-- = None reported.

1/ Does not include sulfur.
2/ Includes corn, cotton, sorghum, rice, other grain, alfalfa, other hay and forage, and pasture and rangeland.
3/ Estimated for 1976 for sugar beets, potatoes, other vegetables, fruits, and other minor crops based on use on these crops in 1966 and 1971 and on trends in use on major crops from 1971 to 1976.

Fumigants are used in crop production to control nematodes which injure plant roots and contribute to plant diseases. About 19 million pounds of soil fumigants were used on major field crops in 1976. A major share of this total, 12.25 million pounds, was used on tobacco. About 4 million pounds were used on cotton, and about 2 million pounds on soybeans. In addition, an estimated 12 million pounds were applied on fruits, vegetables, and other minor crops.

Defoliants and desiccants are used primarily in cotton production to facilitate mechanical harvesting. In 1976, an estimated 8.4 million pounds were used on this crop.

Plant growth regulators are used mostly in tobacco production for sucker control. Small amounts are also used in fruit production to control fruit setting and as harvest aids. In 1976, about 6.3 million pounds of plant growth regulators were used on tobacco, and 600,000 pounds on other crops. Maleic hydrazide accounted for about half of the growth regulators used (table 18).

Table 15--Fungicides (active ingredients): Quantity used by farmers, 1971 and 1976 1/

Fungicides used on major crops 2/	1971		1976		Percentage change 1971 to 1976
	Quantity	Share of total	Quantity	Share of total	
	Million pounds	Percent	Million pounds	Percent	
Inorganics:					
Copper compounds	2.0	31.2	1.2	14.8	-40
Others	--	--	.1	1.2	NA
Total inorganics	2.0	31.2	1.3	16.0	-35
Organics:					
Dithiocarbamates:					
Maneb	.1	1.6	.1	1.2	0
Zineb	.1	1.6	2/	2/	NA
Ferbam	.1	1.6	.1	1.2	0
Others	1.4	21.8	.2	2.5	-86
Total dithiocarbamates	1.7	26.6	.4	4.9	-76
Phthalimides	.2	3.1	.3	3.7	50
Other organics:					
Chlorothalonil	NA	NA	4.4	54.3	NA
Others	NA	NA	1.7	21.1	NA
Total other organics	2.5	39.1	6.1	75.4	144
Total organics	4.4	68.8	6.8	84.0	55
Total used on major crops	6.4	100.0	8.1	100.0	29
Fungicides used on other crops 3/	33.2	NA	35.1	NA	6
Total fungicides	39.6	NA	43.2	NA	9

-- = None reported.
NA = Not available.

1/ Does not include sulfur.
2/ Includes corn, cotton, wheat, sorghum, rice, other grain, soybeans, tobacco, peanuts, alfalfa, other hay and forage, and pasture and rangeland.
3/ Estimated for 1976 for sugar beets, potatoes, other vegetables, fruits, and other minor crops based on use on these crops in 1966 and 1971 and on trends in use on major crops from 1971 to 1976.

Table 16--Fungicides (active ingredients): Quantity used on major field crops, by use and region, 1976 1/

Region	Corn	Cotton	Wheat	Soybeans	Tobacco	Peanuts	Total
				1,000 pounds			
Northeast	4	--	--	--	--	--	4
Appalachian	4	--	--	--	153	1,142	1,299
Southeast	--	--	--	41	--	1,758	4,799
Delta States	2/	42	--	130	--	--	172
Lake States	1	--	--	--	1	--	2
Corn Belt	10	--	1	5	--	--	16
Northern Plains	--	--	--	--	--	--	--
Southern Plains	--	6	861	--	--	934	1,801
Mountain	1	1	2/	--	--	--	2
Pacific	--	--	--	--	--	--	--
United States	20	49	862	176	154	6,834	8,095

-- = None reported.

1/ Does not include Alaska or Hawaii. Does not include sulfur.
2/ Less than 500 pounds.

Geographically, the miscellaneous pesticides were used most extensively in the Appalachian region. Farmers in this region applied 14 million pounds of miscellaneous pesticides (table 19). Nearly all of this was fumigants and growth regulators used on tobacco. The Delta region followed with 8 million pounds used primarily on cotton as defoliants and desiccants.

Livestock

Insecticides are used frequently on many types of livestock, particularly to control flies and lice. Livestock insecticides are usually applied in very dilute sprays and at very low dosage rates. Therefore, they account for only about 2 percent of the insecticides used by farmers. In 1976, farmers used about 11 million pounds of livestock insecticides (table 20).

The major share of livestock insecticides, nearly 70 percent, in 1976 was used on beef cattle to control such pests as face flies, horn flies, and cattle grubs. Dairy operations accounted for 18 percent of all livestock insecticides, using them mostly to control face flies and stable flies. Hogs, poultry, and sheep accounted for 9 percent, and other uses for 3 percent.

Table 17--Other crop pesticides: Farm use, by type of pesticide and crop, 1971 and 1976

Type of pesticide and crop 1/	(Active ingredients)		Acres treated		Use per acre	
	1971	1976	1971	1976	1971	1976
	Million pounds		Million acres		Pounds	
Miticides:						
Major crops:						
Corn	0.11	0.48	0.09	0.39	1.2	1.2
Cotton	.40	.39	.41	.46	1.0	.8
Other major crops	.57	.13	.09	.11	6.3	1.2
Total major crops	1.08	1.00	59	.96	1.8	1.0
Other crops 2/	1.02	1.70	1.59	1.70	.6	1.0
Total all crops	2.10	2.70	2.18	2.66	1.0	1.0
Fumigants:						
Major crops:						
Cotton	1.16	3.93	.27	1.15	4.3	3.4
Tobacco	4.43	12.25	.11	.98	40.3	12.5
Soybeans	.05	2.03	.01	.46	5.0	4.4
Other major crops	3.46	1.18	.12	.12	28.8	9.8
Total major crops	9.10	19.39	.51	2.71	18.0	7.2
Other crops 2/	11.86	12.25	.35	.35	33.9	35.0
Total all crops	20.96	31.64	.86	3.06	24.4	10.3
Defoliants and dessicants:						
Major crops:						
Cotton	17.25	8.37	5.80	4.08	3.1	2.1
Other major crops	.12	.26	.06	.07	2.0	3.7
Total major crops	17.37	8.63	5.66	4.15	3.1	2.1
Other crops 2/	.35	.40	.22	.20	1.6	2.0
Total all crops	17.72	9.03	5.88	4.35	3.0	2.1
Plant growth regulators:						
Major crops:						
Tobacco	4.98	6.27	.85	1.26	5.9	5.0
Other major crops	--	--	--	--	--	--
Total major crops	4.98	6.27	.85	1.26	5.9	5.0
Other crops 2/	.57	.60	.24	.24	2.4	2.5
Total all crops	5.55	6.87	1.09	1.50	5.1	4.6
Total miscellaneous pesticides:						
Major crops	32.53	35.29	7.61	9.08	4.3	3.9
Other crops	13.80	14.95	2.40	2.49	5.8	6.0
All crops	46.33	50.24	10.01	11.57	4.6	4.3

-- = None reported.

1/ Major crops include corn, cotton, wheat, sorghum, rice, other grain, soybeans, tobacco, peanuts, alfalfa, other hay and forage, and pasture and rangeland.

2/ Estimated for 1976 for sugarbeets, potatoes, other vegetables, fruits, and other minor crops based on use on these crops in 1966 and 1971 and on trends in major crop use from 1971 to 1976.

Table 18--Other pesticides (active ingredients): Quantity used by farmers, 1971 and 1976

Miscellaneous pesticides used on major crops 1/	1971		1976		Percentage change 1971 to 1976
	Quantity	Share of total	Quantity	Share of total	
	Million pounds	Percent	Million pounds	Percent	
Miticides:					
Omite	0.05	4.6	0.30	30.0	552
Others	1.03	95.4	.70	70.0	-32
Total	1.08	100.0	1.00	100.0	-7
Fumigants:					
Dibromochloropropane	1.63	17.9	2.91	15.0	78
D-D mixture	3.36	36.9	1.24	6.4	-63
Methyl bromide	2/	3/	6.58	33.9	NA
Pentachloronitrobenzene	2/	3/	4.22	21.8	NA
Telone	2.40	26.4	1.47	7.6	-39
Others	1.71	18.8	2.97	15.3	74
Total	9.10	100.0	19.39	100.0	113
Defoliants and dessicants:					
Arsenic acid	6.66	38.3	1.68	19.5	-75
DEF and Folex	5.05	29.1	3.39	39.3	-33
Others	5.66	32.6	3.56	41.2	-37
Totals	17.37	100.0	8.63	100.0	-50
Plant growth regulators:					
Maleic hydrazide	4.13	82.9	3.22	51.4	-22
Others	.85	17.1	3.05	48.6	259
Total	4.98	100.0	6.27	100.0	26
Total miscellaneous pesticides used on major crops	32.53	NA	35.29	NA	8
Miscellaneous pesticides used on other crops: 4/					
Miticides	1.02	NA	1.70	NA	67
Fumigants	11.86	NA	12.25	NA	3
Defoliants and dessicants	.35	NA	.40	NA	14
Plant growth regulators	.57	NA	.60	NA	5
Total	13.80	NA	14.95	NA	8
Total miscellaneous pesticides:					
Miticide	2.10	NA	2.70	NA	29
Fumigants	20.96	NA	31.64	NA	51
Defoliants and dessicants	17.72	NA	9.03	NA	-49
Plant growth regulators	5.55	NA	6.87	NA	24
Total	46.33	NA	50.24	NA	8

NA = Not available.

