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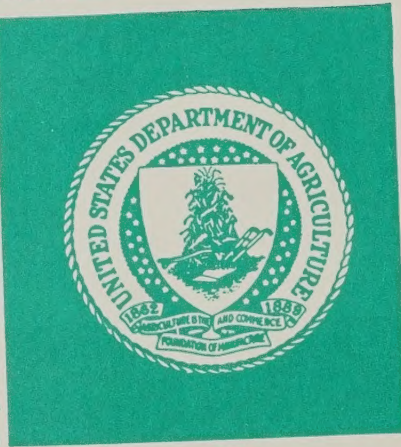
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NRE Staff Report

1979 HERBICIDE, DEFOLIANT, AND DESICCANT USE
ON COTTON IN THE UNITED STATES

by

Peter R. Rich

May 1982

ERS Staff Report No. AGES820504

Natural Resource Economics Division
Economic Research Service
U.S. Department of Agriculture
Washington, D.C. 20250

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by Peter R. Rich; Natural Resource Economics Division, Economic Research Service,
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ABSTRACT

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ABSTRACT

Farmers reported that 18.6 million pounds (a.i.) of herbicides and 23.2 million pounds of defoliants and desiccants were applied to cotton during 1979. Herbicide acre-treatments totaled 22.9 million and consisted of 20.5 million with single material herbicides, and 2.4 million with herbicide mixes. Defoliant and desiccant acre-treatments totaled 9.2 million and consisted of 8.1 million single material defoliants and desiccants and 1.1 million tank-mixes. The major herbicides were fluometuron, glyphosate, MSMA, and trifluralin. The primary defoliants and desiccants were arsenic acid, DEF, paraquat, and sodium chlorate. Coefficients of variation were computed for acres treated with specific pesticides.

Key words: Pesticides, herbicides, defoliants, desiccants, active ingredient, acres treated, acre-treatments, application rates, cotton.

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INTRODUCTION

This report presents herbicide, defoliant, and desiccant use data for cotton grown in the major producing States in 1979. Information is included on acres treated, acre-treatments, pounds of active ingredient used per season and per treatment, and number of applications. This report emphasizes U.S. and regional totals, with State level data included in the Appendices. The information in this report should be useful to policymakers, academic researchers, and private sector groups in evaluating the impacts of regulatory actions on specific pesticides and conducting economic analyses of pesticide use on cotton.

Herbicide use on cotton increased dramatically during the 1950's to the mid-1960's. In 1952 and 1958 the cotton acreage treated with herbicides was 5 and 7 percent, respectively. In 1966, 52 percent of the cotton acreage was treated with herbicides. Since 1971 herbicide use has been in the 80 to 90 percent range for acres treated. In 1971, 82 percent were treated, 84 percent in 1976, and 91 percent in 1979. Growers have substituted herbicides for mechanical cultivation and hand labor as costs of machinery and labor have risen.

METHODOLOGY

The Economics, Statistics, and Cooperatives Service collected cotton pesticide use data during the 1979 crop year as part of the Cotton Objective Yield Survey. A total of 2,027 cotton farm operators responded to the survey. The States are listed below, along with the number of sample observations for each State.

| <u>State</u> | <u>Completed questionnaires</u> |
|--------------|-------------------------------------|
| Alabama | 104 |
| Arizona | 88 |
| Arkansas | 198 |
| California | 232 |

| | |
|----------------|------------|
| Georgia | 67 |
| Louisiana | 107 |
| Mississippi | 334 |
| New Mexico | 57 |
| Oklahoma | 85 |
| South Carolina | 75 |
| Tennessee | 95 |
| Texas | <u>585</u> |
| TOTAL | 2,027 |

The major cotton growing regions in the United States are delineated as follows:

| <u>Southeast</u> | <u>Delta</u> | <u>Southern Plains</u> | <u>Far West</u> |
|------------------|--------------|------------------------|-----------------|
| Alabama | Arkansas | Oklahoma | Arizona |
| Georgia | Louisiana | Texas | California |
| South Carolina | Mississippi | | New Mexico |
| | Tennessee | | |

The sample size by region was as follows: Southeast, 246; Delta, 734; Southern Plains, 670; and Far West, 377.

Sample fields for each State were randomly selected from growers who reported through the June Enumerative Survey that they had planted or intended to plant cotton in 1979. Each acre had an equal probability of being selected so that the probability of a field being chosen was directly correlated with its size.

After the information was collected and validated the survey data were expanded to State level estimates. These State level estimates were then aggregated to regional and U.S. totals.

Several important definitions are as follows:

Acres treated - the number of acres receiving a specific pesticide application one or more times.

Number of applications - the number of times the specific pesticide was applied to one acre.

Acre-treatments - the number of acres treated times the number of applications of the material.

Rate per season - the total amount of pesticide applied during the growing season. It is found by dividing total pounds active ingredient (a.i.) by acres treated.

Rate per acre-treatment - the dosage rate per application. It is found by dividing total pounds of active ingredient by the number of acre-treatments.

Active ingredient - the portion of the pesticide product which controls the pest.

Pesticide application rates vary as a result of weather conditions, soil type, and weed spectrum. Herbicide application rates are generally expressed as broadcast rates. The amount of a material applied on an acre in either a band or spot application is generally one-fourth to one-third the amount in a broadcast application. The application rate listed for each material in this report is an aggregation of band, broadcast, and spot applications.

RELIABILITY OF ESTIMATES

Estimates based upon sample surveys have varying degrees of statistical reliability. Confidence in data depends upon sample size, sampling methods, and the variability of the responses. To provide the user of the data some indication of the reliability of the estimates, coefficients of variation (CV's) are presented in Appendix Table 1. The CV is a measure of relative variation (expressed in percentage terms) and can be used to indicate the degree of confidence a user can place in the estimate. The smaller the CV, the more reliable the estimate.

In simplest terms, one can be 95 percent confident that the sample represents the true population and that the true value for the population lies within

an interval defined as ± 2 CV's times the estimated value. For example, with a CV of 10 percent and an estimate of 40, the interval would be 32 to 48. However, there is also a 5 percent chance that the true value does not fall within the interval as defined above because the sample is not representative of the population.

CV's were calculated only for acres treated with specific pesticides. The estimates of acres treated are expected to have greater variation than other data reported. Consequently, for most other information included in this report, the level of reliability should be equal to or greater than reported for acres treated.

U.S. COTTON HERBICIDE USE

Approximately 14 million acres of cotton were planted in the United States in 1979. Of this total, close to 13 million acres were harvested, with an average yield of 547 pounds of lint per acre. In the 12 States surveyed for pesticide use 13.8 million acres of cotton were planted (Table 1). The largest production area for cotton in terms of both area harvested and production is the Southern Plains, encompassing Oklahoma and Texas. The Southern Plains produced approximately 41 percent (6.1 million bales) of the cotton grown in 1979. The next leading production area was the Far West, comprised of Arizona, California, and New Mexico, with approximately 34 percent (4.9 million bales) of the total production. The Delta and Southeast regions had approximately 20 and 5 percent (2.9 million and 592,000 bales) of the production, respectively.

A total of approximately 18.6 million pounds (a.i.) of herbicides were applied in 22.9 million acre-treatments in 1979 (Table 2). Of this total, 20.5 million acre-treatments, or 88 percent, were single applications while 2.4 million, or 12 percent, were tank mixtures. Single material herbicides accounted

Table 1. U.S. cotton acreage, production, yield, and value, 1979 a/

| Region and State | : Area : : planted : : b/ : | : Area : : harvested : : b/ : | : Lint yield : : per acre : : b/ : | : Production : : b/ : | : Value : : c/ : |
|------------------------|-----------------------------------|-------------------------------------|--|--------------------------|------------------------|
| | -----1000 acres----- | | <u>Lbs.</u> | <u>1,000 bales d/</u> | <u>Million dollars</u> |
| <u>Southeast</u> | | | | | |
| Alabama | 310 | 305 | 510 | 324 | 102 |
| Georgia | 155 | 150 | 486 | 152 | 48 |
| South Carolina | 110 | 109 | 510 | 116 | 37 |
| Total | 575 | 564 | 504 | 592 | 187 |
| <u>Delta</u> | | | | | |
| Arkansas | 610 | 530 | 549 | 606 | 190 |
| Louisiana | 470 | 465 | 712 | 690 | 212 |
| Mississippi | 1,090 | 1,050 | 657 | 1,437 | 438 |
| Tennessee | 250 | 230 | 357 | 171 | 52 |
| Total | 2,420 | 2,275 | 613 | 2,904 | 892 |
| <u>Southern Plains</u> | | | | | |
| Oklahoma | 600 | 580 | 432 | 522 | 150 |
| Texas | 7,731 | 6,831 | 389 | 5,539 | 1,486 |
| Total | 8,331 | 7,411 | 393 | 6,061 | 1,636 |
| <u>Far West</u> | | | | | |
| Arizona | 624 | 618 | 1,046 | 1,347 | 451 |
| California | 1,650 | 1,635 | 1,000 | 3,408 | 1,186 |
| New Mexico | 170 | 141 | 380 | 112 | 38 |
| Total | 2,444 | 2,394 | 976 | 4,867 | 1,675 |
| TOTAL, STATES SURVEYED | 13,770 | 12,644 | 548 | 14,424 | 4,390 |
| U.S. TOTAL <u>e/</u> | 13,978 | 12,831 | 547 | 14,629 | 4,450 |

a/ The States listed are those included in the "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division. The data include Upland and American-Pima cotton.

b/ "Crop Production-1980 Annual Summary," USDA, ESS, Crop Reporting Board, CrPr 2-1(81), January 14, 1981.

c/ "Crop Values-1978-1979-1980," USDA, ESS, Crop Reporting Board, CrPr 2-1(81), January 22, 1981. Value is for lint cotton only.

d/ Standard bale equals 480 pounds net weight.

e/ U.S. totals include data for Florida, Missouri, Nevada, North Carolina, and Virginia.

