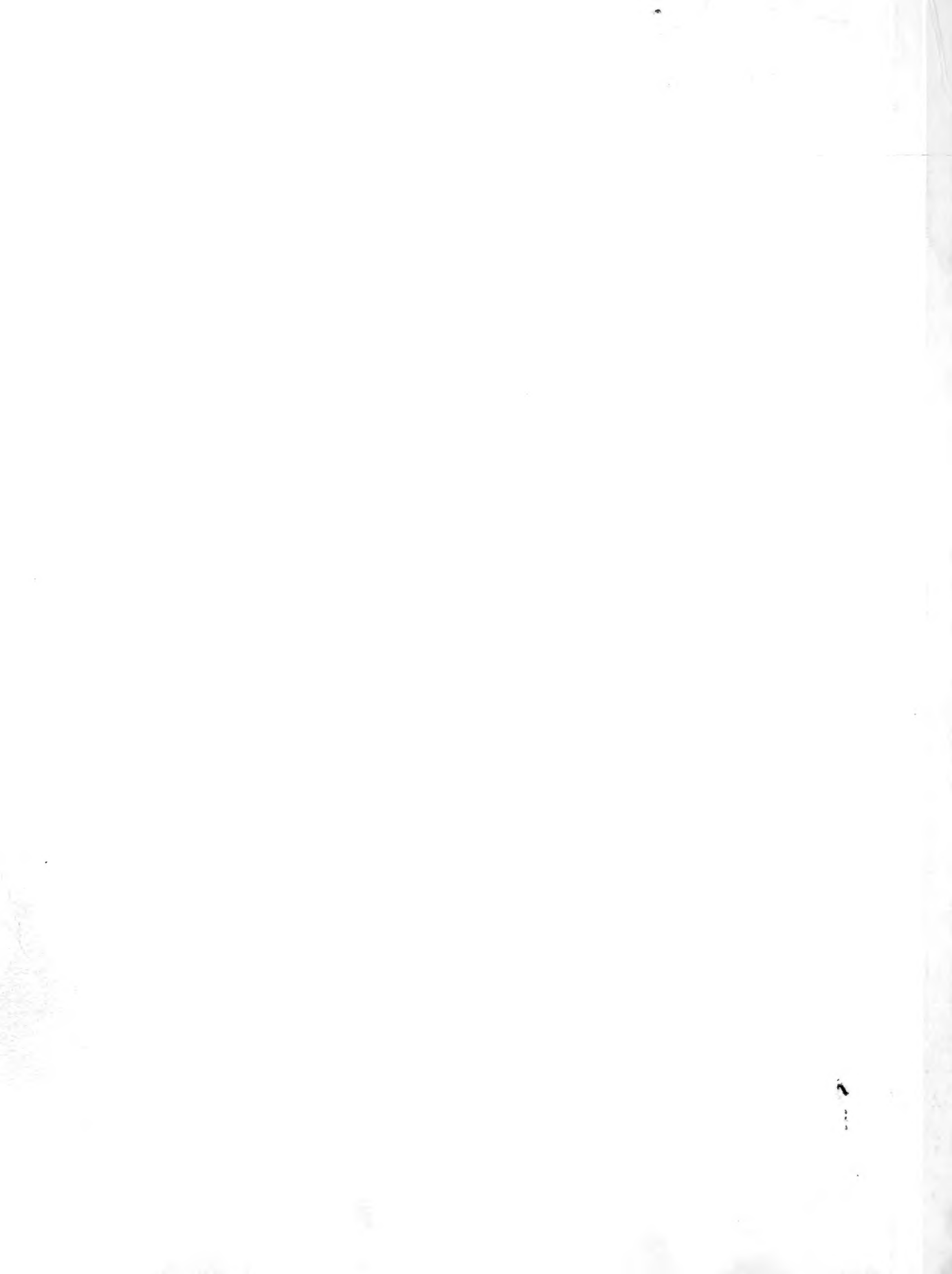


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3/ **EXTENT AND COST OF WEED CONTROL WITH HERBICIDES  
AND AN EVALUATION OF IMPORTANT WEEDS, 1965** 732

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*Use Pesticides Safely*

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U.S. DEPARTMENT OF AGRICULTURE

This report supersedes ARS-34-21, "A Survey of Extent and Cost of Weed Control and Specific Weed Problems," issued in 1965.