1/ Includes corn, cotton, wheat, sorghum, rice, other grain, soybeans, tobacco, peanuts, alfalfa, other hay and forage, and pasture and rangeland.
2/ Less than 5,000 pounds.
3/ Less than 0.5 percent.
4/ Estimated for 1976 for sugar beets, potatoes, other vegetables, fruits, and other minor crops based on use in 1966 and 1971 and on trends in use from 1971 to 1976.

Table 19--Other pesticides (active ingredients): Quantity used on major field crops and alfalfa, by use and region, 1976 1/

Region	Corn	Cotton	Sorghum	Soybeans	Tobacco	Peanuts	Alfalfa	Total
				1,000 pounds				
Northeast	--	--	--	--	20	--	--	20
Appalachian	--	253	--	--	13,654	41	--	13,948
Southeast	--	1,481	--	270	4,747	393	1	6,892
Delta States	--	6,227	--	1,760	--	--	--	7,987
Corn Belt	--	--	266	--	55	--	--	321
Lake States	--	--	--	--	50	--	--	50
Northern Plains	--	--	--	--	--	--	--	--
Southern Plains	--	1,881	--	--	--	754	--	2,635
Mountain	--	919	--	--	--	--	1	920
Pacific	483	1,921	--	--	--	--	122	2,526
United States	483	12,682	266	2,030	18,526	1,188	124	35,299

-- = None reported.

1/ Does not include Alaska or Hawaii.

Leading insecticides by farmers to control beef cattle insects in 1976 were toxaphene with 2 million pounds and methoxychlor with 1.7 million pounds. These two products accounted for about half of all insecticides used for beef cattle insect control. The most popular dairy cattle insecticides were dichlorvos, (0.7 million pounds) and methoxychlor, (0.5 million pounds).

Products used for livestock insect control did not change appreciably between 1971 and 1976. Toxaphene and methoxychlor were the major products in both years. Although DDT was extensively used in beef cattle operations in 1971, its use was eliminated a few years later by Administrative action. The use of other organochlorines (excluding methoxychlor and toxaphene) also has been largely discontinued, primarily because of possible residue problems.

Table 20--Livestock insecticides (active ingredients): Quantity used, 1976 1/

Type of insecticide	Dairy	Beef	Hogs	Sheep	Poultry	Other	All livestock
				1,000 pounds			
Botanicals and derivatives	34	11	2/	2/	1	113	159
Synthetic organics:							
Organochlorines:							
Lindane	3	79	91	2/	2/	1	176
Methoxychlor	497	1,735	40	3	7	86	2,368
Toxaphene	83	1,986	275	8	8	16	2,376
Other	2	22	2	--	--	5	31
Total	585	3,822	408	13	15	108	4,951
Organophosphorus:							
Systemics:							
Coumaphos	58	455	2	2/	2/	2	517
Famphur	1	490	1	--	--	2/	492
Ronnel	32	377	69	3	2/	2	483
Crufomate	--	120	--	--	--	--	120
Total	91	1,442	72	3	2/	4	1,612
Others:							
Fenthion	--	429	9	--	--	--	438
Crotoxyphos	144	71	3	2/	2/	4	222
Dichlorvos	749	66	14	2/	4	31	864
Dioxathion	3	88	7	1	--	1	100
Malathion	151	754	173	1	9	16	1,104
Tetrachlorvinphos	60	80	3	2/	72	11	226
Trichlorfon	5	527	6	--	--	2/	538
Other	77	27	1	2/	45	1	151
Total	1,189	2,042	216	2	130	64	3,643
Carbamates:	1	100	4	2	187	17	311
Other	32	19	11	2/	1	12	75
Total synthetics	1,898	7,425	711	20	333	205	10,592
Total	1,932	7,436	711	20	334	318	10,751

-- = None reported.

1/ Includes insecticides used on replacement livestock and livestock buildings.
2/ Less than 500 pounds.

Appendix table 1--Farmers reporting pesticide use, by type of pest control for major field crops, hay, and pasture and rangeland, 1976 1/

Crop	Farmers 3/	Type of pesticide used 2/				
		Herbicides	Insecticides	Fungicides	Other 4/	Any
	Thousands	Percent				
Corn	997	78	24	1	5/	80
Cotton	89	87	59	8	31	94
Wheat	532	28	6	5/	--	32
Sorghum	152	48	21	5/	1	56
Rice	8	90	12	--	--	90
Other grain 6/	412	40	2	5/	--	26
Soybeans	526	83	7	2	1	85
Tobacco	196	38	59	10	83	92
Peanuts	32	85	55	75	8	91
Alfalfa	474	2	10	5/	5/	11
Other hay and forage	735	3	2	--	--	4
Pasture and rangeland	1,380	7	1	--	5/	7
Total/average	2,041	51	23	4	9	38

-- = None reported. 1/ Excludes farmers reporting pesticides used for seed treatment and stored crops. 2/ Farmers using pesticides on specified crops as a percentage of farmers growing that crop. 3/ Estimates of farmers producing these crops and distribution are based on 1974 Census of Agriculture and on survey results. 4/ Other pesticides include defoliants, desiccants, growth regulators, and miticides. 5/ Less than 0.5 percent. 6/ Includes oats, rye, and barley.

Appendix table 2--Acres of major field crops, hay, and pasture and rangeland treated, by type of pest control, 1971 and 1976

Crop	1971					1976				
	Area 1/	Acres treated with--				Area 2/	Acres treated with--			
		Herbicides	Insecticides	Fungicides	Pesticides		Herbicides	Insecticides	Fungicides	Pesticides
	1,000 Acres					1,000 Acres				
Corn	74,055	58,503	20,476	741	61,466	84,123	75,709	31,966	841	77,391
Cotton	12,355	10,131	7,537	494	11,120	11,684	9,815	7,010	1,052	11,100
Wheat	53,810	22,062	3,767	--	25,291	80,215	30,482	11,230	802	38,503
Sorghum	20,756	9,548	8,095	3/	13,076	18,639	9,506	5,033	3/	10,811
Rice	1,826	1,735	639	--	1,735	2,510	2,083	276	3/	2,083
Other grain 4/	37,918	11,755	1,138	379	12,892	29,799	10,430	1,490	3/	12,218
Soybeans	43,472	29,561	3,478	869	31,300	50,327	44,288	3,523	1,510	45,294
Tobacco	839	59	645	59	755	1,042	574	793	313	1,033
Peanuts	1,529	1,407	1,330	1,300	1,468	1,543	1,435	849	1,173	1,528
Alfalfa	27,539	275	2,203	3/	2,476	26,556	797	3,452	3/	3,718
Other hay and forage	33,866	339	3/	--	340	34,359	687	687	3/	1,374
Pasture and rangeland	5/563,314	5,633	--	--	5,633	6/488,178	3,467	3/	3/	7,811
Total	871,279	151,008	49,308	3,842	167,552	340,797	189,273	66,309	5,691	212,864
Total, excluding pasture and rangeland	307,965	145,375	49,308	3,842	161,919	828,975	185,806	66,309	5,691	205,053

-- = None reported.

1/ Estimate of acres grown based on Crop Production, U.S. Dept. Agr., Stat. Rptg. Serv., Cr Pr 2-2, Aug. 1973
2/ Estimate of acres grown based on Crop Production, U.S. Dept. Agr., Stat. Rptg. Serv., Cr Pr 2-1, Jan. 17, 1977.
3/ Less than 500 acres.
4/ Includes oats, rye, and barley.
5/ Estimate based on 1969 Census of Agriculture.
6/ Estimate based on 1974 Census of Agriculture.

Appendix table 3--Pesticides: Acres of major field crops, hay, and pasture and rangeland treated, by region, 1976 1/

Crop	Northeast	Appalachain	Southeast	Delta States	Corn Belt	Lake States	Northern Plains	Southern Plains	Mountain	Pacific	United States
						Percent					
Corn	96	90	68	60	97	95	87	72	77	88	92
Cotton	3/	100	98	100	--	--	--	89	100	100	95
Wheat	8	15	--	5	6	78	46	55	56	83	48
Sorghum	84	71	77	66	85	45	71	42	65	67	58
Rice	--	--	--	95	--	--	--	100	--	18	83
Other grain 2/	53	23	4	--	9	51	38	49	67	56	41
Soybeans	89	91	95	89	92	89	63	48	--	--	90
Tobacco	100	96	100	--	100	90	--	--	--	--	97
Peanuts	--	100	99	--	--	--	--	100	100	--	99
Alfalfa	21	26	13	--	11	3	3	89	12	53	14
Other hay and forage	1	1	14	11	1	1	2	16	1	14	4
Pasture and rangeland	--	2	1	5	3	1	1	4	--	1	2
Average	34	33	27	49	56	42	21	10	6	14	24
Average, excluding pasture and rangeland	50	64	67	76	74	65	45	55	47	71	61

-- = None reported.

1/ Does not include Alaska or Hawaii. Excludes pesticides used for seed treatment and stored crops.
2/ Includes oats, rye and barley.
3/ Less than 0.5 percent.