Table 2. Herbicide use on cotton in the United States: Acres treated, acre-treatments, rates and quantities used, single ingredient and tank-mix applications, 1979 a/

| Herbicides | : Acres : | | :Pounds of active ingredient: | | | : No. of applica- |
|-------------------------|-------------|--------------|-------------------------------|----------|---------------|-------------------|
| | : treated : | Acres- | : Total : | : Per : | : Treatment : | |
| | : b/ : | treatments : | Total : | Season : | Treatment : | tions |
| -----Thousand----- | | | | | | |
| | <u>c/</u> | | | | | |
| <u>Single materials</u> | | | | | | |
| Cyanazine | 588 (6) | 650 | 399 | 0.7 | 0.6 | 1.1 |
| Diuron | 397 (10) | 425 | 276 | .7 | .6 | 1.1 |
| DNBP | 319 (9) | 534 | 310 | 1.0 | .6 | 1.7 |
| DSMA | 752 (6) | 903 | 1,345 | 1.8 | 1.5 | 1.2 |
| Fluometuron | 2,094 (3) | 2,338 | 1,629 | .8 | .7 | 1.1 |
| Glyphosate | 1,090 (9) | 1,524 | 1,402 | 1.3 | .9 | 1.4 |
| MSMA | 873 (7) | 1,372 | 1,406 | 1.6 | 1.0 | 1.6 |
| Pendimethalin | 544 (8) | 544 | 431 | .8 | .8 | 1.0 |
| Profluralin | 498 (13) | 530 | 430 | .9 | .8 | 1.1 |
| Prometryn | 931 (10) | 938 | 890 | 1.0 | .9 | 1.0 |
| Trifluralin | 9,496 (2) | 9,991 | 6,366 | .7 | .6 | 1.1 |
| Other | - | 752 | 685 | - | .9 | - |
| Total | - | 20,501 | 15,569 | - | .8 | - |
| <u>Tank mixtures</u> | | | | | | |
| Fluometuron + MSMA | 490 (7) | 874 | 340 | .7 | .4 | 1.8 |
| | | | 590 | 1.2 | .7 | |
| MSMA + prometryn | 266 (18) | 336 | 254 | 1.0 | .8 | 1.3 |
| | | | 75 | .3 | .2 | |
| MSMA + other <u>d/</u> | 310 | 500 | 311 | 1.0 | .6 | 1.6 |
| | | | 463 | 1.5 | .9 | |
| DSMA + other | 252 | 402 | 374 | 1.5 | .9 | 1.6 |
| | | | 236 | .9 | .6 | |
| Other | - | 326 | 364 | - | 1.1 | - |
| Total | - | 2,438 | 3,007 | - | 1.2 | - |
| TOTAL HERBICIDES | - | 22,939 | 18,576 | - | .8 | - |

a/ "1979 Cotton Pesticide Use Survey", USDA, ESCS, Natural Resource Economics Division.

b/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

c/ Coefficients of variation for acres treated (in percent) are in parentheses. The coefficient of variation is the standard error of the estimate multiplied by 100 and divided by the estimate. The coefficient is a measure of reliability; the lower the coefficient, the more reliable is the estimate.

d/ Includes 16 other herbicides.

for 15.6 million pounds (a.i.) and tank mixtures 3.0 million pounds (a.i.).

The major materials used as single applications were: fluometuron, glyphosate, MSMA, and trifluralin. Trifluralin was used extensively in all regions and accounted for 49 percent of the single material acre-treatments. Fluometuron (11 percent) and MSMA (7 percent) were prominent in the Southeast and Delta regions. Glyphosate accounted for 7 percent of the acre-treatments, with most of it being applied in the Southern Plains. Tank mixtures accounted for about 10 percent of the herbicide acre-treatments. About 37 percent of all tank mixtures were a combination of MSMA and fluometuron and used primarily in the Southeast and Delta regions. MSMA was also tank-mixed with many other herbicides for a total of 26 percent of the acre-treatments. Tank mixtures were relatively unimportant in the Southern Plains and Far West regions.

Single material rates ranged from 0.6 to 1.5 pounds (a.i.) per acre-treatment. The average number of applications for single materials ranged from 1.0 to 1.7 times. Tank mixture rates for individual ingredients ranged from 0.2 to 1.1 pounds (a.i.) per acre-treatment. The average number of applications for tank mixtures ranged from 1.3 to 1.8 times.

Weed species vary between regions. Within regions the weed problems vary with respect to the magnitude of the problem. The most common species are cocklebur, morningglory, crabgrass, Johnsongrass, and nutsedge (1).

Trifluralin, the most commonly used herbicide, is applied as a preplant, broadcast, soil-incorporated treatment. Fluometuron was applied as a band application at planting in the Delta and in the pre-bloom period in the Southeast. Prometryn was applied most commonly at planting in the Southern Plains as a band application (1).

SOUTHEAST REGION

The Southeast region is composed of three States: Alabama, Georgia, and South Carolina. The region had a total of 564,000 acres of cotton harvested in 1979 (Table 1). Alabama had 305,000 acres (54 percent), Georgia 150,000 acres (27 percent), and South Carolina 109,000 acres (19 percent).

Herbicide usage in the Southeast totaled 1.7 million pounds (a.i.) (Table 3). Single application herbicides accounted for 1.5 million pounds, or 88 percent of the total. Tank mixtures accounted for 240,000 pounds (12 percent).

Acre-treatments totaled 1.7 million, of which 1.5 million (90 percent) were single material applications. Tank mixtures accounted for 173,000 acre-treatments (10 percent).

Herbicide use patterns were similar throughout the Southeast region. In Alabama, Georgia, and South Carolina, the two most frequently used herbicides were trifluralin and fluometuron. Trifluralin accounted for 31 percent of the acre-treatments followed by fluometuron at 28 percent. Other herbicides commonly used in single material applications included DSMA and MSMA.

Tank mixtures were also predominantly combinations of DSMA plus other herbicides and MSMA plus other herbicides. DSMA was often used in conjunction with fluometuron, while MSMA was used with a variety of herbicides, each of which amounted to a relatively small number of acre-treatments.

Total pounds of herbicides (a.i.) for all applications was led by DSMA with 453,000 (27 percent), followed by fluometuron with 368,000 (22 percent) and trifluralin with 293,000 (17 percent). Tank mixtures of DSMA plus other herbicides comprised 3 percent of the total pounds (a.i.) and MSMA plus other herbicides accounted for 8 percent.

Rates per acre-treatment ranged from 0.3 pound (a.i.) for linuron and prometryn to 1.9 pounds (a.i.) for DSMA. Average number of applications

Table 3. Herbicide use on cotton in the Southeast: Acres treated, acre-treatments, rates and quantity used, single ingredient and tank-mix applications, 1979 a/

| Herbicide | : Acres | : | :Pounds of active ingredient: | : No. of | | |
|-----------------------------|----------|--------------|-------------------------------|----------|------------|---------|
| | :treated | : Acre- | : | : Per | : applica- | |
| | : b/ | :treatments: | Total | : Season | :Treatment | : tions |
| ----- <u>Thousand</u> ----- | | | | | | |
| <u>Single materials</u> | | | | | | |
| Cyanazine | 85.2 | 85.2 | 52.7 | 0.6 | 0.6 | 1.0 |
| Diuron | 23.9 | 23.9 | 16.0 | .7 | .7 | 1.0 |
| DSMA | 163.5 | 234.5 | 453.2 | 2.8 | 1.9 | 1.4 |
| Fluometuron | 377.5 | 419.4 | 368.3 | 1.0 | .9 | 1.1 |
| Linuron | 23.9 | 33.3 | 10.0 | .4 | .3 | 1.4 |
| MSMA | 87.5 | 111.7 | 187.3 | 2.1 | 1.7 | 1.3 |
| Norflurazon | 28.3 | 28.3 | 21.6 | .8 | .8 | 1.0 |
| Pendimethalin | 45.6 | 45.6 | 26.3 | .6 | .6 | 1.0 |
| Profluralin | 29.3 | 29.3 | 20.6 | .7 | .7 | 1.0 |
| Prometryn | 25.4 | 25.4 | 8.1 | .3 | .3 | 1.0 |
| Trifluralin | 460.0 | 460.2 | 292.8 | .6 | .6 | 1.0 |
| Other | - | 10.9 | 7.2 | - | .7 | - |
| Total | - | 1,507.7 | 1,464.1 | - | 1.0 | - |
| <u>Tank mixtures</u> | | | | | | |
| DSMA | 24.9 | 31.1 | 28.5 | 1.1 | .9 | 1.2 |
| + other | | | 17.0 | .7 | .5 | |
| MSMA | 71.9 | 91.6 | 90.6 | 1.3 | 1.0 | 1.3 |
| + other | | | 52.6 | .7 | .6 | |
| Other | - | 50.1 | 50.6 | - | 1.0 | - |
| Total | - | 172.8 | 239.3 | - | 1.4 | - |
| TOTAL HERBICIDES | - | 1,680.5 | 1,703.4 | - | 1.0 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division. Coefficients of variation for acres treated and the State data are presented in Appendix A.

b/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

ranged from 1.0 to 1.4 times per season.

Herbicides were used to control a number of major weed species in the Southeast region. Among these species were cocklebur, morningglory, Johnson-grass, nutsedge, and crabgrass (1).

The four major herbicides used in the Southeast to control these weed species were used under different schedules and application methods. DSMA was applied at planting as a broadcast treatment, either soil-incorporated or surface applied, to control broadleaf weeds. DSMA was also used to control grasses and was applied pre-bloom in a band application. Fluometuron was used predominantly against broadleaf and grass species and applied at planting or pre-bloom in a band application. MSMA tank mixtures were used almost exclusively in a pre-bloom band application. Trifluralin was used exclusively as a pre-plant, broadcast, soil-incorporated application against broadleaf and grass species (1).

DELTA REGION

The Delta region is comprised of four States: Arkansas, Louisiana, Mississippi, and Tennessee. The region had a total of 2.3 million acres of cotton harvested in 1979 (Table 1). Mississippi had 1.1 million acres (47 percent), Arkansas 530,000 acres (23 percent), Louisiana 465,000 acres (20 percent), and Tennessee 230,000 acres (10 percent).

Herbicide usage in the Delta region totaled 7.4 million pounds of active ingredient (Table 4). Single application herbicides accounted for close to 5 million pounds (a.i.), while tank mixtures accounted for nearly 2.5 million pounds (a.i.).