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# EXTENT AND COST OF WEED CONTROL WITH HERBICIDES AND AN EVALUATION OF IMPORTANT WEEDS, 1965<sup>1</sup>

## INTRODUCTION

For ages the figure of a man with a hoe has symbolized the farmer. A better symbol would be difficult to find. To the farmer, probably no effort in crop production is more universal or more characteristic than his constant battle with weeds. The hoe symbolizes this effort.

Until a generation ago, the farmer's solution to his weed problems was a relatively straightforward attack with physical force. His weapons were tillage implements and, in many situations, even his hands or hand tools. Herbicides have greatly increased the farmer's ability to control weeds. At the same time, herbicides complemented other adjustments in crop production technology and are needed to replace the diminishing supply of farm labor. Weed control with herbicides continues to fit into the scheme of increased mechanization of agriculture. However, with the advances in weed control systems have come changes in the weed problems--the enemy has also changed tactics!

The dramatically effective and selective herbicide 2,4-D was the first organic herbicide widely adopted by farmers for killing weedy broadleaf vegetation in grain crops, pastures, and other areas. However, 2,4-D was no panacea. Tolerant broadleaf weeds and resistant grasses survive treatment and increase in numbers. It is evident that no single herbicide is sufficient and that our weed problems constantly change.

<sup>1</sup> Information was compiled by L. L. Danielson, W. B. Ennis, Jr., J. T. Holstun, Jr., L. E. Jansen, D. L. Klingman, and F. L. Timmons, Crops Research Division, Agricultural Research Service; J. R. Paulling, Federal Extension Service; and A. S. Fox, Farm Production Economics Division, Economic Research Service, U.S. Department of Agriculture. Information was supplied by specialists in the Cooperative State Extension Services and in the State Agricultural Experiment Stations.

The U.S. Department of Agriculture recognizes that all measures for controlling weeds must be employed to reduce losses in crop production. Integrated weed control programs must include time-tested control measures, such as cultivation, mowing, burning, use of weedfree seed, crop rotation, and fertilizer practices, as well as herbicide control measures.<sup>2</sup> Biological controls must also be developed and integrated into the programs. In the foreseeable future, however, herbicides hold the greatest promise for checking and reducing the losses caused by weeds. The current survey was designed to provide basic information on the economics, costs, and effectiveness of herbicides.

Today we have a growing force of chemically-armed farmers, advised by a dedicated group of trained weed specialists. Their efforts against weeds are aided by an efficient staff of industrial organizations, weed scientists, and teachers who provide needed materials, new and improved methods, and trained personnel for replacement and expansion. However, achievement of desired goals--effective allocation of weed control efforts, maximum utilization of energies, and economy of operation--depends upon constant reappraisal of progress on old problems and definition of new problems. This report provides a basis for assessing these needs.

This report presents results of a third survey on the extent and cost of weed control with herbicides and provides an updated evaluation of some of our more important weed problems. Previous surveys were made in 1959 and 1962; the present survey was conducted during 1965. The data are especially

<sup>2</sup> U.S. Agricultural Research Service. Suggested guide for weed control, 1967. Agr. Handb. 332. 1967.

important in establishing trends in usage, costs, effectiveness, areas of application, and intensification of problems. Analysis of trends and new evaluations of specific problems can help us focus attention on problems of greatest importance. What are the costs? What costs are becoming critical? In what crops and geographical areas are the needs for better control of weeds most pressing? In which crops should we develop better alternative treatments? Where do residue hazards exist? Are we directing our efforts against the most important weeds? How important are certain weeds nationally, regionally, statewide, crop-wise? These are only a few of the questions

for which some answers may be forthcoming to help map future strategy. But other questions remain unanswered. Despite the gaps in the information collected, this third survey provides our best overall appraisal of the extent and costs of weed control and gives valuable new insights into the status of important weed problems.