Appendix table 4--Herbicides: Acres of major field crops, hay, and pasture and rangeland treated, by region, 1976 1/

Crop	North-east	Appa-lachain	South-east	Delta States	Corn Belt	Lake States	Northern Plains	Southern Plains	Mountain	Pacific	United States
						Percent					
Corn	96	89	65	57	96	95	84	62	73	69	90
Cotton	--	100	98	100	--	--	--	68	92	92	84
Wheat	4	11	--	5	3	78	41	10	54	80	38
Sorghum	84	71	23	65	76	45	66	35	60	24	51
Rice	--	--	--	95	--	--	--	100	--	18	83
Other grain 2/	46	23	1	--	9	51	38	8	66	28	35
Soybeans	89	89	88	88	92	89	63	5	--	--	88
Tobacco	--	53	77	--	61	79	--	--	--	--	55
Peanuts	--	83	98	--	--	--	--	91	100	--	93
Alfalfa	2	--	--	--	3	3/	--	--	1	22	3
Other hay and forage	1	1	8	1	1	3/	2	7	1	10	2
Pasture and rangeland	--	2	3/	1	3	1	1	4	3/	1	1
Average	31	31	25	47	55	51	20	6	5	11	22
Average, excl. pasture and rangeland	46	61	67	76	73	64	44	36	44	61	56

-- = None reported.

1/ Does not include Alaska or Hawaii.
2/ Includes oats, rye, and barley.
3/ Less than 0.5 percent.

Appendix table 5--Insecticides: Acres of major field crops, hay, and pasture and rangeland treated, by region, 1976 1/

Crop	North-east	Appa-lachian	South-east	Delta States	Corn Belt	Lake States	Northern Plains	Southern Plains	Mountain	Pacific	United States
						Percent					
Corn	23	30	12	6	39	36	52	37	40	74	38
Cotton	--	54	96	99	--	--	--	30	92	52	60
Wheat	4	4	--	--	3	1	5	50	6	27	14
Sorghum	--	--	62	27	9	--	41	17	11	67	27
Rice	--	--	--	6	--	--	--	37	--	--	11
Other grain 2/	11	--	3	--	1	3/	3/	46	3/	4	5
Soybeans	41	16	48	4	1	1	3/	44	--	--	7
Tobacco	66	80	60	--	39	71	--	--	--	--	76
Peanuts	--	87	60	--	--	--	--	30	--	--	55
Alfalfa	20	26	--	--	10	3	3	89	11	46	13
Other hay and forage	1	--	11	10	3/	1	--	10	1	4	2
Pasture and rangeland	--	3/	5	--	--	--	--	3/	--	3/	3/
Average	11	12	14	12	14	12	6	12	2	9	9
Average, exlucding pasture and rangeland	15	20	31	17	19	14	15	35	9	29	18

-- = None reported.

1/ Does not include Alaska or Hawaii. Includes fumigants used to treat soil organisms. Excludes insecticides used for seed treatment and stored crops.
2/ Includes oats, rye, and barley.
3/ Less than 0.5 percent.

Appendix table 6--Fungicides: Acres of major field crops treated, by region, 1976 1/

Crop	North-east	Appa-lachian	South-east	Delta States	Corn Belt	Lake States	Northern Plains	Southern Plains	Mountain	Pacific	United States
						Percent					
Corn	1	--	3	1	1	2/	1	--	3	2	1
Cotton	--	2	16	19	--	--	--	2/	8	15	9
Wheat	2/	2/	--	--	2/	--	--	4	2/	--	1
Other grain 3/	--	--	--	--	--	--	--	--	2/	27	2/
Soybeans	1	2/	5	9	1	--	--	--	--	--	3
Tobacco	--	29	48	--	--	22	--	--	--	--	30
Peanuts	--	79	79	--	--	--	--	74	--	--	76
Average	1	2	4	5	1	--	2/	1	2/	2	1
Average, excluding pasture and rangeland	1	3	9	8	1	--	2/	3	1	7	2

-- = None reported.

1/ Does not include Alaska or Hawaii. Excludes fungicides used for seed treatment and stored crops.
2/ Less than 0.5 percent.
3/ Includes oats, rye, and barley.

Appendix table 7--Other pesticides: Acres of major field crops treated, by region, 1976 1/

Crop	North-east	Appa-lachian	South-east	Delta States	Corn Belt	Lake States	Northern Plains	Southern Plains	Mountain	Pacific	United States
						Percent					
Corn	--	4	--	1	1	--	1	--	5	--	1
Cotton	--	37	73	38	--	--	--	11	48	92	34
Wheat	--	--	--	--	--	--	--	--	--	1	2/
Sorghum	--	--	--	--	5	--	--	--	--	--	2/
Soybeans	--	2/	3	4	--	--	--	--	--	--	1
Tobacco	34	91	79	--	66	74	--	--	--	--	86
Peanuts	--	14	6	--	--	--	--	3	--	--	6
Alfalfa	--	--	13	--	--	--	--	--	--	--	2/
Average	2/	4	2	4	2/	2/	2/	1	2/	3	1
Average, excl. pasture and rangeland	2/	7	5	7	2/	2/	2/	1	1	10	2

-- = None reported.

1/ Does not include Alaska or Hawaii. Excludes pesticides used for seed treatment and stored crops.
2/ Less than 0.5 percent.

Appendix table 8--Acres of major field crops, hay, and pasture and rangeland, by region, 1976 1/

Crop	North-east	Appa-lachian	South-east	Delta States	Corn Belt	Lake States	Northern Plains	Southern Plains	Mountain	Pacific	United States
	1,000 acres										
Corn	4,134	5,409	4,502	405	39,702	13,299	12,861	1,774	1,399	638	84,123
Cotton	--	510	936	3,342	--	--	--	5,297	438	1,161	11,684
Wheat	752	1,422	539	1,085	7,319	5,253	32,181	14,301	11,557	5,806	80,215
Sorghum	39	244	197	462	823	28	7,370	8,331	910	235	18,639
Rice	--	--	--	1,578	--	--	--	513	--	419	2,510
Other grain 2/	1,597	1,141	1,113	198	3,775	5,418	8,408	2,151	3,502	2,496	29,799
Soybeans	636	4,629	3,721	9,845	24,709	3,780	2,380	626	--	1	50,327
Tobacco	41	815	158	--	18	10	--	--	--	--	1,042
Peanuts	--	272	818	11	--	--	--	433	9	3/	1,543
Alfalfa	2,126	469	26	89	3,926	6,171	6,612	700	4,421	2,016	26,556
Other hay and forage	3,633	4,190	1,564	1,690	5,480	2,309	7,416	3,210	3,312	1,555	34,359
Pasture and rangeland 4/	5,657	16,472	17,572	11,197	26,375	10,965	78,086	116,295	166,059	39,500	488,178
Total	18,615	35,573	31,146	29,902	112,127	47,233	155,314	153,631	191,607	53,827	828,975
Total, excluding pasture and rangeland	12,958	19,101	13,574	18,705	85,752	36,268	77,228	37,336	25,548	14,327	340,797

-- = None reported.

1/ Does not include Alaska or Hawaii. Acres reported in Crop Production, 1976, U.S. Dept. Agr., Stat. Rptg. Serv., Cr Pr 2-1 (77), Jan. 17, 1977.
2/ Includes oats, rye, and barley.
3/ Less than 500 acres.
4/ Estimates based on 1974 Census of Agriculture.

Appendix table 9--Herbicides (active ingredients): Quantity used on major field crops, hay, and pasture and rangeland, 1976

Type of herbicide 1/	Corn	Cotton	Wheat	Sorghum	Rice	Other grain 2/	Soybeans
			1,000 pounds				
Inorganic:							
Sodium cacodylate	3/	617	--	--	--	--	--
Other	--	--	9	--	--	--	--
Total	--	617	9	--	--	--	--
Organic:							
Arsenicals:							
Cacodylic acid	--	33	--	--	--	--	--
DSMA	--	1,460	--	--	--	--	--
MSMA	186	1,787	--	--	--	8	--
Total	186	3,280	--	--	--	8	--
Phenoxys:							
2,4-D	8,009	--	15,486	1,376	126	3,751	103
Other	99	--	1,214	25	339	1,111	170
Total	8,108	--	16,700	1,401	465	4,862	273
Phenyl ureas:							
Chlorobromuron	--	--	15	--	--	--	197
Diuron	--	395	342	--	--	--	--
Flumeturon	--	5,284	--	--	--	--	--
Linuron	1,635	396	106	--	--	--	6,211
Other	--	--	--	--	--	--	19
Total	1,635	6,075	463	--	--	--	6,427
Amides:							
Alachlor	58,211	5	--	64	--	10	29,581
Alanap	--	--	--	--	--	--	3,892
Propachlor	7,729	--	--	3,131	--	--	155
Propanil	--	--	--	--	6,850	--	--
Other	79	--	--	--	--	--	--
Total	66,019	5	--	3,195	6,850	10	33,628
Carbamates:							
Barban	2	--	214	--	--	42	--
Butylate	24,315	--	--	--	--	28	67
Chloropropham	14	--	--	--	--	--	603
EPTC	8,216	--	--	--	--	--	--
Molinate	--	--	--	--	1,162	--	--
Pebulate	--	--	--	--	--	--	6
Propham	--	--	--	--	--	--	--
Triallate	--	--	643	--	--	213	--
Other	--	--	43	--	--	15	554
Total	32,547	--	900	--	1,162	298	1,230
Dinitro (DNBP)	--	211	48	--	--	92	3,702

See footnotes at end of table.