Acre-treatments totaled 9.2 million, of which 7.2 million, or approximately 78 percent, were single material applications. Tank mixtures accounted for

Table 4. Herbicide use on cotton in the Delta: Acres treated, acre-treatments, rates and quantity used, single ingredient and tank-mix applications, 1979 a/

| Herbicide | : Acres | : | :Pounds of active ingredient: | : | No. of | |
|-------------------------|----------|--------------|-------------------------------|------------|------------|-----|
| | :treated | : Acre- | : | : Per | : applica- | |
| | : b/ | :treatments: | Total | : Season | :Treatment | |
| | | | | :Treatment | : tions | |
| -----Thousand----- | | | | | | |
| <u>Single materials</u> | | | | | | |
| Cyanazine | 502.6 | 565.3 | 346.1 | 0.7 | 0.6 | 1.1 |
| Diuron | 276.3 | 304.6 | 170.8 | .6 | .6 | 1.1 |
| DNBP | 319.0 | 534.4 | 310.0 | 1.0 | .6 | 1.7 |
| DSMA | 485.1 | 535.8 | 680.7 | 1.4 | 1.3 | 1.1 |
| Fluchloralin | 78.0 | 78.0 | 62.5 | .8 | .8 | 1.0 |
| Fluometuron | 1,561.5 | 1,756.6 | 1,123.0 | .7 | .6 | 1.1 |
| Glyphosate | 198.4 | 266.8 | 136.1 | .7 | .5 | 1.3 |
| MSMA | 607.1 | 890.6 | 784.2 | 1.3 | .9 | 1.5 |
| Pendimethalin | 139.7 | 139.7 | 88.2 | .6 | .6 | 1.0 |
| Profluralin | 96.7 | 96.7 | 68.1 | .7 | .7 | 1.0 |
| Prometryn | 73.9 | 80.3 | 46.3 | .6 | .6 | 1.1 |
| Trifluralin | 1,742.5 | 1,754.7 | 1,048.5 | .6 | .6 | 1.0 |
| Other | - | 163.1 | 89.9 | - | .6 | - |
| Total | - | 7,166.6 | 4,954.4 | - | .7 | - |
| <u>Tank mixtures</u> | | | | | | |
| Fluormeturon | 459.7 | 830.1 | 282.3 | .6 | .3 | 1.8 |
| + MSMA | | | 556.9 | 1.2 | .7 | |
| MSMA | 427.6 | 681.7 | 450.4 | 1.1 | .7 | 1.6 |
| + other | | | 492.1 | 1.2 | .7 | |
| Other | - | 555.4 | 679.8 | - | 1.2 | - |
| Total | - | 2,067.2 | 2,461.5 | - | 1.2 | - |
| TOTAL HERBICIDES | - | 9,233.8 | 7,415.9 | - | .8 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division. Coefficients of variation for acres treated and the State data are presented in Appendix B.

b/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

2.1 million acre-treatments, or 22 percent.

Herbicide use patterns were similar throughout the Delta region. In all four States the two major herbicides were trifluralin and fluometuron. Arkansas also used significant amounts of MSMA, DNBP, and cyanazine. There was significant use of MSMA in Louisiana. Mississippi used a diverse spectrum of herbicides, including MSMA, DNBP, and cyanazine. Tennessee used DSMA extensively. Fluometuron and trifluralin each accounted for approximately 25 percent of single material acre-treatments. MSMA, cyanazine, DNBP, and DSMA were each used on less than 12 percent of the single material acre-treatments.

The predominant tank mixes were MSMA plus fluometuron and MSMA plus other herbicides. MSMA plus fluometuron accounted for 40 percent of all tank-mix acre-treatments, while MSMA plus other herbicides accounted for 33 percent. Other tank mixtures accounted for 27 percent and were comprised of six different mixtures.

Total pounds of active ingredients for all applications was led by fluometuron with 1.4 million pounds (a.i.), or 19 percent of the total. Trifluralin had 1.0 million pounds or 13 percent. Other important materials in terms of total pounds (a.i.) applied were MSMA at 784,000 pounds (11 percent) and MSMA (tank-mixed with fluometuron) at 557,000 pounds (8 percent).

Rates per acre-treatment ranged from 0.3 pound (a.i.) for fluometuron (tank-mixed with MSMA) to 1.3 pounds (a.i.) for DSMA. The number of applications ranged from 1.0 to 1.8 times per season.

The major weed species in the Delta are spurred anoda, cocklebur, morning-glory, crabgrass, and Johnsongrass (1). The major herbicides in the Delta, fluometuron, trifluralin, and MSMA, were generally used under different application and timing schedules. Fluometuron was applied mainly at planting in a band application. Trifluralin was applied mainly as a preplant, broadcast,

soil-incorporated herbicide, and MSMA was applied mainly as a band application pre-bloom.

SOUTHERN PLAINS REGION

The Southern Plains region is comprised of Oklahoma and Texas. A total of 8.3 million acres of cotton was planted in this region in 1979 (Table 1). Of this total, 7.7 million acres (93 percent) were planted in Texas, while 600,000 acres (7 percent) were planted in Oklahoma.

Herbicide usage in this region totaled 7.2 million pounds of active ingredients (Table 5). Single application herbicides accounted for 7.0 million pounds (a.i.) or 97 percent. Tank mixtures accounted for 230,000 pounds (a.i.) or 3 percent. Acre-treatments totaled 9.7 million, of which 9.6 million (99 percent) were single materials. Tank mixtures accounted for 149,000 acre-treatments or 1 percent.

Herbicide use patterns were similar in both Oklahoma and Texas. In both States the major herbicide used was trifluralin with 6.6 million acre-treatments. Glyphosate was used in 1.1 million acre-treatments, and prometryn in 709,000 acre-treatments. All of this use was in Texas. Tank mixtures included MSMA plus prometryn and prometryn plus other herbicides.

Total quantity of active ingredients applied as single material herbicides was led by trifluralin with 4.1 million pounds (a.i.), or 58 percent. Glyphosate totaled 1.1 million pounds (a.i.) (16 percent), and prometryn accounted for 694,000 pounds (a.i.) (10 percent).

Rates per acre-treatment ranged from 0.6 for trifluralin to 2.7 for prometryn tank-mixed with other herbicides. Average number of applications ranged from 1.0 to 2.2 times per season.

In the Southern Plains, herbicides were used to control a number of weed

Table 5. Herbicide use on cotton in the Southern Plains: Acres treated, acre-treatments, rates and quantity used, single ingredient and tank-mix applications, 1979 a/

| Herbicide | : Acres : | | :Pounds of active ingredient: | | : No. of applica- |
|-------------------------|--------------------|---------------|-------------------------------|------------|-------------------|
| | : treated : | : Acre- | : : | : Per : | |
| | : b/ : | : treatments: | : Total : | : Season : | : Treatment : |
| | -----Thousand----- | | | | |
| <u>Single materials</u> | | | | | |
| Dipropetryn | 110.6 | 110.6 | 94.7 | 0.9 | 1.0 |
| DSMA | 103.0 | 132.4 | 211.1 | 2.0 | 1.3 |
| Fluometuron | 154.5 | 161.8 | 137.5 | .9 | 1.0 |
| Glyphosate | 774.7 | 1,065.7 | 1,111.7 | 1.4 | 1.4 |
| MSMA | 136.5 | 294.9 | 311.8 | 2.3 | 2.2 |
| Profluralin | 305.5 | 337.8 | 276.6 | .9 | 1.1 |
| Prometryn | 708.5 | 708.5 | 694.4 | 1.0 | 1.0 |
| Trifluralin | 6,161.2 | 6,629.3 | 4,067.2 | .7 | 1.1 |
| Other | - | 141.2 | 78.2 | - | - |
| Total | - | 9,582.2 | 6,983.2 | - | - |
| <u>Tank mixtures</u> | | | | | |
| MSMA | 97.4 | 97.4 | 72.9 | .7 | 1.0 |
| + prometryn | | | 18.2 | .2 | |
| Prometryn | 51.4 | 51.4 | 69.1 | 1.3 | 1.0 |
| + other | | | 69.4 | 1.4 | |
| Total | - | 148.8 | 229.6 | - | - |
| TOTAL HERBICIDES | - | 9,731.0 | 7,212.8 | - | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division. Coefficients of variation for acres treated and the State data are presented in Appendix C.

b/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

species including spurred anoda, cocklebur, morningglory, smartweed, teaweed, and annual and perennial grasses (1). The major herbicides used in this region (prometryn, trifluralin, and glyphosate) were generally used under different treatment schedules. Trifluralin was utilized as a preplant, broadcast, soil-incorporated herbicide. Prometryn was used mainly as a band treatment at planting. Glyphosate was applied prior to crop emergence and as a spot application during the post-bloom portion of the growing season (1).

FAR WEST

The Far West region is comprised of Arizona, California, and New Mexico. The region had a total of 2.4 million acres of cotton harvested in 1979 (Table 1). California had 1.6 million acres (68 percent); Arizona 618,000 acres (26 percent); and New Mexico 141,000 acres (6 percent).

Herbicide usage in the Far West totaled approximately 2.2 million pounds (a.i.) (Table 6). Single application herbicides accounted for 97 percent of the total. Tank mixtures accounted for nearly 80,000 pounds (a.i.), or 3 percent.

Acre-treatments totaled 2.3 million. Single material acre-treatments accounted for 2.2 million, or 96 percent. Tank mixtures accounted for 4 percent of the total acre-treatments.

In California and Arizona the two major herbicides used were trifluralin and pendimethalin. In New Mexico the major herbicides were glyphosate and trifluralin. On a regional basis trifluralin accounted for 51 percent of single material acre-treatments. The other commonly used herbicides included pendimethalin, accounting for 15 percent of the acre-treatments, and prometryn, accounting for 5 percent. Of the seven other materials used as single material applications, none accounted for more than 5 percent of the single material acre-treatments.

Table 6. Herbicide use on cotton in the Far West: Acres treated, acre-treatments, rates and quantity used, single ingredient and tank-mix applications, 1979 a/

| Herbicide | : Acres | : | :Pounds of active ingredient: | | : No. of | |
|-------------------------|-----------|---------------|-------------------------------|---------|------------|---------|
| | : treated | : Acre- | : | : Per | : applica- | |
| | : b/ | : treatments: | Total | :Season | :Treatment | : tions |
| -----Thousand----- | | | | | | |
| <u>Single materials</u> | | | | | | |
| DCPA | 55.9 | 55.9 | 175.3 | 3.1 | 3.1 | 1.0 |
| Dinitramine | 48.3 | 48.3 | 27.1 | .6 | .6 | 1.0 |
| Diuron | 96.6 | 96.6 | 89.2 | .9 | .9 | 1.0 |
| Fluchloralin | 13.8 | 13.8 | 15.5 | 1.1 | 1.1 | 1.0 |
| Glyphosate | 116.8 | 191.4 | 154.5 | 1.3 | .8 | 1.6 |
| MSMA | 42.2 | 74.8 | 123.2 | 2.9 | 1.6 | 1.8 |
| Pendimethalin | 358.2 | 358.2 | 316.1 | .9 | .9 | 1.0 |
| Profluralin | 66.3 | 66.3 | 65.0 | 1.0 | 1.0 | 1.0 |
| Prometryn | 123.5 | 123.5 | 141.1 | 1.1 | 1.1 | 1.0 |
| Trifluralin | 1,132.4 | 1,146.9 | 957.6 | .8 | .8 | 1.0 |
| Other | - | 68.7 | 103.0 | - | 1.5 | - |
| Total | - | 2,244.4 | 2,167.6 | - | 1.0 | - |
| <u>Tank mixtures</u> | | | | | | |
| Prometryn | 20.0 | 20.0 | 18.5 | .9 | .9 | 1.0 |
| + trifluralin | | | 10.7 | .5 | .5 | |
| Other | - | 28.8 | 47.7 | - | 1.7 | - |
| Total | - | 48.8 | 76.9 | - | 1.6 | - |
| TOTAL HERBICIDES | - | 2,293.2 | 2,244.5 | - | 1.0 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division. Coefficients of variation for acres treated and the State data are presented in Appendix D.

b/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

Tank mixture acre-treatments were predominantly prometryn plus trifluralin (41 percent) and other tank-mixed herbicides accounted for 59 percent. These other tank mixtures were composed of separate combinations, including fluometuron, MSMA, and pendimethalin.