Continued--

Appendix table 9--Herbicides (active ingredients): Quantity used on major field crops, hay, and pasture and rangeland, 1976--Continued

Type of herbicide 1/	Tobacco	Peanuts	Alfalfa	Other hay and forage	Pasture and rangeland	Total
			1,000 pounds			
Inorganic:						
Sodium cacodylate	--	--	--	1	--	618
Other	--	--	--	24	--	33
Total	--	--	--	25	--	651
Organic:						
Arsenicals:						
Cacodylic acid	--	--	--	3/	--	33
DSMA	--	--	--	4	--	1,464
MSMA	--	--	--	--	--	1,981
Total	--	--	--	4	--	3,478
Phenoxys:						
2,4-D	--	--	11	487	9,044	38,393
Other	--	49	29	70	269	3,375
Total	--	49	40	557	9,313	41,768
Phenyl ureas:						
Chlorobromuron	--	--	--	--	--	212
Diuron	--	--	195	--	3	935
Fluometuron	--	--	--	--	--	5,284
Linuron	--	--	--	--	--	8,348
Other	--	--	--	--	--	19
Total	--	--	195	--	3	14,798
Amides:						
Alachlor	--	678	--	--	--	88,549
Alanap	--	381	--	--	--	4,273
Propachlor	--	--	--	--	--	11,015
Propanil	--	--	--	--	--	6,850
Other	--	--	--	--	--	79
Total	--	1,059	--	--	--	110,766
Carbamates:						
Barban	--	--	--	--	--	258
Butylate	--	--	--	--	--	24,410
Chloropropham	--	--	158	--	--	775
EPTC	--	--	376	--	9	8,601
Molinate	--	--	--	--	--	1,162
Pebulate	327	--	--	--	--	333
Propham	--	--	94	58	--	152
Triallate	--	--	--	--	--	856
Other	--	865	--	--	--	1,477
Total	327	865	628	58	9	38,024
Dinitro (DNBP)	20	344	--	7	--	4,424

See footnotes at end of table.

Continued--

Appendix table 9--Herbicides (active ingredients): Quantity used on major field crops, hay, and pasture and rangeland, 1976--Continued

Type of herbicide 1/	Corn	Cotton	Wheat	Sorghum	Rice	Other grain 2/	Soybeans
	1,000 pounds						
Organic--Continued:							
Triazines:							
Atrazine	83,790	--	20	6,530	--	--	--
Cyanazine	10,390	--	--	160	--	--	15
Metribuzin	11	--	--	--	--	--	5,202
Prometone	--	--	--	--	--	--	--
Prometryne	--	656	--	--	--	--	--
Propazine	--	--	--	3,887	--	--	--
Simazine	2,410	--	--	98	--	--	7
Terbutryn	--	--	842	--	--	--	--
Other	4	24	--	--	3/	--	--
Total	96,605	680	862	10,675	3/	--	5,224
Benzoics:							
Amiben	105	--	5	--	--	--	4,350
Dicamba	1,386	--	1,500	432	--	128	--
Other	--	--	--	--	--	--	2
Total	1,491	--	1,505	432	--	128	4,352
Phosphorous:							
Glyphosate	16	--	88	--	--	--	3
Other	--	--	--	--	--	--	--
Total	16	--	88	--	--	--	--
Other:							
Benefin	7	--	--	--	--	--	10
Bentazone	--	--	--	--	30	--	3,785
Dinitramine	1	269	--	--	--	--	253
Diphenamid	--	--	--	--	--	--	38
Oryzalin	--	--	--	--	--	--	363
Paraquat	123	171	--	--	--	--	344
Penoxalin	127	8	--	--	--	--	--
Picloram	--	--	388	--	--	5	--
Profluralin	--	1	--	--	--	--	258
Trifluralin	46	6,980	3	16	--	--	21,091
Other	150	15	913	--	--	73	82
Total	454	7,444	1,304	16	30	78	26,224
Total organic	207,061	17,695	21,980	15,719	8,507	5,476	81,063
Total	207,061	18,312	21,879	15,719	8,507	5,476	81,063

See footnotes at end of table.

Continued--

Appendix table 9--Herbicides (active ingredients): Quantity used on major field crops, hay, and pasture and rangeland, 1976--Continued

Type of herbicide 1/	Tobacco	Peanuts	Alfalfa	Other hay and forage	Pasture and rangeland	Total
			1,000 pounds			
Organic--Continued:						
Triazines:						
Atrazine	--	--	--	--	--	90,340
Cyanazine	--	--	--	--	--	10,565
Metribuzin	--	--	--	--	--	5,213
Prometone	--	--	9	11	180	200
Prometryne	--	--	--	--	--	656
Propazine	--	--	--	--	--	3,887
Simazine	--	--	10	--	--	2,525
Terbutryn	--	--	--	--	--	842
Other	3/	--	--	--	--	28
Total	3/	--	19	11	180	114,256
Benzoics:						
Amiben	--	--	--	--	--	4,460
Dicamba	--	--	1	36	78	3,561
Other	--	--	--	--	--	2
Total	--	--	1	36	78	8,023
Phosphorous:						
Glyphosate	--	--	--	--	10	117
Other	1	--	--	--	--	1
Total	1	--	--	--	10	118
Other:						
Benefin	78	777	3/	8	--	880
Bentazone	--	--	--	--	--	3,815
Dinitramine	--	72	--	--	--	595
Diphenamid	510	9	--	--	--	557
Oryzalin	--	--	--	--	--	363
Paraquat	--	--	11	--	2	651
Penoxalin	--	--	--	--	--	135
Picloram	--	--	--	4	24	421
Profluralin	--	--	--	--	--	259
Trifluralin	--	191	5	--	1	28,333
Other	273	--	19	14	24	1,563
Total	861	1,049	35	26	51	37,572
Total organic	1,209	3,366	918	699	9,644	373,227
Total	1,209	3,366	918	724	9,644	373,878

-- = None reported.

1/ May include use for other purposes.
2/ Includes oats, rye, and barley.
3/ Less than 500 pounds.

Appendix table 10--Herbicides (active ingredients): Quantity used on major field crops, hay, and pasture and rangeland, by region, 1976 1/

Type of herbicide 2/	North-east	Appa-lachian	South-east	Delta States	Corn Belt	Lake States
			1,000 pounds			
Inorganic:						
Sodium cacodylate	--	1	159	65	--	--
Other	--	--	--	--	--	--
Total	--	1	159	65	--	--
Organic:						
Arsenicals:						
Cacodylic acid	--	--	--	--	--	--
DSMA	--	--	79	1,307	--	--
MSMA	8	219	3/	1,747	--	7
Total	8	219	79	3,054	--	7
Phenoxys:						
2,4-D	276	664	436	360	7,552	3,490
Other	63	92	67	298	111	1,062
Total	339	756	503	658	7,663	4,552
Phenyl ureas:						
Chlorobromuron	--	26	--	--	151	20
Diuron	--	--	82	306	--	--
Fluometuron	--	411	179	4,652	--	--
Linuron	260	505	1,125	911	4,550	748
Other	--	14	--	4	--	--
Total	260	956	1,386	5,873	4,701	768
Amides:						
Alachlor	4,087	5,634	1,719	1,427	56,690	14,457
Alanap	5	1,465	923	529	1,345	--
Propachlor	124	1,098	--	--	4,433	1,623
Propanil	--	--	--	5,022	--	--
Other	--	--	--	--	36	43
Total	4,216	8,197	2,642	6,978	62,504	16,123
Carbamates:						
Barban	--	--	--	--	--	62
Butylate	843	5,537	1,913	28	11,303	2,166
Chloropropham	23	--	--	--	603	--
EPTC	15	1,641	433	--	2,910	43
Molinate	--	--	--	774	--	--
Pebulate	--	264	69	--	--	--
Propham	--	--	--	--	--	--
Triallate	--	--	--	--	--	493
Other	--	544	461	--	412	--
Total	881	7,986	2,876	802	15,228	2,764
Dinitro (DNBP)	249	1,239	659	1,561	664	--

See footnotes at end of table.

Continued--

Appendix table 10--Herbicides (active ingredients): Quantity used on major field crops, hay, and pasture and rangeland, by region, 1976 1/--Continued

Type of herbicide 2/	Northern Plains	Southern Plains	Mountain	Pacific	United States
			1,000 pounds		
Inorganic:					
Sodium cacodylate	--	201	--	192	618
Other	--	--	9	24	33
Total	--	201	9	216	651
Organic:					
Arsenicals:					
Cacodylic acid	--	3/	--	33	33
DSMA	--	78	--	--	1,464
MSMA	--	--	--	--	1,981
Total	--	78	--	33	3,478
Phenoxys:					
2,4-D	12,357	2,998	4,711	5,549	38,393
Other	911	349	276	146	3,375
Total	13,268	3,347	4,987	5,695	41,768
Phenyl ureas:					
Chlorobromuron	--	--	15	--	212
Diuron	--	--	7	540	935
Fluometron	--	42	--	--	5,284
Linuron	143	25	25	56	8,348
Other	--	1	--	--	19
Total	143	68	47	596	14,798
Amides:					
Alachlor	4,087	74	168	206	88,549
Alanap	6	--	--	--	4,273
Propachlor	3,737	--	--	--	11,015
Propanil	--	1,828	--	--	6,850
Other	--	--	--	--	79
Total	7,830	1,902	168	206	110,766
Carbamates:					
Barban	44	--	119	33	258
Butylate	1,977	304	40	299	24,410
Chloropropham	--	--	14	135	775
EPTC	2,452	403	376	328	8,601
Molinate	--	388	--	--	1,162
Pebulate	--	--	--	--	333
Propham	--	--	--	152	152
Triallate	75	--	288	--	856
Other	--	2	15	43	1,477
Total	4,548	1,097	852	990	38,024
Dinitro (DNBP)	3	--	6	43	4,424

See footnotes at end of table.

Continued--

Appendix table 10--Herbicides (active ingredients): Quantity used on major field crops, hay, and pasture and rangeland, by region, 1976 1/--Continued

Type of herbicide 2/	North-east	Appa-lachian	South-east	Delta States	Corn Belt	Lake States
			1,000 pounds			
Organic--Continued:						
Triazines:						
Atrazine	5,204	8,396	3,562	554	42,131	14,310
Cyanazine	667	69	65	24	6,689	1,939
Metribuzin	--	277	956	999	2,517	251
Prometone	9	--	--	--	7	2
Prometryne	--	--	--	113	--	--
Propazine	--	--	--	23	--	--
Simazine	909	703	7	--	763	39
Terbutryn	--	--	--	--	--	--
Other	--	--	--	--	--	4
Total	6,789	9,445	4,590	1,713	52,107	16,545
Benzoics:						
Amiben	--	23	--	--	3,110	1,234
Dicamba	55	55	12	8	758	444
Other	--	--	2	--	--	--
Total	55	78	14	8	3,868	1,678
Phosphorous:						
Glyphosate	13	6	--	--	10	--
Other	--	1	--	--	--	--
Total	13	7	--	--	10	--
Other:						
Benefin	--	118	682	8	15	16
Bentazone	20	136	416	2,367	741	135
Dinitramine	--	135	91	247	70	17
Diphenamid	--	304	166	--	--	49
Oryzalin	--	--	--	--	363	--
Paraquat	26	190	1	204	38	4
Penoxalin	--	--	--	--	127	--
Picloram	--	1	--	--	2	--
Profluralin	--	--	--	--	258	--
Trifluralin	11	1,817	3,711	10,349	6,764	1,307
Other	--	216	76	34	154	74
Total	57	2,917	5,143	13,209	8,532	1,602
Total organic	12,867	31,800	17,892	33,856	155,277	44,039
Total	12,867	31,801	18,051	33,921	155,277	44,039

See footnotes at end of table.

Continued--

Appendix table 10--Herbicides (active ingredients): Quantity used on major field crops, hay, and pasture and rangeland, by region, 1976 1/--Continued

Type of herbicide 2/	Northern Plains	Southern Plains	Mountain	Pacific	United States
			1,000 pounds		
Organic--Continued:					
Triazines:					
Atrazine	14,281	1,452	377	73	90,340
Cyanazine	1,055	8	49	--	10,565
Metribuzin	211	2	--	--	5,213
Prometone	47	135	--	3/	200
Prometryne	--	502	41	--	656
Propazine	756	2,892	216	--	3,887
Simazine	94	--	--	10	2,525
Terbutryn	--	--	24	818	842
Other	--	24	--	--	28
Total	16,444	5,015	707	901	114,256
Benzoics:					
Amiben	88	--	--	5	4,460
Dicamba	278	490	199	1,262	3,561
Other	--	--	--	--	2
Total	366	490	199	1,267	8,023
Phosphorous:					
Glyphosate	--	72	16	--	117
Other	--	--	--	--	1
Total	--	72	16	--	118
Other:					
Benefin	--	41	--	3/	880
Bentazone	--	--	--	--	3,815
Dinitramine	--	2	21	12	595
Diphenamid	38	--	--	--	557
Oryzalin	--	--	--	--	363
Paraquat	13	15	24	136	651
Penoxalin	--	8	--	--	135
Picloram	11	--	34	373	421
Profluralin	--	--	--	1	259
Trifluralin	551	2,068	1,224	531	28,333
Other	4	--	176	829	1,563
Total	617	2,134	1,479	1,882	37,572
Total organic	43,219	14,203	8,461	11,613	373,227
Total	43,219	14,404	8,470	11,829	373,878

-- = None reported.

1/ Does not include Alaska or Hawaii.
2/ May include use for other purposes.
3/ Less than 500 pounds.

Appendix table 11--Herbicides: Acres treated with selected ingredients, by major field crops, hay, and pasture and rangeland, 1976

Type of herbicide 1/	Corn	Cotton	Wheat	Sorghum	Rice	Other grain 2/	Soybeans
			1,000 acres				
Inorganic:							
Sodium cacodylate	3/	906	--	--	--	--	--
Other	--	--	1	--	--	--	--
Organic:							
Arsenicals:							
Cacodylic acid	--	478	--	--	--	--	--
DSMA	--	1,183	--	--	--	--	--
MSMA	58	2,460	--	--	--	7	--
Phenoxys:							
2,4-D	12,468	--	30,166	2,596	205	7,509	203
Other	438	--	3,494	83	773	3,175	550
Phenyl ureas:							
Chlorobromuron	--	--	74	--	--	--	235
Diuron	--	1,074	238	--	--	--	--
Fluometuron	--	5,161	--	--	--	--	--
Linuron	1,204	913	201	--	--	--	10,391
Other	--	--	--	--	--	--	18
Amides:							
Alachlor	34,347	10	--	77	--	10	18,690
Alanap	--	--	--	--	--	--	3,050
Propachlor	4,163	--	--	1,094	--	--	105
Propanil	--	--	--	--	1,944	--	--
Other	88	--	--	--	--	--	--
Carbamates:							
Barban	12	--	1,034	--	--	229	--
Butylate	8,183	--	--	--	--	19	158
Chloropropham	7	--	--	--	--	--	434
EPTC	2,578	--	--	--	--	--	--
Molinate	--	--	--	--	712	--	--
Pebulate	--	--	--	--	--	--	1
Propham	--	--	--	--	--	--	--
Triallate	--	--	694	--	--	245	--
Other	--	--	47	--	--	17	225
Dinitro (DNBP)	--	240	24	--	--	73	4,172

See footnotes at end of table.

Continued--

Appendix table 11--Herbicides: Acres treated with selected ingredients, by major field crops, hay, and pasture and rangeland, 1976--Continued

Type of herbicide 1/	Tobacco	Peanuts	Alfalfa	Other hay and forage	Pasture and rangeland	Total
			1,000 acres			
Inorganic:						
Sodium cacodylate	--	--	--	1	--	907
Other	--	--	--	1	--	2
Organic:						
Arsenicals:						
Cacodylic acid	--	--	--	1	--	479
DSMA	--	--	--	3	--	1,186
MSMA	--	--	--	--	--	2,525
Phenoxys:						
2,4-D	--	--	25	599	4,847	58,618
Other	--	170	39	111	668	9,501
Phenyl ureas:						
Chlorobromuron	--	--	--	--	--	309
Diuron	--	--	173	--	1	1,486
Fluometuron	--	--	--	--	--	5,161
Linuron	--	--	--	--	--	12,709
Other	--	--	--	--	--	18
Amides:						
Alachlor	--	399	--	--	--	53,533
Alanap	--	200	--	--	--	3,250
Propachlor	--	--	--	--	--	5,362
Propanil	--	--	--	--	--	1,944
Other	--	--	--	--	--	88
Carbamates:						
Barban	--	--	--	--	--	1,275
Butylate	--	--	--	--	--	8,360
Chloropropham	--	--	31	--	--	472
EPTC	--	--	161	--	4	2,743
Molinate	--	--	--	--	--	712
Pebulate	92	--	--	--	--	93
Propham	--	--	12	44	--	56
Triallate	--	--	--	--	--	939
Other	--	479	--	--	--	768
Dinitro (DNBP)	1	290	--	10	--	4,810

See footnotes at end of table.

Continued--

Appendix table 11--Herbicides: Acres treated with selected ingredients, by major field crops, hay, and pasture and rangeland, 1976--Continued

Type of herbicide 1/	Corn	Cotton	Wheat	Sorghum	Rice	Other grain 2/	Soybeans
	1,000 acres						
Organic--Continued:							
Triazines:							
Atrazine	56,863	--	25	4,862	--	--	--
Cyanazine	6,600	--	--	116	--	--	61
Metribuzin	29	--	--	--	--	--	8,547
Prometone	--	--	--	--	--	--	--
Prometryne	--	908	--	--	--	--	--
Propazine	--	--	--	2,376	--	--	--
Simazine	1,773	--	--	53	--	--	7
Terbutryn	--	--	559	--	--	--	--
Other	5	87	--	--	30	--	--
Benzoics:							
Amiben	84	--	46	--	--	--	3,729
Dicamba	4,358	--	3,524	587	--	635	--
Other	--	--	--	--	--	--	4
Phosphorous:							
Glyphosate	15	--	40	--	--	--	2
Other	--	--	--	--	--	--	--
Other:							
Benefin	20	--	--	--	--	--	27
Bentazone	--	--	--	--	30	--	5,342
Dinitramine	4	708	--	--	--	--	561
Diphenamid	--	--	--	--	--	--	24
Oryzalin	--	--	--	--	--	--	416
Paraquat	220	519	--	--	--	--	605
Penoxalin	50	15	--	--	--	--	--
Picloram	--	--	982	--	--	21	--
Profluralin	--	2	--	--	--	--	258
Trifluralin	65	9,086	3	18	--	--	24,151
Other	77	24	2,420	46	--	236	46

See footnotes at end of table.