Total pounds of active ingredients for all applications was led by trifluralin, with 958,000 pounds (a.i.), or 43 percent of the total. Pendimethalin totaled 316,000 pounds (14 percent) and prometryn 141,000 pounds (6 percent). Tank mixtures accounted for 3 percent of the total pounds (a.i.).

Rates per acre-treatments ranged from 0.6 pound (a.i.) for dinitramine to 3.1 pounds (a.i.) for single applications of DCPA.

The major weed species in the Far West were morningglory, cocklebur, crabgrass, and Johnsongrass (1). The three major herbicides used to control these weed species, trifluralin, pendimethalin, and prometryn, were used under different schedules and application methods. Trifluralin was used as a pre-plant, broadcast, soil-incorporated herbicide against both broadleaf and grass species. Pendimethalin was used against broadleaf and grass species in a preplant, broadcast, soil-incorporated application. Prometryn was used mainly against broadleaf species as a pre- or post-bloom, broadcast, non-incorporated herbicide (1).

U.S. COTTON DEFOLIANT AND DESICCANT USE

Defoliants and desiccants are often used to facilitate mechanical harvesting. Defoliants cause the leaves to drop while they are still green while desiccants cause the leaves to dry out completely and then drop off.

A total of approximately 9.2 million acre-treatments were made with defoliants and desiccants in 1979 (Table 7). Of this total, 8.1 million acre-treatments, or 88 percent, were single material applications. Tank mixtures accounted for 1.1 million acre-treatments (12 percent).

Total quantity was 23.2 million pounds (a.i.). Single materials accounted for 19.8 million, or 85 percent. Tank mixtures accounted for 3.4 million pounds (a.i.), or 15 percent. Rates per acre-treatment ranged from 0.2 pound (a.i.) for endothall to 4.6 pounds (a.i.) for sodium chlorate. Number of applications ranged from 1.0 to 1.2 times per season.

In the Southeast the major defoliant used in all three States was DEF (Appendix E). In the Delta the predominant defoliant was DEF, however, sodium chlorate was used extensively in Mississippi. Arsenic acid (a desiccant) was the dominant material used in the Southern Plains. The defoliants, DEF and sodium chlorate, were also used. In the Far West the major defoliants used were DEF and sodium chlorate.

Table 7. Defoliant and desiccant use on cotton in the United States: Acres treated, acre-treatments, rates and quantities used, single ingredient and tank-mix applications, 1979 a/

| Defoliant and desiccant | Acres | | Pounds of active ingredient | | No. of applica- | |
|---------------------------------|-----------|-------------|-----------------------------|-----------|-----------------|-------|
| | treated | Acres- | Total | Per | Treatment | tions |
| | b/ | treatments: | Season | Treatment | | |
| -----Thousand----- | | | | | | |
| <u>c/</u> | | | | | | |
| <u>Single materials</u> | | | | | | |
| Arsenic acid | 1,654 (8) | 1,677 | 6,744 | 4.1 | 4.0 | 1.0 |
| Cacodylic acid | 225 (2) | 235 | 120 | .5 | .5 | 1.0 |
| DEF | 3,124 (3) | 3,331 | 4,519 | 1.4 | 1.4 | 1.1 |
| Endothall | 301 (17) | 322 | 75 | .2 | .2 | 1.1 |
| Magnesium chlorate | 90 (11) | 111 | 90 | 1.0 | .8 | 1.2 |
| Paraquat | 611 (11) | 699 | 381 | .6 | .5 | 1.1 |
| Sodium chlorate | 1,455 (5) | 1,692 | 7,788 | 5.4 | 4.6 | 1.2 |
| Other | - | 33 | 48 | - | 1.5 | - |
| Total | - | 8,100 | 19,765 | - | 2.4 | - |
| <u>Tank mixtures</u> | | | | | | |
| Arsenic acid + other | - | 36 | 89 | - | 2.4 | - |
| Cacodylic acid + other | - | 89 | 68 | - | .8 | - |
| DEF + endothall | 362 (13) | 421 | 1,217 | 3.4 | 2.9 | 1.2 |
| DEF + other | - | 191 | 461 | - | 2.4 | - |
| Paraquat + sodium chlorate | 157 (21) | 157 | 50 | .3 | .3 | 1.0 |
| Other | - | 189 | 555 | - | 2.9 | - |
| Total | - | 1,083 | 3,393 | - | 3.1 | - |
| TOTAL DEFOLIANTS/ DESICCANTS | - | 9,183 | 23,158 | - | 2.5 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division. Regional data are presented in Appendix E.

b/ Acres treated data in this column not reported for "other" and "total" because two or more materials may have been used on the same acre, resulting in double counting.

c/ Coefficients of variation for acres treated (in percent) are in parentheses. The coefficient is the standard error of the estimate multiplied by 100 and divided by the estimate. The coefficient is a measure of reliability; the lower the coefficient, the more reliable is the estimate.

REFERENCES

1. USDA, ESCS, Natural Resource Economics Division, "1979 Cotton Pesticide Use Survey," 1979 (unpublished).
2. USDA, ESS, Crop Reporting Board, "Crop Production-1980 Annual Summary," CrPr 2-1(81), January 14, 1981.
3. USDA, ESS, Crop Reporting Board, "Crop Values-1978-1979-1980," CrPr 2-1(81), January 22, 1981.

APPENDIX A

1979 HERBICIDE USE ON COTTON
IN THE SOUTHEAST

Table A-1. Coefficients of variation

Table A-2. Alabama

Table A-3. Georgia

Table A-4. South Carolina

Table A-1. Coefficients of variation for cotton acres treated with single ingredient herbicides, Southeast region and States, 1979 a/

| Herbicide | : | Alabama | : | Georgia | : | South Carolina | : | Region |
|------------------|---|---------------------|---|-----------|---|----------------|---|-----------|
| | | | | | | | | |
| | | ----- Percent ----- | | | | | | |
| Single materials | | | | | | | | |
| Cyanazine | | 20 | | 49 | | 31 | | 17 |
| Diuron | | - | | - | | 22 | | 22 |
| DSMA | | 11 | | 49 | | 15 | | 9 |
| Fluchloralin | | 57 | | - | | - | | <u>c/</u> |
| Fluometuron | | 7 | | 9 | | 10 | | <u>5</u> |
| Linuron | | 34 | | - | | 57 | | 29 |
| MSMA | | 20 | | 27 | | - | | 16 |
| Norflurazon | | 44 | | 49 | | <u>b/</u> | | 32 |
| Pendimethalin | | 26 | | <u>b/</u> | | 70 | | 24 |
| Profluralin | | 40 | | - | | 36 | | 29 |
| Prometryn | | - | | 27 | | - | | 28 |
| Trifluralin | | 6 | | 3 | | 7 | | 3 |

- None reported.

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Use of this material at the State level was not significant and was reported in the "other" category.

c/ Use of this material at the regional level was not significant and was reported in the "other" category.

Table A-2. Herbicide use on cotton in Alabama: Acres treated, acre-treatments, rates and quantities used, single ingredient and tank-mix applications, 1979 a/

| Herbicides | : Acres | : | :Pounds of active ingredient: | | : No. of | |
|-----------------------------|----------|-------------|-------------------------------|---------|------------|---------|
| | :treated | : Acre- | : | : Per | : applica- | |
| | : b/ | :treatments | : Total | :Season | :Treatment | : tions |
| ----- <u>Thousand</u> ----- | | | | | | |
| <u>Single materials</u> | | | | | | |
| Cyanazine | 62.5 | 62.5 | 40.8 | 0.7 | 0.7 | 1.0 |
| DSMA | 117.1 | 174.4 | 331.9 | 2.8 | 1.9 | 1.5 |
| Fluchloralin | 9.4 | 9.4 | 6.6 | .7 | .7 | 1.0 |
| Fluometuron | 199.9 | 215.7 | 161.8 | .8 | .8 | 1.1 |
| Linuron | 19.4 | 28.8 | 7.8 | .4 | .3 | 1.5 |
| MSMA | 62.1 | 63.1 | 118.6 | 1.9 | 1.9 | 1.0 |
| Norflurazon | 17.5 | 17.5 | 13.6 | .8 | .8 | 1.0 |
| Pendimethalin | 40.3 | 40.3 | 22.5 | .6 | .6 | 1.0 |
| Profluralin | 18.8 | 18.8 | 12.8 | .7 | .7 | 1.0 |
| Trifluralin | 227.0 | 227.0 | 117.4 | .5 | .5 | 1.0 |
| Total | - | 857.5 | 833.8 | - | 1.0 | - |
| <u>Tank mixtures</u> | | | | | | |
| DSMA | 24.9 | 31.1 | 28.5 | 1.1 | .9 | 1.2 |
| + other | | | 17.0 | .7 | .5 | |
| MSMA | 25.0 | 31.3 | 14.9 | .6 | .5 | 1.3 |
| + other | | | 14.1 | .6 | .5 | |
| Other | - | 12.5 | 4.0 | - | .3 | - |
| Total | - | 74.9 | 78.5 | - | 1.0 | - |
| TOTAL HERBICIDES | - | 932.4 | 912.3 | - | 1.0 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" were not reported because two or more materials may have been used on the same acre resulting in multiple counting.

Table A-3. Herbicide use on cotton in Georgia: Acres treated, acre-treatments, rates and quantities used, single ingredient and tank-mix applications, 1979 a/

| Herbicides | : Acres : | | :Pounds of active ingredient: | | | No. of applica- |
|-------------------------|-------------|--------------|-------------------------------|----------|-------------|-----------------|
| | : treated : | Acre- | : | Per | tions | |
| | : b/ : | treatments : | Total : | Season : | Treatment : | |
| -----Thousand----- | | | | | | |
| <u>Single materials</u> | | | | | | |
| Cyanazine | 9.3 | 9.3 | 7.3 | 0.8 | 0.8 | 1.0 |
| DSMA | 4.6 | 9.3 | 20.8 | 4.5 | 2.2 | 2.0 |
| Fluometuron | 98.5 | 121.6 | 153.0 | 1.6 | 1.3 | 1.2 |
| MSMA | 25.4 | 48.6 | 68.7 | 2.7 | 1.4 | 1.9 |
| Norflurazon | 9.3 | 9.3 | 7.4 | .8 | .8 | 1.0 |
| Prometryn | 25.4 | 25.4 | 8.1 | .3 | .3 | 1.0 |
| Trifluralin | 147.9 | 148.1 | 106.3 | .7 | .7 | 1.0 |
| Other | - | 2.3 | 2.3 | - | 1.0 | - |
| Total | - | 373.9 | 373.9 | - | 1.0 | - |
| <u>Tank mixtures</u> | | | | | | |
| MSMA | 18.5 | 18.5 | 11.5 | .6 | .6 | 1.0 |
| + other | | | 6.2 | .3 | .3 | |
| Other | - | 30.1 | 30.0 | - | 1.0 | - |
| Total | - | 48.6 | 47.7 | - | 1.0 | - |
| TOTAL HERBICIDES | - | 422.5 | 421.6 | - | 1.0 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" were not reported because two or more materials may have been used on the same acre resulting in multiple counting.