Continued--

Appendix table 11--Herbicides: Acres treated with selected ingredients, by major field crops, hay, and pasture and rangeland, 1976--Continued

Type of herbicide 1/	Tobacco	Peanuts	Alfalfa	Other hay and forage	Pasture and rangeland	Total
			1,000 acres			
Organic--Continued:						
Triazines:						
Atrazine	--	--	--	--	--	61,750
Cyanazine	--	--	--	--	--	6,777
Metribuzin	--	--	--	--	--	8,576
Prometone	--	--	17	13	191	221
Prometryne	--	--	--	--	--	908
Propazine	--	--	--	--	--	2,376
Simazine	--	--	12	--	--	1,845
Terbutryn	--	--	--	--	--	559
Other	1	--	--	--	--	123
Benzoics:						
Amiben	--	--	--	--	--	3,859
Dicamba	--	--	2	69	313	9,488
Other	--	--	--	--	--	4
Phosphorous:						
Glyphosate	--	--	--	--	5	62
Other	3/	--	--	--	--	3/
Other:						
Benefin	55	827	3	15	--	947
Bentazone	--	--	--	--	--	5,372
Dinitramine	--	103	--	--	--	1,376
Diphenamid	228	5	--	--	--	257
Oryzalin	--	--	--	--	--	416
Paraquat	--	--	31	--	3	1,378
Penoxlin	--	--	--	--	--	65
Picloram	--	--	--	15	138	1,156
Profluralin	--	--	--	--	--	260
Trifluralin	--	337	5	--	30	33,695
Other	167	--	13	31	10	3,070

-- = None reported.

1/ May include use for other purposes.
2/ Includes oats, rye and barley.
3/ Less than 500 acres.

Appendix table 12--Insecticides (active ingredients): Quantity used on major field crops, hay, and pasture and rangeland, 1976

Type of insecticide 1/	Corn	Cotton	Wheat	Sorghum	Rice	Other grain 2/	Soybeans
	1,000 pounds						
Inorganic	1	--	--	--	--	--	--
Botanicals and biologicals	3/	--	--	--	--	--	--
Synthetic organics:							
Organochlorines:							
Aldrin	850	--	--	--	--	--	--
Chlordane	1,359	--	--	--	--	--	--
Endosulfan	--	677	--	--	--	--	--
Endrin	--	311	196	--	--	--	43
Heptachlor	1,628	--	1	--	--	--	--
Methoxychlor	10	--	--	--	--	--	--
Toxaphene	94	26,289	556	1,001	--	202	2,207
Other	19	--	4	7	--	--	--
Total	3,960	27,277	757	1,008	--	202	2,250
Organophosphorus:							
Azinphosmethyl	--	229	--	--	--	--	51
Bidrin	--	251	--	--	--	--	--
Dasanit	495	--	--	--	--	--	--
DDVP	--	--	--	--	--	--	--
Diazinon	772	36	119	47	--	--	13
Dimethoate	105	87	64	259	--	--	3
Disulfoton	105	1,819	1,844	1,070	--	22	234
Dyfonate	5,002	--	--	--	--	--	--
EPN	101	6,140	--	--	--	--	8
Ethoprop	197	--	--	--	--	--	--
Malathion	39	43	100	416	97	4	--
Methyl parathion	150	19,981	1,173	130	43	166	713
Monocrotophos	--	1,487	--	--	--	--	9
Parathion	626	680	3,061	1,214	--	99	313
Phorate	5,842	158	22	89	--	82	31
Phosmet	--	--	--	27	--	--	--
Terbufos	2,492	--	--	--	--	--	--
Trichlorfon	--	--	--	--	--	--	--
Others	4	69	6	--	--	4	--
Total	15,930	30,980	6,389	3,252	140	377	1,375
Carbamates:							
Aldicarb	92	470	--	2	--	--	--
Carbaryl	2,080	385	37	79	--	1,244	3,669
Carbofuran	9,879	--	53	222	368	--	67
Methomyl	7	590	--	41	--	--	483
Other	29	--	--	--	--	--	22
Total	12,087	1,445	90	344	368	1,244	4,241
Other:							
Chlordimeform	--	4,437	--	--	--	--	--
Other	1	--	--	--	--	--	--
Total	1	4,437	--	--	--	--	--
Total synthetics	31,978	64,139	7,236	4,604	508	1,823	7,866
Total	31,979	64,139	7,236	4,604	508	1,823	7,866

See footnotes at end of table.

Continued--

Appendix table 12--Insecticides (active ingredients): Quantity used on major field crops, hay, and pasture and rangeland, 1976--Continued

Type of insecticide 1/	Tobacco	Peanuts	Alfalfa	Other hay and forage	Pasture and rangeland	Total
			1,000 pounds			
Inorganic	--	--	--	--	--	1
Botanicals and biologicals	3	--	--	--	--	3
Synthetic organics:						
Organochlorines:						
Aldrin	12	--	3	--	--	865
Chlordane	15	2	39	--	8	1,423
Endosulfan	58	--	75	--	--	810
Endrin	11	--	--	--	--	561
Heptachlor	--	--	--	--	--	1,629
Methoxychlor	41	--	1,350	37	--	1,438
Toxaphene	14	352	6	--	--	30,721
Other	14	--	--	3/	2	46
Total	165	354	1,473	37	10	37,493
Organophosphorus:						
Azinphosmethyl	--	--	39	--	--	319
Bidrin	--	--	19	--	--	270
Dasanit	186	67	--	--	--	748
DDVP	107	--	3/	--	--	107
Diazinon	30	5	620	--	1	1,643
Dimethoate	3	--	62	--	--	583
Disulfoton	229	72	98	3	--	5,496
Dyfonate	--	6	--	--	--	5,008
EPN	--	--	--	--	--	6,249
Ethoprop	847	104	--	--	--	1,148
Malathion	116	50	752	77	--	1,694
Methyl parathion	28	77	285	40	1	22,787
Monocrotophos	217	204	--	--	--	1,917
Parathion	50	18	496	2	--	6,559
Phorate	--	52	45	--	--	6,321
Phosmet	--	--	449	47	--	523
Terbufos	--	--	--	--	--	2,492
Trichlorfon	3/	--	63	26	6	95
Others	20	--	132	27	--	262
Total	1,833	655	3,060	222	8	64,221
Carbamates:						
Aldicarb	--	24	--	--	--	588
Carbaryl	513	327	204	699	96	9,333
Carbofuran	57	466	500	1	--	11,613
Methomyl	650	613	104	--	--	2,488
Other	18	--	--	--	--	69
Total	1,238	1,430	808	700	96	24,091
Other:						
Chlordimeform	1	--	50	--	--	4,488
Other	3/	--	--	--	--	1
Total	1	--	50	--	--	4,489
Total synthetic	3,237	2,439	5,391	959	114	130,294
Total	3,240	2,439	5,391	959	114	130,298

-- = None reported.

1/ May include use for other purposes. 2/ Includes oats, rye, and barley. 3/ Less than 500 pounds.

Appendix table 13--Insecticides (active ingredients): Quantity used on major field crops, hay, and pasture and rangeland, by region, 1976 1/

Type of insecticide 2/	North-east	Appa-lachian	South-east	Delta States	Corn Belt	Lake States
	1,000 pounds					
Inorganic	--	--	--	--	1	--
Botanicals and biologicals	--	3	3/	--	--	--
Synthetic organic:						
Organochlorines:						
Aldrin	--	--	12	--	756	32
Chlordane	97	--	2	--	568	748
Endosulfan	--	58	359	318	--	--
Endrin	--	--	179	174	--	11
Heptachlor	--	--	--	--	1,569	31
Methoxychlor	473	23	23	--	153	--
Toxaphene	277	2,514	15,144	10,109	594	11
Other	--	11	14	2	14	--
Total	847	2,606	15,733	10,603	3,654	833
Organophosphorus:						
Azinphosmethyl	7	9	171	43	--	13
Bidrin	--	--	--	192	--	--
Dasanit	--	162	41	--	149	--
DDVP	--	--	107	--	3/	--
Diazinon	3/	39	1	--	689	207
Dimethoate	--	--	3	85	58	3
Disulfoton	220	299	54	--	--	--
Dyfonate	--	6	--	--	2,323	1,049
EPN	--	75	41	6,032	--	--
Ethoprop	3	738	262	--	130	--
Malathion	394	107	70	99	200	--
Methyl parathion	71	1,174	6,296	12,450	315	15
Monocrotophos	8	167	462	1,063	--	--
Parathion	31	85	494	10	--	12
Phorate	37	76	44	--	3,560	985
Phosmet	88	--	--	--	9	--
Terbufos	--	91	--	--	2,001	171
Trichlorfon	--	2	--	12	--	--
Other	3	47	--	--	29	--
Total	862	3,077	8,046	19,986	9,463	2,455
Carbamates:						
Aldicarb	--	83	208	--	--	92
Carbaryl	16	1,282	3,578	273	426	54
Carbofuran	874	961	1,131	39	2,194	1,739
Methomyl	--	1,208	933	82	--	--
Other	--	18	--	--	--	28
Total	890	3,552	5,850	394	2,620	1,913
Other:						
Chlordimeform	--	310	496	2,727	--	--
Other	3/	1	--	--	--	--
Total	3/	311	496	2,727	--	--
Total synthetics	2,599	9,546	30,125	33,710	15,737	5,201
Total	2,599	9,549	30,125	33,710	15,738	5,201

See footnotes at end of table.