Table A-4. Herbicide use on cotton in South Carolina: Acres treated, acre-treatments, rates and quantities used, single ingredient and tank-mix applications, 1979 a/

| Herbicides | : Acres | : | :Pounds of active ingredient: | | | No. of |
|-------------------------|----------|-------------|-------------------------------|---------|------------|------------|
| | :treated | : Acre- | : | : Per | | : applica- |
| | : b/ | :treatments | : Total | :Season | :Treatment | : tions |
| -----Thousand----- | | | | | | |
| <u>Single materials</u> | | | | | | |
| Cyanazine | 13.4 | 13.4 | 4.6 | 0.3 | 0.3 | 1.0 |
| Diuron | 23.9 | 23.9 | 16.0 | .7 | .7 | 1.0 |
| DSMA | 41.8 | 50.8 | 100.5 | 2.4 | 2.0 | 1.2 |
| Fluometuron | 79.1 | 82.1 | 53.5 | .7 | .7 | 1.0 |
| Linuron | 4.5 | 4.5 | 2.2 | .5 | .5 | 1.0 |
| Pendimethalin | 3.0 | 3.0 | 1.5 | .5 | .5 | 1.0 |
| Profluralin | 10.5 | 10.5 | 7.8 | .8 | .8 | 1.0 |
| Trifluralin | 85.1 | 85.1 | 69.1 | .7 | .7 | 1.0 |
| Other | - | 3.0 | 1.2 | - | .4 | - |
| Total | - | 276.3 | 256.4 | - | .9 | - |
| <u>Tank mixtures</u> | | | | | | |
| MSMA | 28.4 | 41.8 | 64.2 | 2.3 | 1.5 | 1.5 |
| + other | | | 32.3 | 1.1 | .8 | |
| Other | - | 7.5 | 16.6 | - | 2.2 | - |
| Total | - | 49.3 | 113.1 | - | 2.3 | - |
| TOTAL HERBICIDES | - | 325.6 | 369.5 | - | 1.1 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" were not reported because two or more materials may have been used on the same acre resulting in multiple counting.

APPENDIX B

1979 HERBICIDE USE ON COTTON
IN THE DELTA

Table B-1. Coefficients of variation

Table B-2. Arkansas

Table B-3. Louisiana

Table B-4. Mississippi

Table B-5. Tennessee

Table B-1. Coefficients of variation for cotton acres treated with single ingredient and tank-mix herbicide applications, Delta region and States, 1979 a/

| Herbicide | : | : | : | : | : |
|-------------------------|----------------------------|-----------|-----------|-------------|-----------|
| | | Arkansas | Louisiana | Mississippi | Tennessee |
| | | : | : | : | : |
| | | : | : | : | Region |
| | | : | : | : | : |
| | ----- <u>Percent</u> ----- | | | | |
| <u>Single materials</u> | | | | | |
| Cyanazine | 9 | 30 | 9 | 74 | 6 |
| Dinitramine | 79 | - | 58 | - | <u>c/</u> |
| Diuron | 40 | 44 | 10 | <u>b/</u> | <u>10</u> |
| DNBP | 12 | - | 12 | - | 9 |
| DSMA | 16 | 16 | 15 | 9 | 7 |
| Fluchloralin | - | - | 20 | <u>b/</u> | 20 |
| Fluometuron | 4 | 6 | 5 | <u>5</u> | 2 |
| Glyphosate | 31 | 40 | 16 | 32 | 12 |
| Linuron | 30 | - | 18 | - | <u>c/</u> |
| Methazole | 53 | - | - | - | <u>c/</u> |
| MSMA | 11 | 13 | 9 | 39 | <u>6</u> |
| Norflurazon | 26 | - | 12 | - | <u>c/</u> |
| Pendimethalin | 19 | 70 | 15 | 49 | <u>11</u> |
| Profluralin | 40 | 34 | 30 | 57 | 19 |
| Prometryn | 29 | 40 | 41 | - | 21 |
| Trifluralin | 5 | 4 | 3 | 5 | 2 |
| <u>Tank mixtures</u> | | | | | |
| Fluometuron + MSMA | 11 | 22 | 12 | <u>b/</u> | 7 |
| DNBP + MSMA | - | <u>b/</u> | 16 | - | <u>c/</u> |
| MSMA + prometryn | <u>b/</u> | <u>b/</u> | 17 | - | <u>c/</u> |

- None reported.

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Use of this material at the State level was not significant and was reported in the "other" category.

c/ Use of this material at the regional level was not significant and was reported in the "other" category.

Table B-2. Herbicide use on cotton in Arkansas: Acres treated, acre-treatments, rates and quantities used, single ingredient and tank-mix applications, 1979 a/

| Herbicides | : Acres | : | :Pounds of active ingredient: | | No. of applica- | |
|-------------------------|-----------------------------|--------------|-------------------------------|----------|-----------------|-----|
| | :treated | : Acre- | : | : Per | | |
| | : b/ | :treatments: | Total | : Season | :Treatment | |
| | ----- <u>Thousand</u> ----- | | | | | |
| <u>Single materials</u> | | | | | | |
| Cyanazine | 219.5 | 238.6 | 128.6 | 0.6 | 0.5 | 1.1 |
| Dinitramine | 4.2 | 4.2 | 1.5 | .4 | .4 | 1.0 |
| Diuron | 19.1 | 19.1 | 4.5 | .2 | .2 | 1.0 |
| DNBP | 140.0 | 245.6 | 164.1 | 1.2 | .7 | 1.8 |
| DSMA | 93.5 | 101.5 | 97.5 | 1.0 | 1.0 | 1.1 |
| Fluometuron | 432.4 | 553.3 | 354.9 | .8 | .6 | 1.3 |
| Glyphosate | 31.8 | 31.8 | 23.1 | .7 | .7 | 1.0 |
| Linuron | 31.5 | 31.5 | 8.6 | .3 | .3 | 1.0 |
| Methazole | 9.2 | 9.2 | 5.8 | .6 | .6 | 1.0 |
| MSMA | 165.5 | 267.3 | 290.7 | 1.8 | 1.1 | 1.6 |
| Norflurazon | 44.5 | 44.5 | 41.0 | .9 | .9 | 1.0 |
| Pendimethalin | 79.5 | 79.5 | 43.8 | .6 | .6 | 1.0 |
| Profluralin | 19.1 | 19.1 | 12.7 | .7 | .7 | 1.0 |
| Prometryn | 28.6 | 35.0 | 21.6 | .8 | .6 | 1.2 |
| Trifluralin | 405.9 | 409.1 | 217.8 | .5 | .5 | 1.0 |
| Total | - | 2,089.3 | 1,416.2 | - | .7 | - |
| <u>Tank mixtures</u> | | | | | | |
| Fluometuron | 194.1 | 362.7 | 130.0 | .7 | .4 | 1.9 |
| + MSMA | | | 264.1 | 1.4 | .7 | |
| DSMA | 48.7 | 82.7 | 94.0 | 1.9 | 1.1 | 1.7 |
| + other | | | 48.9 | 1.0 | .6 | |
| Other | - | 54.1 | 58.9 | - | 1.1 | - |
| Total | - | 499.5 | 595.9 | - | 1.2 | - |
| TOTAL HERBICIDES | - | 2,588.8 | 2,012.1 | - | .8 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" were not reported because two or more materials may have been used on the same acre resulting in multiple counting.

Table B-3. Herbicide use on cotton in Louisiana: Acres treated, acre-treatments, rates and quantities used, single ingredient and tank-mix applications, 1979 a/

| Herbicides | : Acres | : | :Pounds of active ingredient: | | : No. of | |
|-----------------------------|----------|-------------|-------------------------------|---------|------------|---------|
| | :treated | : Acre- | : | : Per | : applica- | |
| | : b/ | :treatments | : Total | :Season | :Treatment | : tions |
| ----- <u>Thousand</u> ----- | | | | | | |
| <u>Single materials</u> | | | | | | |
| Cyanazine | 43.9 | 43.9 | 32.2 | 0.7 | 0.7 | 1.0 |
| Diuron | 22.0 | 22.0 | 7.4 | .3 | .3 | 1.0 |
| DSMA | 123.0 | 140.6 | 149.0 | 1.2 | 1.1 | 1.1 |
| Fluometuron | 329.4 | 347.0 | 203.6 | .6 | .6 | 1.1 |
| Glyphosate | 26.4 | 35.1 | 13.0 | .5 | .4 | 1.3 |
| MSMA | 162.5 | 193.3 | 156.4 | 1.0 | .8 | 1.2 |
| Pendimethalin | 8.8 | 8.8 | 8.8 | 1.0 | 1.0 | 1.0 |
| Profluralin | 35.1 | 35.1 | 19.5 | .6 | .6 | 1.0 |
| Prometryn | 26.4 | 26.4 | 14.8 | .6 | .6 | 1.0 |
| Trifluralin | 390.7 | 390.7 | 300.3 | .8 | .8 | 1.0 |
| Total | - | 1,242.9 | 905.0 | - | .7 | - |
| <u>Tank mixtures</u> | | | | | | |
| Fluometuron | 79.1 | 118.6 | 44.2 | .6 | .4 | 1.5 |
| + MSMA | | | 97.5 | 1.2 | .8 | |
| Fluometuron | 57.1 | 74.7 | 54.1 | .9 | .7 | 1.3 |
| + other | | | 65.2 | 1.1 | .9 | |
| Other | - | 61.5 | 79.5 | - | 1.3 | - |
| Total | - | 254.8 | 340.5 | - | 1.3 | - |
| TOTAL HERBICIDES | - | 1,497.7 | 1,245.5 | - | .8 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" were not reported because two or more materials may have been used on the same acre resulting in multiple counting.

Table B-4. Herbicide use on cotton in Mississippi: Acres treated, acre-treatments, rates and quantities used, single ingredient and tank-mix applications, 1979 a/

| Herbicides | : Acres | : | :Pounds of active ingredient: | | | No. of |
|-------------------------|----------|-------------|-------------------------------|------------|------------|------------|
| | :treated | : Acre- | : | : Per | | : applica- |
| | : b/ | :treatments | : Total | :Season | :Treatment | : tions |
| -----Thousand----- | | | | | | |
| <u>Single materials</u> | | | | | | |
| Cyanazine | 235.3 | 278.9 | 178.9 | 0.8 | 0.6 | 1.2 |
| Dinitramine | 9.4 | 9.4 | 3.5 | .4 | .4 | 1.0 |
| Diuron | 232.6 | 260.9 | 158.1 | .7 | .6 | 1.1 |
| DNBP | 179.0 | 288.8 | 145.9 | .8 | .5 | 1.6 |
| DSMA | 128.9 | 154.0 | 178.1 | 1.4 | 1.2 | 1.2 |
| Fluchloralin | 75.4 | 75.4 | 60.5 | .8 | .8 | 1.0 |
| Fluometuron | 600.0 | 656.6 | 409.3 | .7 | .6 | 1.1 |
| Glyphosate | 116.3 | 176.0 | 78.4 | .7 | .4 | 1.5 |
| Linuron | 10.9 | 10.9 | 8.0 | .7 | .7 | 1.0 |
| MSMA | 264.1 | 415.0 | 319.8 | 1.2 | .8 | 1.6 |
| Norflurazon | 53.4 | 53.4 | 21.5 | .4 | .4 | 1.0 |
| Pendimethalin | 40.9 | 40.9 | 26.4 | .6 | .7 | 1.0 |
| Profluralin | 34.6 | 34.6 | 28.0 | .8 | .8 | 1.0 |
| Prometryn | 18.9 | 18.0 | 9.9 | .5 | .5 | 1.0 |
| Trifluralin | 750.2 | 756.5 | 450.1 | .6 | .6 | 1.0 |
| Total | - | 3,230.2 | 2,076.4 | - | .6 | - |
| <u>Tank mixtures</u> | | | | | | |
| Fluometuron + MSMA | 178.6 | 340.9 | 106.1 191.2 | .6 1.1 | .3 .6 | 1.9 |
| DNBP + MSMA | 100.4 | 141.2 | 72.1 101.4 | .7 1.0 | .5 .7 | 1.4 |
| MSMA + prometryn | 100.6 | 166.6 | 120.6 37.3 | 1.2 .4 | .7 .2 | 1.7 |
| MSMA + other | 226.6 | 373.9 | 228.4 382.7 | 1.0 1.7 | .6 1.0 | - |
| Other | - | 279.8 | 277.4 | - | 1.0 | - |
| Total | - | 1,302.4 | 1,517.2 | - | 1.2 | - |
| TOTAL HERBICIDES | - | 4,532.6 | 3,593.6 | - | .8 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" were not reported because two or more materials may have been used on the same acre resulting in multiple counting.

Table B-5. Herbicide use on cotton in Tennessee: Acres treated, acre-treatments, rates and quantities used, single ingredient and tank-mix applications, 1979 a/

| Herbicides | : Acres : | | :Pounds of active ingredient: | | | No. of |
|-----------------------------|------------|--------------|-------------------------------|----------|-------------|----------|
| | :treated : | Acre- | : | Per | : | applica- |
| | : b/ : | treatments : | Total : | Season : | Treatment : | tions |
| ----- <u>Thousand</u> ----- | | | | | | |
| <u>Single materials</u> | | | | | | |
| Cyanazine | 3.9 | 3.9 | 6.4 | 1.6 | 1.6 | 1.0 |
| DSMA | 139.7 | 139.7 | 256.1 | 1.8 | 1.8 | 1.0 |
| Fluometuron | 199.7 | 199.7 | 155.2 | .8 | .8 | 1.0 |
| Glyphosate | 23.9 | 23.9 | 21.6 | .9 | .9 | 1.0 |
| MSMA | 15.0 | 15.0 | 17.3 | 1.2 | 1.2 | 1.0 |
| Pendimethalin | 10.5 | 10.5 | 9.2 | .9 | .9 | 1.0 |
| Profluralin | 7.9 | 7.9 | 7.9 | 1.0 | 1.0 | 1.0 |
| Trifluralin | 195.7 | 198.4 | 80.3 | .4 | .4 | 1.0 |
| Other | - | 5.2 | 2.8 | - | .5 | - |
| Total | - | 604.2 | 556.8 | - | .9 | - |
| <u>Tank mixtures</u> | | | | | | |
| Fluometuron | 10.5 | 10.5 | 3.7 | .4 | .4 | 1.0 |
| + other | | | 4.2 | .4 | .4 | |
| Total | - | 10.5 | 7.9 | - | .8 | - |
| TOTAL HERBICIDES | - | 614.7 | 564.8 | - | .9 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" were not reported because two or more materials may have been used on the same acre resulting in multiple counting.

APPENDIX C

1979 HERBICIDE USE ON COTTON
IN THE SOUTHERN PLAINS

Table C-1. Coefficients of variation

Table C-2. Oklahoma

Table C-3. Texas

Table C-1. Coefficients of variation for cotton acres treated with single ingredient herbicides, Southern Plains region and States, 1979 a/

| Herbicide | : | Oklahoma | : | Texas | : | Region |
|-------------------------|---|-----------|---|----------------------------|---|-----------|
| | | | | ----- <u>Percent</u> ----- | | |
| <u>Single materials</u> | | | | | | |
| Dinitramine | | - | | 57 | | <u>c/</u> |
| Dipropetryn | | 70 | | 41 | | <u>37</u> |
| Diuron | | - | | 57 | | <u>c/</u> |
| DSMA | | - | | 26 | | <u>26</u> |
| Fluometuron | | 70 | | 21 | | 21 |
| Glyphosate | | <u>b/</u> | | 12 | | 12 |
| MSMA | | <u>70</u> | | 29 | | 27 |
| Pendimethalin | | 46 | | <u>b/</u> | | <u>c/</u> |
| Profluralin | | 40 | | <u>21</u> | | <u>19</u> |
| Prometryn | | - | | 12 | | 12 |
| Trifluralin | | 7 | | 3 | | 2 |
| <u>Tank mixtures</u> | | | | | | |
| MSMA | | | | | | |
| + prometryn | | - | | 38 | | 38 |

- None reported.

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Use of this material at the State level was not significant and was reported in the "other" category.

c/ Use of this material at the regional level was not significant and was reported in the "other" category.

Table C-2. Herbicide use on cotton in Oklahoma: Acres treated, acre-treatments, rates and quantities used, single ingredient and tank-mix applications, 1979 a/

| Herbicides | : Acres | : | :Pounds of active ingredient: | | No. of | |
|-------------------------|-----------------------------|-------------|-------------------------------|---------|------------|---------|
| | :treated | : Acre- | : | : Per | : applica- | |
| | : b/ | :treatments | : Total | :Season | :Treatment | : tions |
| | ----- <u>Thousand</u> ----- | | | | | |
| <u>Single materials</u> | | | | | | |
| Dipropetryn | 13.7 | 13.7 | 5.5 | .4 | .4 | 1.0 |
| Fluometuron | 13.7 | 13.7 | 3.3 | .2 | .2 | 1.0 |
| MSMA | 14.1 | 28.2 | 37.6 | 2.7 | 1.3 | 2.0 |
| Pendimethalin | 26.1 | 26.1 | 21.4 | .8 | .8 | 1.0 |
| Profluralin | 38.5 | 38.5 | 31.0 | .8 | .8 | 1.0 |
| Trifluralin | 397.7 | 461.2 | 303.8 | .8 | .7 | 1.2 |
| Other | - | 21.1 | 4.8 | - | .2 | - |
| TOTAL HERBICIDES | - | 602.5 | 407.4 | - | .7 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" were not reported because two or more materials may have been used on the same acre resulting in multiple counting.

Table C-3. Herbicide use on cotton in Texas: Acres treated, acre-treatments, rates and quantities used, single ingredient and tank-mix applications, 1979 a/

| Herbicides | : Acres | : | :Pounds of active ingredient: | | No. of | |
|-------------------------|----------|-------------|-------------------------------|---------|------------|---------|
| | :treated | : Acre- | : | : Per | : applica- | |
| | : b/ | :treatments | : Total | :Season | :Treatment | : tions |
| -----Thousand----- | | | | | | |
| <u>Single materials</u> | | | | | | |
| Dinitramine | 22.1 | 22.1 | 9.9 | 0.4 | 0.4 | 1.0 |
| Dipropetryn | 96.9 | 96.9 | 89.2 | .9 | .9 | 1.0 |
| Diuron | 41.2 | 44.5 | 17.8 | .4 | .4 | 1.1 |
| DSMA | 103.0 | 132.4 | 211.1 | 2.0 | 1.6 | 1.3 |
| Fluometuron | 140.8 | 148.1 | 134.2 | 1.0 | .9 | 1.1 |
| Glyphosate | 767.6 | 1,044.6 | 1,106.9 | 1.4 | 1.1 | 1.4 |
| MSMA | 122.4 | 266.7 | 274.2 | 2.2 | 1.0 | 2.2 |
| Profluralin | 267.0 | 299.3 | 245.6 | .9 | .8 | 1.1 |
| Prometryn | 708.5 | 708.5 | 694.4 | 1.0 | 1.0 | 1.0 |
| Trifluralin | 5,763.5 | 6,168.1 | 3,763.4 | .7 | .6 | 1.1 |
| Other | - | 48.5 | 29.1 | - | .6 | - |
| Total | - | 8,979.7 | 6,575.8 | - | .7 | - |
| <u>Tank mixtures</u> | | | | | | |
| MSMA | 97.4 | 97.4 | 72.9 | .7 | .7 | 1.0 |
| + prometryn | | | 18.2 | .2 | .2 | |
| Prometryn | 51.4 | 51.4 | 69.1 | 1.3 | 1.3 | 1.0 |
| + other | | | 69.4 | 1.4 | 1.4 | |
| Total | - | 148.8 | 229.6 | - | 1.5 | - |
| TOTAL HERBICIDES | - | 9,128.5 | 6,805.4 | - | .7 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" were not reported because two or more materials may have been used on the same acre, resulting in multiple counting.

APPENDIX D

1979 HERBICIDE USE ON COTTON
IN THE FAR WEST

Table D-1. Coefficients of variation

Table D-2. Arizona

Table D-3. California

Table D-4. New Mexico

Table D-1. Coefficients of variation for cotton acres treated with single ingredient and tank-mix herbicide applications, Far West region and States, 1979 a/

| Herbicide | : | Arizona | : | California | : | New Mexico | : | Region |
|-------------------------|----|---------|----|------------|-----------|------------|---|-----------|
| ----- Percent ----- | | | | | | | | |
| <u>Single materials</u> | | | | | | | | |
| Bensulide | - | | 69 | | - | | | <u>c/</u> |
| DCPA | - | | 11 | | - | | | 11 |
| Dinitramine | 50 | | 57 | | - | | | 38 |
| Diuron | 34 | | 37 | | <u>b/</u> | | | 25 |
| Fluchloralin | 70 | | - | | - | | | 70 |
| Fluometuron | - | | 51 | | - | | | <u>c/</u> |
| Glyphosate | 42 | | 40 | | 23 | | | 25 |
| MSMA | - | | 44 | | 61 | | | 43 |
| Pendimethalin | 17 | | 19 | | <u>b/</u> | | | 13 |
| Profluralin | 49 | | 57 | | 39 | | | 34 |
| Prometryn | 26 | | 42 | | <u>b/</u> | | | 22 |
| Trifluralin | 20 | | 6 | | 16 | | | 5 |
| <u>Tank mixtures</u> | | | | | | | | |
| Prometryn | | | | | | | | |
| + trifluralin | 57 | | - | | - | | | 57 |

- None reported.