Continued--

Appendix table 13--Insecticides (active ingredients): Quantity used on major field crops, hay, and pasture and rangeland, by region, 1976 1/--Continued

Type of insecticide 2/	Northern Plains	Southern Plains	Mountain	Pacific	United States
			1,000 pounds		
Inorganic	--	--	--	--	1
Botanicals and biologicals	--	--	--	--	3
Synthetic organics:					
Organochlorines:					
Aldrin	65	--	--	--	865
Chlordane	--	8	--	--	1,423
Endosulfan	--	--	--	75	810
Endrin	142	--	55	--	561
Heptachlor	--	28	1	--	1,629
Methoxychlor	--	32	4	730	1,438
Toxaphene	52	371	1,649	--	30,721
Other	--	3/	5	--	46
Total	259	439	1,714	805	37,493
Organophosphorus:					
Axinphosmethyl	1	42	--	33	319
Bidrin	--	28	--	50	270
Dasanit	230	50	116	--	748
DDVP	--	--	--	--	107
Diazinon	--	58	69	580	1,643
Dimethoate	310	--	4	120	583
Disulfoton	837	2,445	412	1,229	5,496
Dyfonate	1,512	--	89	29	5,008
EPN	101	--	--	--	6,249
Ethoprop	15	--	--	--	1,148
Malathion	448	321	41	14	1,694
Methyl parathion	319	1,091	894	162	22,787
Monocrotophos	--	37	7	173	1,917
Parathion	1,133	4,193	420	181	6,559
Phorate	1,138	--	121	360	6,321
Phosmet	--	305	--	121	523
Terbufos	229	--	--	--	2,492
Trichlorfon	--	19	--	62	95
Other	18	2	19	144	262
Total	6,291	8,591	2,192	3,258	64,221
Carbamates:					
Aldicarb	--	44	--	161	588
Carbaryl	1,566	2,088	6	44	9,333
Carbofuran	2,874	1,545	120	136	11,613
Methomyl	--	--	33	232	2,488
Other	23	--	--	--	69
Total	4,463	3,677	159	573	24,091
Other:					
Chlordimeform	--	237	475	243	4,488
Other	--	--	--	--	1
Total	--	237	475	243	4,489
Total synthetics	11,013	12,944	4,540	4,879	130,294
Total	11,013	12,944	4,540	4,879	130,298

-- = None reported.

1/ Does not include Alaska or Hawaii.
2/ May include use for other purposes.
3/ Less than 500 pounds.

Appendix table 14--Insecticides: Acres treated with selected ingredients, by major field crops, hay, and pasture and rangeland, 1976

Type of insecticide 1/	Corn	Cotton	Wheat	Sorghum	Rice	Other grain 2/	Soybeans
	1,000 acres						
Inorganic	9	--	--	--	--	--	--
Botanicals and biologicals	1	--	--	--	--	--	--
Synthetic organics:							
Organochlorines:							
Aldrin	452	--	--	--	--	--	--
Chlordane	1,026	--	--	--	--	--	--
Endosulfan	--	325	--	--	--	--	--
Endrin	--	325	935	--	--	--	90
Heptachlor	1,741	--	50	--	--	--	--
Methoxychlor	10	--	--	--	--	--	--
Toxaphene	220	3,112	437	304	--	181	488
Other	56	--	71	10	--	3/	--
Organophosphorus:							
Azinphosmethyl	--	378	--	--	--	--	51
Bidrin	--	658	--	--	--	--	--
Dasanit	651	--	--	--	--	--	--
DDVP	--	--	--	--	--	--	--
Diazinon	1,100	51	199	47	--	--	6
Dimethoate	105	237	97	767	--	--	5
Disulfoton	109	1,400	3,701	1,460	--	88	193
Dyfonate	5,491	--	--	--	--	--	--
EPN	539	1,496	--	--	--	--	15
Ethoprop	170	--	--	--	--	--	--
Malathion	60	55	171	247	194	5	--
Methyl parathion	744	6,166	3,399	181	43	204	676
Monocrotophos	--	1,494	--	--	--	--	15
Parathion	1,634	561	6,369	2,018	--	133	405
Phorate	6,092	115	15	302	--	99	34
Phosmet	--	--	--	25	--	--	--
Terbufos	2,239	--	--	--	--	--	--
Trichlorfon	--	--	--	--	--	--	--
Other	13	213	14	--	--	4	--
Carbamates:							
Aldicarb	92	171	--	5	--	--	--
Carbaryl	2,069	177	136	56	--	744	2,923
Carbofuran	9,320	--	100	383	--	--	67
Methomyl	16	789	--	22	--	--	865
Other	29	--	--	--	--	--	26
Other:							
Chlordimeform	--	2,912	--	--	--	--	--
Others	3/	--	--	--	--	--	--

See footnotes at end of table.

Continued--

Appendix table 14--Insecticides: Acres treated with selected ingredients, by major field crops, hay, and pasture and rangeland, 1976--Continued

Type of insecticide 1/	Tobacco	Peanuts	Alfalfa	Other hay and forage	Pasture and rangeland	Total
			1,000 acres			
Inorganic	--	--	--	--	--	9
Botanicals and biologicals	65	--	--	--	--	66
Synthetic organics:						
Organochlorines:						
Aldrin	4	--	4	--	--	460
Chlordane	3	3	39	--	1	1,072
Endosulfan	64	--	48	--	--	437
Endrin	3/	--	--	--	--	1,350
Heptachlor	--	--	--	--	--	1,791
Methoxychlor	16	--	621	33	--	680
Toxaphene	4	94	11	--	--	4,851
Others	22	--	--	4	7	170
Organophosphorus:						
Azinphosmethyl	--	--	82	--	--	511
Bidrin	--	--	41	--	--	699
Dasanit	54	34	--	--	--	739
DDVP	60	--	8	--	--	68
Diazinon	56	11	588	--	2	2,060
Dimethoate	3	--	101	--	--	1,315
Disulfoton	201	65	81	2	--	7,300
Dyfonate	--	3	--	--	--	5,494
EPN	--	--	--	--	--	2,050
Ethoprop	186	52	--	--	--	408
Malathion	88	26	626	63	--	1,535
Methyl parathion	12	90	479	80	1	12,075
Monocrotophos	144	198	--	--	--	1,851
Parathion	51	24	863	4	--	12,032
Phorate	--	57	36	--	--	6,750
Phosmet	--	--	554	26	--	605
Terbufos	--	--	--	--	--	2,239
Trichlorfon	1	--	99	16	6	122
Others	11	--	442	54	--	751
Carbamates:						
Aldicarb	--	33	--	--	--	901
Carbaryl	240	238	226	620	115	7,544
Carbofuran	38	287	949	5	--	11,417
Methomyl	199	156	227	--	--	2,274
Others	49	--	--	--	--	104
Other:						
Chlordimeform	3/	--	48	--	--	2,960
Others	22	--	--	--	--	22

-- = None reported. 1/ May include use for other purposes. 2/ Includes oats, rye, and barley. 3/ Less than 500 acres.

Appendix table 15--Fungicides (active ingredients): Quantity used on major field crops, 1976

Type of fungicide 1/	Corn	Cotton	Wheat	Soybeans	Tobacco	Peanuts	Total
	1,000 pounds						
Inorganic:							
Coppers:							
Basic copper sulfate	--	--	--	--	--	42	42
Copper sulfate	--	--	--	--	--	168	168
Metallic sulfate	--	--	861	--	--	106	967
Total	--	--	861	--	--	316	1,177
Other	2/	--	2/	--	34	73	107
Total inorganic	2/	--	861	--	34	389	1,284
Organic:							
Dithiocarbamates:							
Dithane M-45	--	--	--	--	--	198	198
Ferbam	--	--	--	--	71	--	71
Maneb	--	--	--	--	35	66	101
Other	--	--	--	--	1	1	2
Total	--	--	--	--	107	265	372
Phthalimides:							
Captan	17	42	1	43	--	--	103
Difolatan	--	--	--	--	--	169	169
Other	--	--	--	--	2	--	2
Total	17	42	1	43	2	169	274
Other:							
Benomyl	2	--	--	133	--	1,582	1,717
Chlorothalonil	--	--	--	--	--	4,428	4,428
Other	1	7	--	--	11	1	20
Total	3	7	--	133	11	6,011	6,165
Total organic	20	49	1	176	120	6,445	6,811
Total	20	49	862	176	154	6,834	8,095

-- = None reported.

1/ May include use for other purposes.
2/ Less than 500 pounds.