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Use of this material at the State level was not significant and was reported in the "other" category.

c/ Use of this material at the regional level was not significant and was reported in the "other" category.

Table D-2. Herbicide use on cotton in Arizona: Acres treated, acre-treatments, rates and quantities used, single ingredient and tank-mix applications, 1979 a/

| Herbicides | : Acres | : | :Pounds of active ingredient: | | : No. of | |
|-----------------------------|----------|-------------|-------------------------------|---------|------------|---------|
| | :treated | : Acre- | : | : Per | : applica- | |
| | : b/ | :treatments | : Total | :Season | :Treatment | : tions |
| ----- <u>Thousand</u> ----- | | | | | | |
| <u>Single materials</u> | | | | | | |
| Dinitramine | 25.8 | 25.8 | 14.5 | .6 | .6 | 1.0 |
| Diuron | 53.5 | 53.5 | 51.7 | 1.0 | 1.0 | 1.0 |
| Fluchloralin | 13.8 | 13.8 | 15.5 | 1.1 | 1.1 | 1.0 |
| Glyphosate | 34.6 | 55.4 | 28.5 | .8 | .5 | 1.0 |
| Pendimethalin | 180.2 | 180.2 | 151.9 | .8 | .8 | 1.0 |
| Profluralin | 27.7 | 27.7 | 20.8 | .8 | .8 | 1.0 |
| Prometryn | 86.8 | 86.8 | 97.1 | 1.1 | 1.1 | 1.0 |
| Trifluralin | 138.6 | 145.6 | 105.2 | .8 | .7 | 1.1 |
| Other | - | 20.7 | 37.4 | - | 1.8 | - |
| Total | - | 609.5 | 522.6 | - | .9 | - |
| <u>Tank mixtures</u> | | | | | | |
| Prometryn | 20.0 | 20.0 | 18.5 | .9 | .9 | 1.0 |
| + trifluralin | | | 10.7 | .5 | .5 | |
| Other | - | 20.7 | 36.3 | - | 1.8 | - |
| Total | - | 40.7 | 65.5 | - | 1.6 | - |
| TOTAL HERBICIDES | - | 650.2 | 588.1 | - | .9 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" were not reported because two or more materials may have been used on the same acre resulting in multiple counting.

Table D-3. Herbicide use on cotton in California: Acres treated, acre-treatments, rates and quantities used, single ingredient and tank-mix applications, 1979 a/

| Herbicides | : Acres : | | :Pounds of active ingredient: | | | No. of |
|-----------------------------|------------|--------------|-------------------------------|----------|-------------|--------|
| | :treated : | Acres- | : | Per | : applica- | |
| | : b/ : | treatments : | Total : | Season : | Treatment : | tions |
| ----- <u>Thousand</u> ----- | | | | | | |
| <u>Single materials</u> | | | | | | |
| Bensulide | 6.6 | 6.6 | 4.9 | 0.7 | 0.7 | 1.0 |
| DCPA | 55.9 | 55.9 | 175.3 | 3.1 | 3.1 | 1.0 |
| Dinitramine | 22.5 | 22.5 | 12.6 | .6 | .6 | 1.0 |
| Diuron | 43.1 | 43.1 | 37.5 | .9 | .9 | 1.0 |
| Fluometuron | 26.7 | 26.7 | 48.3 | 1.8 | 1.8 | 1.0 |
| Glyphosate | 45.1 | 52.6 | 33.4 | .7 | .6 | 1.2 |
| MSMA | 37.5 | 67.4 | 120.0 | 3.2 | 1.8 | 1.8 |
| Pendimethalin | 177.2 | 177.2 | 163.7 | .9 | .9 | 1.0 |
| Profluralin | 22.5 | 22.5 | 28.1 | 1.2 | 1.2 | 1.0 |
| Prometryn | 35.9 | 35.9 | 43.2 | 1.2 | 1.2 | 1.0 |
| Trifluralin | 932.6 | 940.1 | 810.6 | .9 | .9 | 1.0 |
| Other | - | 6.0 | 5.6 | - | .9 | - |
| Total | - | 1,456.5 | 1,483.2 | - | 1.0 | - |
| <u>Tank mixtures</u> | | | | | | |
| Other | - | 4.9 | 8.2 | - | 1.7 | - |
| TOTAL HERBICIDES | - | 1,461.4 | 1,491.4 | - | 1.0 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" were not reported because two or more materials may have been used on the same acre resulting in multiple counting.

Table D-4. Herbicide use on cotton in New Mexico: Acres treated, acre-treatments, rates and quantities used, single ingredient and tank-mix applications, 1979 a/

| Herbicides | : Acres | : | :Pounds of active ingredient: | : | | No. of |
|-----------------------------|----------|-------------|-------------------------------|---------|------------|------------|
| | :treated | : Acre- | : | : Per | : | : applica- |
| | : b/ | :treatments | : Total | :Season | :Treatment | : tions |
| ----- <u>Thousand</u> ----- | | | | | | |
| <u>Single materials</u> | | | | | | |
| Glyphosate | 37.1 | 83.4 | 92.6 | 2.5 | 1.1 | 2.2 |
| MSMA | 4.7 | 7.4 | 3.2 | .7 | .4 | 1.6 |
| Profluralin | 16.1 | 16.1 | 16.1 | 1.0 | 1.0 | 1.0 |
| Trifluralin | 61.2 | 61.2 | 41.8 | .7 | .7 | 1.0 |
| Other | - | 10.3 | 8.1 | - | .8 | - |
| Total | - | 178.4 | 161.8 | - | .9 | - |
| <u>Tank mixtures</u> | | | | | | |
| Other | - | 3.2 | 3.2 | - | 1.0 | - |
| TOTAL HERBICIDES | - | 181.6 | 165.0 | - | .9 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" were not reported because two or more materials may have been used on the same acre resulting in multiple counting.

APPENDIX E

1979 DEFOLIANT AND DESICCANT
USE ON COTTON

Table E-1. Coefficients of variation

Table E-2. Southeast

Table E-3. Delta

Table E-4. Southern Plains

Table E-5. Far West

Table E-1. Coefficients of variation for cotton acres treated single ingredient and tank-mix applications of defoliant and desiccant: U.S. and region, 1979 a/

| Defoliant/desiccant | : | : | : Southern : | : | : |
|--|----|---------------------|--------------|--------|-----------------|
| | : | Southeast | Delta | Plains | Far West : U.S. |
| | | ----- Percent ----- | | | |
| <u>Single materials</u> | | | | | |
| Arsenic acid | - | 71 | 8 | 28 | 8 |
| Cacodylic acid | 47 | - | 60 | 23 | 22 |
| DEF | 4 | 3 | 13 | 8 | 3 |
| Endothall | - | - | 25 | 21 | 17 |
| Magnesium chlorate | - | 58 | - | 30 | 11 |
| Paraquat | 51 | 31 | 21 | 13 | 11 |
| Sodium chlorate | 40 | 12 | 19 | 6 | 5 |
| <u>Tank mixtures</u> | | | | | |
| Arsenic acid + sodium chlorate | - | - | 71 | - | 71 |
| Cacodylic acid + DEF | - | - | - | 35 | 35 |
| Cacodylic acid + paraquat | - | - | - | 50 | 50 |
| DEF + endothall | - | - | 17 | 23 | 13 |
| DEF + paraquat | 44 | 33 | - | 30 | 21 |
| DEF + sodium chlorate | - | - | - | 57 | 57 |
| DEF + paraquat + sodium chlorate | - | - | - | 57 | 57 |
| Endothall + paraquat | - | 50 | 71 | - | 53 |
| Endothall + sodium chlorate | - | - | - | 33 | 33 |
| Paraquat + sodium chlorate | - | - | - | 21 | 21 |

- None reported.

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

Table E-2. Defoliant and desiccant use on cotton in the Southeast: Acres treated, acre-treatments, rates and quantities used, single ingredient and tank-mix applications, 1979 a/

| Defoliant/Desiccant | : Acres | : | :Pounds of active ingredient: | | : No. of | |
|---------------------------------|-----------|---------------|-------------------------------|---------|------------|------------|
| | : treated | : Acre- | : | : Per | : | : applica- |
| | : b/ | : treatments: | Total | :Season | :Treatment | : tions |
| ----- <u>Thousand</u> ----- | | | | | | |
| <u>Single materials</u> | | | | | | |
| Cacodylic acid | 11.2 | 11.2 | 6.7 | .6 | .6 | 1.0 |
| DEF | 515.5 | 515.5 | 482.0 | .9 | .9 | 1.0 |
| Paraquat | 6.3 | 6.3 | .7 | .1 | .1 | 1.0 |
| Sodium chlorate | 18.8 | 18.8 | 8.4 | .4 | .4 | 1.0 |
| Total | - | 551.8 | 497.8 | - | .9 | - |
| <u>Tank mixtures</u> | | | | | | |
| DEF | 15.6 | 15.6 | 5.5 | .4 | .4 | 1.0 |
| + paraquat | | | 1.2 | .1 | .1 | |
| TOTAL DEFOLIANTS/ DESICCANTS | - | 567.4 | 504.5 | - | .9 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division. Includes Alabama, Georgia, and South Carolina.

b/ Data in this column for "other" and "total" were not reported because two or more materials may have been used on the same acre, resulting in multiple counting.

Table E-3. Defoliant and desiccant use on cotton in the Delta: Acres treated, acre-treatments, rates and quantities used, single ingredient and tank-mix applications, 1979 a/

| Defoliant/Desiccant | : Acres | : Acre- | :Pounds of active ingredient: | | : No. of | |
|---------------------------------|-----------|---------------|-------------------------------|----------|-----------------|------------|
| | : treated | : treatments: | : Total | : Season | : Per Treatment | : applica- |
| | : b/ | | | | | tions |
| -----Thousand----- | | | | | | |
| <u>Single materials</u> | | | | | | |
| Arsenic acid | 6.3 | 6.3 | 5.3 | .8 | .8 | 1.0 |
| DEF | 1,524.3 | 1,630.9 | 1,822.4 | 1.2 | 1.1 | 1.1 |
| Magnesium chlorate | 9.4 | 9.4 | 2.1 | .2 | .2 | 1.0 |
| Paraquat | 22.0 | 22.0 | 14.7 | .7 | .7 | 1.0 |
| Sodium chlorate | 155.1 | 180.2 | 368.0 | 2.4 | 2.0 | 1.2 |
| Total | - | 1,848.8 | 2,212.5 | - | 1.2 | - |
| <u>Tank mixtures</u> | | | | | | |
| DEF | 25.0 | 25.0 | 18.8 | .8 | .8 | 1.0 |
| + paraquat | | | 11.8 | .5 | .5 | |
| DEF | - | 3.2 | 3.8 | - | 1.2 | - |
| + other | | | 3.6 | - | 1.1 | |
| Endothall | 12.7 | 12.7 | .7 | .1 | .5 | 1.0 |
| + paraquat | | | 6.7 | .5 | .5 | |
| Total | - | 40.9 | 45.4 | - | 1.1 | 1.1 |
| TOTAL DEFOLIANTS/ DESICCANTS | - | 1,889.7 | 2,257.9 | - | 1.2 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division. Includes Arkansas, Louisiana, Mississippi, and Tennessee.

b/ Data in this column for "other" and "total" were not reported because two or more materials may have been used on the same acre, resulting in multiple counting.

Table E-4. Defoliant and desiccant use on cotton in the Southern Plains:
Acres treated, acre-treatments, rates and quantities used, single
ingredient and tank-mix applications, 1979 a/

| Defoliant/Desiccant | : Acres : | | :Pounds of active ingredient: | | : No. of applica- | |
|-----------------------------------|-------------|---------------|-------------------------------|---------------------|-------------------|-----|
| | : treated : | : Acre- | : _____ : | : _____ Per _____ : | | |
| | : b/ : | : treatments: | : Total : | : Season : | : Treatment : | |
| ----- <u>Thousand</u> ----- | | | | | | |
| <u>Single materials</u> | | | | | | |
| Arsenic acid | 1,538.6 | 1,564.4 | 6,536.1 | 4.2 | 4.2 | 1.0 |
| Cacodylic acid | 88.2 | 93.3 | 87.6 | 1.1 | .9 | 1.1 |
| DEF | 365.3 | 365.3 | 423.3 | 1.2 | 1.2 | 1.0 |
| Endothall | 189.2 | 189.2 | 44.8 | .2 | .2 | 1.0 |
| Paraquat | 312.9 | 312.9 | 119.8 | .4 | .4 | 1.0 |
| Sodium chlorate | 233.5 | 255.5 | 855.5 | 3.7 | 3.3 | 1.1 |
| Total | - | 2,780.6 | 8,067.1 | - | 2.9 | - |
| <u>Tank mixtures</u> | | | | | | |
| Arsenic acid + sodium chlorate | 14.7 | 14.7 | 37.2 53.0 | 2.5 3.6 | 2.5 3.6 | 1.0 |
| DEF + endothall | 228.0 | 286.9 | 402.7 57.5 | 1.8 .3 | 1.8 .3 | 1.0 |
| Endothall + paraquat | 32.3 | 32.3 | 115.6 211.6 | .4 .7 | .4 .7 | 1.0 |
| Other | - | 22.2 | 69.5 | - | 3.1 | - |
| Total | - | 356.1 | 947.1 | - | 2.7 | - |
| TOTAL DEFOLIANTS/ DESICCANTS | - | 3,136.7 | 9,014.2 | - | 2.9 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division. Includes Oklahoma and Texas.

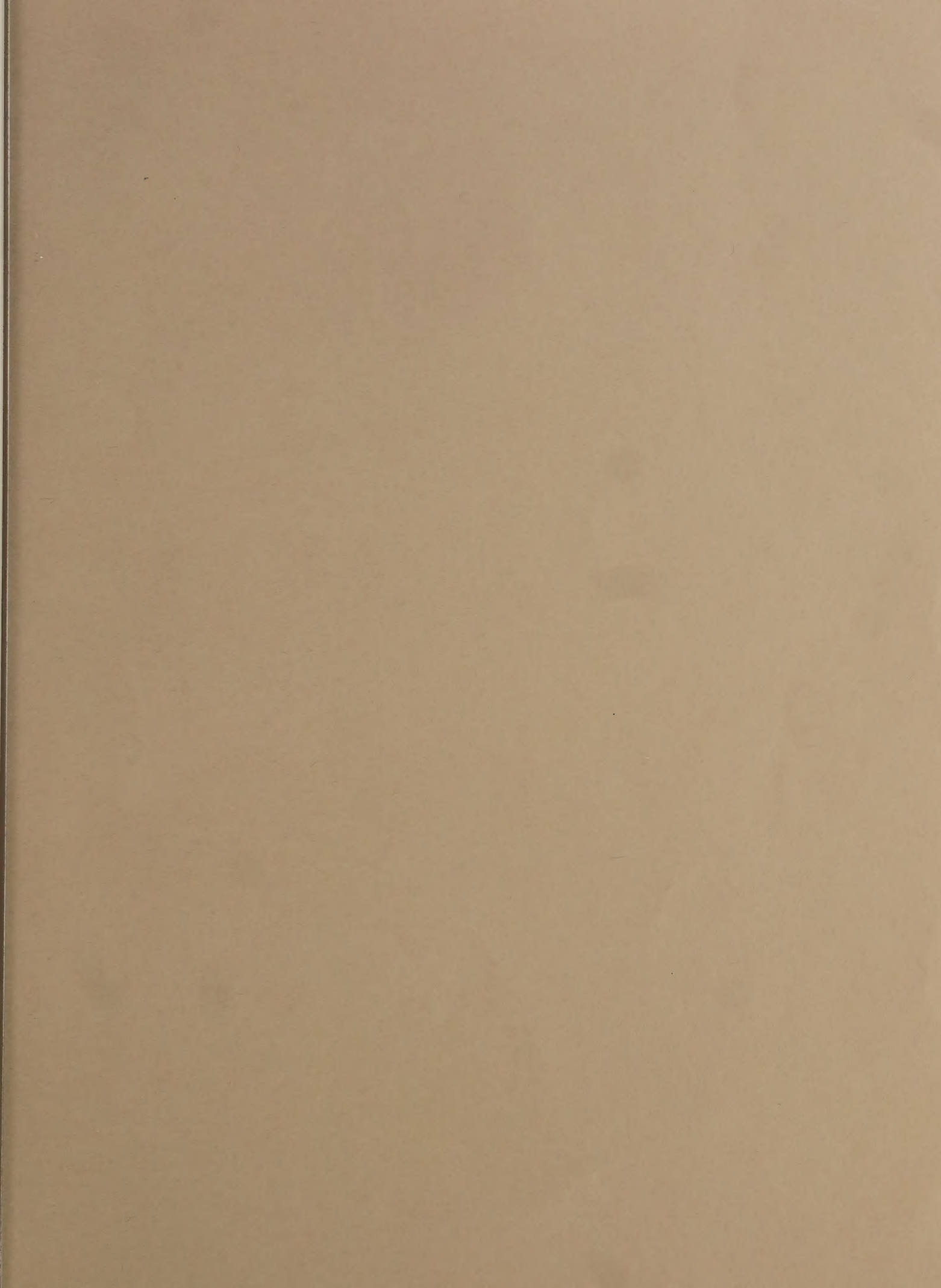
b/ Data in this column for "other" and "total" were not reported because two or more materials may have been used on the same acre, resulting in multiple counting.

Table E-5. Defoliant and desiccant use on cotton in the Far West: Acres treated, acre-treatments, rates and quantities used, single ingredient and tank-mix applications, 1979 a/

| Defoliant/Desiccant | : Acres | : Acre- | : Pounds of active ingredient: | | : applica- | |
|---------------------------------|--------------------|---------------|--------------------------------|----------|-------------|-------------|
| | : treated | | : Total | : Season | | : Treatment |
| | : b/ | : treatments: | : Total | : Season | : Treatment | : tions |
| | -----Thousand----- | | | | | |
| <u>Single materials</u> | | | | | | |
| Arsenic acid | 68.2 | 82.1 | 280.9 | 4.1 | 3.4 | 1.2 |
| Cacodylic acid | 103.9 | 160.3 | 333.7 | 3.2 | 2.1 | 1.5 |
| DEF | 759.6 | 855.2 | 1,867.2 | 2.5 | 2.2 | 1.1 |
| Endothall | 111.7 | 132.5 | 29.7 | .3 | .2 | 1.2 |
| Magnesium chlorate | 80.7 | 101.5 | 87.7 | 1.1 | .9 | 1.3 |
| Paraquat | 328.3 | 347.0 | 249.0 | .8 | .7 | 1.1 |
| Sodium chlorate | 1,020.9 | 1,203.0 | 6,549.4 | 6.4 | 5.4 | 1.2 |
| Total | - | 2,881.6 | 9,397.6 | - | 3.3 | - |
| <u>Tank mixtures</u> | | | | | | |
| Cacodylic acid | 52.4 | 52.4 | 36.4 | .7 | .7 | 1.0 |
| + DEF | | | 53.0 | 1.0 | 1.0 | |
| Cacodylic acid | 30.0 | 30.0 | 27.0 | .9 | .9 | 1.0 |
| + paraquat | | | 15.2 | .5 | .5 | |
| DEF | 127.4 | 127.4 | 205.4 | 1.6 | 1.6 | 1.0 |
| + endothall | | | 34.2 | .3 | .3 | |
| DEF | 76.8 | 76.8 | 209.7 | 2.7 | 2.7 | 1.0 |
| + paraquat | | | 17.0 | .2 | .2 | |
| DEF | 22.5 | 50.0 | 26.7 | 1.2 | .5 | 2.2 |
| + paraquat | | | 5.9 | .3 | .1 | |
| + sodium chlorate | | | 73.6 | 3.3 | 1.5 | |
| DEF | 22.5 | 22.5 | 86.2 | 3.8 | 3.8 | 1.0 |
| + sodium chlorate | | | 49.4 | 2.2 | 2.2 | |
| Endothall | 62.7 | 62.7 | 11.3 | .2 | .2 | 1.0 |
| + sodium chlorate | | | 316.6 | 5.0 | 5.0 | |
| Paraquat | 157.1 | 157.1 | 49.5 | .3 | .3 | 1.0 |
| + sodium chlorate | | | 461.7 | 2.9 | 2.9 | |
| Other | - | 39.5 | 28.8 | - | .7 | - |
| Total | - | 618.4 | 1,606.7 | - | 2.6 | - |
| TOTAL DEFOLIANTS/ DESICCANTS | - | 3,500.0 | 11,004.3 | - | 3.1 | - |

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division. Includes Arizona, California, and New Mexico.

b/ Data in this column for "other" and "total" were not reported because two or more materials may have been used on the same acre, resulting in multiple counting.



a