Appendix table 16--Fungicides (active ingredients): Quantity used on major field crops, by region, 1976 1/

Type of fungicide 2/	North-east	Appa-lachian	South-east	Delta States	Corn Belt	Lake States	Northern Plains	Southern Plains	Mountain	Pacific	United States
					1,000 pounds						
Inorganic:											
Coppers:											
Basic copper sulfate	--	--	42	--	--	--	--	--	--	--	42
Copper sulfate	3/	159	9	--	--	--	--	--	--	--	168
Metallic sulfate	--	83	23	--	--	--	--	861	--	--	967
Total	3/	242	74	--	--	--	--	861	--	--	1,177
Other	--	106	--	--	--	1	--	--	3/	--	107
Total inorganic	--	348	74	--	--	1	--	861	3/	--	1,284
Organic:											
Dithiocarbamates:											
Dithane M-45	--	198	--	--	--	--	--	--	--	--	198
Ferbam	--	71	--	--	--	3/	--	--	--	--	71
Maneb	--	35	66	--	--	--	--	--	--	--	101
Other	--	1	1	--	--	--	--	--	--	--	2
Total	--	305	67	--	--	--	--	--	--	--	372
Phthalimides:											
Captan	1	4	--	81	16	--	--	--	1	--	103
Difolatan	--	--	79	--	--	--	--	90	--	--	169
Other	--	2	--	--	--	--	--	--	--	--	2
Total	1	6	79	81	16	--	--	90	1	--	274
Other:											
Benomyl	3	182	1,393	91	--	--	--	48	--	--	1,717
Chlorothalonil	--	447	3,185	--	--	--	--	796	--	--	4,428
Other	--	11	1	3/	--	1	--	6	1	--	20
Total	3	640	4,579	91	--	1	--	850	1	--	6,165
Total organic	4	951	4,725	172	16	1	--	940	2	--	6,811
Total	4	1,299	4,799	172	16	2	--	1,801	2	--	8,095

-- = None reported.

1/ Does not include Alaska or Hawaii. 2/ May include use for other purposes. 3/ Less than 500 pounds.

Appendix table 17--Fungicides: Acres treated with selected ingredients, by major field crops, 1976

Type of fungicide 1/	Corn	Cotton	Wheat	Soybeans	Tobacco	Peanuts	Total
				1,000 acres			
Inorganic:							
Coppers:							
Basic copper sulfate	--	--	--	--	--	21	21
Copper sulfate	--	--	--	--	--	26	26
Metallic sulfate	--	--	538	--	--	52	590
Other	--	--	13	--	21	24	58
Organic:							
Dithiocarbamates:							
Dithane M-45	--	--	--	--	--	28	28
Ferbam	--	--	--	--	73	--	73
Maneb	--	--	--	--	21	19	40
Other	--	--	--	--	4	1	5
Phthalimides:							
Captan	22	50	5	944	--	--	1,021
Difolatan	--	--	--	--	--	75	75
Other	--	--	--	--	1	--	1
Other:							
Benomyl	10	--	--	250	--	533	793
Chlorothalonil	--	--	--	--	--	894	894
Other	2/	51	--	--	15	4	70

-- = None reported.

1/ May include use for other purposes.
2/ Less than 500 acres.

Appendix table 18--Other pesticides (active ingredients): Quantity used on major field crops, hay, and pasture and rangeland, 1976

Type of pesticide 1/	Corn	Cotton	Sorghum	Soybeans	Tobacco	Peanuts	Hay and pasture	Total
	1,000 pounds							
Miticides:								
Omite	298	1	--	--	--	--	--	299
Formetante hydrochloride	--	--	--	--	--	--	67	67
Kelthane	185	384	--	--	--	4	56	629
Other	--	--	--	--	9	--	--	9
Total	483	385	--	--	9	4	123	1,004
Fumigants:								
Chloropicrin	--	--	--	--	1,284	--	--	1,284
D-D mixture	--	--	--	--	1,241	--	--	1,241
Dibromochloropropane	--	456	--	2,030	--	425	--	2,911
Ethylene dibromide	--	--	--	--	1,659	--	--	1,659
Methyl bromide	--	--	--	--	6,578	--	--	6,578
Pentachloronitrobenzene	--	3,473	--	--	--	753	--	4,226
Telone	--	--	--	--	1,474	--	--	1,474
Other	--	--	--	--	13	--	--	13
Total	--	3,929	--	2,030	12,249	1,178	1	19,387
Defoliants and desiccants:								
Arsenic acid	--	1,677	--	--	--	--	--	1,677
DEF	--	3,387	--	--	--	--	--	3,387
Sodium chlorate	--	3,275	266	--	--	--	--	3,541
Other	--	29	--	--	--	--	--	29
Total	--	8,368	266	--	--	--	--	8,634
Plant growth regulators:								
Maleic hydrazide	--	--	--	--	3,222	--	--	3,222
T-148	--	--	--	--	3,045	--	--	3,045
Other	--	--	--	--	1	6	--	7
Total	--	--	--	--	6,268	6	--	6,274
Total	483	12,682	266	2,030	18,526	1,188	124	35,299

-- = None reported.

1/ May include use for other purposes.

Appendix table 19--Other pesticides (active ingredients): Quantity used on major field crops, hay, and pasture and rangeland, by region, 1976 1/

Type of pesticide 2/	North-east	Appa-lachian	South-east	Delta States	Corn Belt	Lake States	Northern Plains	Southern Plains	Mountain	Pacific	United States
	1,000 pounds										
Miticides:											
Omite	--	--	--	--	--	--	--	--	--	299	299
Formetante hydrochloride	--	--	--	--	--	--	--	--	--	67	67
Kelthane	--	26	--	--	--	--	--	--	--	603	629
Other	--	9	--	--	--	--	--	--	--	--	9
Total	--	35	--	--	--	--	--	--	--	969	1,004
Fumigants:											
Chloropicrin	--	241	1,043	--	--	--	--	--	--	--	1,284
D-D mixture	--	264	977	--	--	--	--	--	--	--	1,241
Dibromochloropropane	--	31	1,087	1,760	--	--	--	--	--	33	2,911
Ethylene dibromide	--	471	1,188	--	--	--	--	--	--	--	1,659
Methyl bromide	--	6,503	75	--	--	--	--	--	--	--	6,578
Pentachloronitrobenzene	--	--	--	3,373	--	--	--	776	--	77	4,226
Telone	--	1,046	428	--	--	--	--	--	--	--	1,474
Other	--	13	--	--	--	--	--	--	--	--	13
Total	--	8,569	4,798	5,133	--	--	--	776	1	110	19,387
Defoliants and desiccants:											
Arsenic acid	--	--	--	--	--	--	--	1,584	93	--	1,677
DEF	--	219	1,057	810	--	--	--	275	153	873	3,387
Sodium chlorate	--	--	--	2,044	266	--	--	--	673	558	3,541
Other	--	13	--	--	--	--	--	--	--	16	29
Total	--	232	1,057	2,854	266	--	--	1,859	919	1,447	8,634
Plant growth regulators:											
Maleic hydrazide	20	2,865	232	--	55	50	--	--	--	--	3,222
T-148	--	2,240	805	--	--	--	--	--	--	--	3,045
Other	--	7	--	--	--	--	--	--	--	--	7
Total	20	5,112	1,037	--	55	50	--	--	--	--	6,274
Total	20	13,948	6,892	7,987	321	50	--	2,635	920	2,526	35,299

-- = None reported.

1/ Does not include Alaska or Hawaii. 2/ May include use for other purposes.

Appendix table 20--Other pesticides: Acres treated with selected ingredients, by major field crops, hay, and pasture and rangeland, 1976

Type of pesticide 1/	Corn	Cotton	Sorghum	Soybeans	Tobacco	Peanuts	Hay and pasture and rangeland	Total
	1,000 acres							
Miticides:								
Omite	193	1	--	--	--	--	--	194
Formetante hydrochloride	--	--	--	--	--	--	48	48
Kelthane	195	456	--	--	--	20	41	712
Other	--	--	--	--	9	--	--	9
Fumigants:								
Chloropicrin	--	--	--	--	379	--	--	379
D-D mixture	--	--	--	--	20	--	--	20
Dibromochloropropane	--	98	--	464	--	60	--	622
Ethylene dibromide	--	--	--	--	83	--	--	83
Methyl bromide	--	--	--	--	466	--	--	466
Pentachloronitrobenzene	--	1,051	--	--	--	59	--	1,110
Telone	--	--	--	--	27	--	--	27
Other	--	--	--	--	7	--	24	31
Defoliants and desiccants:								
Arsenic acid	--	352	--	--	--	--	--	352
DEF	--	2,285	--	--	--	--	--	2,285
Sodium chlorate	--	1,417	47	--	--	--	--	1,464
Other	--	26	--	--	--	--	--	26
Plant growth regulators:								
Maleic hydrazide	--	--	--	--	875	--	--	875
T-148	--	--	--	--	386	--	--	386
Other	--	--	--	--	2	8	--	10

-- = None reported.

1/ May include use for other purposes.

*U.S. Government Printing Office 1978 280-931/ESCS-6

UNITED STATES DEPARTMENT OF AGRICULTURE
WASHINGTON, D.C. 20250

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF
AGRICULTURE
AGR 101
THIRD CLASS

This publication reports research involving pesticides. It does not contain recommendations for their use, nor does it imply that the uses discussed here have been registered. All uses of pesticides must be registered by appropriate State and/or Federal agencies before they can be recommended.

CAUTION: Pesticides can be injurious to humans, domestic animals, desirable plants, and fish or other wildlife -- if they are not handled or applied properly. Use all pesticides selectively and carefully. Follow recommended practices for the disposal of surplus pesticides and pesticide containers.