This study was made possible by the close cooperation of State research and extension workers and three agencies of the U.S. Department of Agriculture--the Economic Research Service, Agricultural Research Service, and Federal Extension Service. All shared in planning the study and writing the report.

## GENERAL LIMITATIONS

Tabular data and associated discussions in this report are based on information provided in returned questionnaires.

Some crops are grown in only a few States. Some States did not report on a specific crop, although the crop was grown in the State. In several instances reports were received on specific weed problems but not on associated costs and extent of weed control. Consequently, the number of States reporting on different aspects of problems in a commodity area varies. Weighted averages, totals, and percentages in the summary tables were calculated from the individual reports.

Persistence problems discussed in this report are limited to soil persistence, except for persistence in water of treated aquatic areas. Figures tabulated on persistence problems reflect the number of "yes" or "no"

replies to the question "Are herbicidal residues in the soil becoming a problem?" Positive replies are interpreted as indicating that herbicidally active residues persist in the soil (or water) for a sufficient period of time to injure either the crop to which applied or succeeding crops, or to otherwise interfere with traditional programs of cropping, land management, or water usage. Herbicides which persist in the soil do not necessarily cause other environmental contamination.

For several questions, data are not available for providing quantitative answers. In these instances, reporting specialists used their best judgment in making estimates.

These general limitations should be considered in interpreting the report. Other specific limitations are referred to at appropriate places in the discussion.

## PURPOSE OF THE SURVEY AND PROCEDURE

The primary objectives of this survey are to update previous information on chemical control of weeds and to identify more exactly the extent and status of the major weed problems contributing to the losses and costs of agriculture. Secondly, the data are evaluated and presented in a form suited to the varied requirements of both public and private agencies for program reviews and analyses. The report provides a source of information useful for establishing priorities in short

term and long range research planning, for implementing research, development, and educational programs, and for guiding effectively the leadership efforts of extension personnel.

Current national and international emphasis on world food problems highlights the importance of weed control in crop production.<sup>3</sup> As

<sup>3</sup>Ennis, W. B., Jr., L. L. Jansen, I. T. Ellis, and L. D. Newsom, Inputs for pesticides. In The World Food Problem, a Report of the President's Science Advisory Committee, Vol. III, pp. 130-175. The White House, 1967.



agricultural technology advances to provide higher levels of production, any factor which limits or reduces yields becomes increasingly important. Information on weed control--one of the major and most costly inputs in time, energy, and materials in crop production--must be updated continually to keep abreast of other developments.

The questionnaire used in the current survey (conducted in 1965) followed the general format of questionnaires used in similar surveys in 1959 and 1962.<sup>4,5</sup> Questions covered items that provide consolidated information on:

- (1) The costs of herbicidal control measures, the extent of their use in different crops or commodity areas, their effectiveness, usage trends and residue problems; and
- (2) The relative importance of specific weeds as major problems with respect to their geographical distributions and the extent and trends of their infestations in individual crop or commodity areas.

The Federal Extension Service supervised the distribution of the questionnaires to extension specialists charged with educational leadership in weed control in the 50 States. Each specialist was asked to assume responsibility for the reports from his State but was requested to solicit support from all staff members who could contribute to a sound appraisal of the weed problems. Sep-

arate reports were requested for each of the 28 crop or commodity areas or types of land usage covered in the tables. Reports were received from all 50 States. Survey results are more complete than were either of the previous surveys.

The Economic Research Service tabulated the information. Regional and national cost averages were weighted for acreages involved. Weed specialists in the Agricultural Research Service interpreted and evaluated the summarized information for each of the crop or commodity areas surveyed. In most instances, State specialists followed suggested guidelines in reporting the weeds by the common names approved by the Weed Science Society of America. Where this was not done, in the best judgment of the botanist and ARS weed specialists, colloquial names were changed to approved common names or to common names used in standard reference volumes. Most of the common names listed in this report are identified in the Appendix by the best-judged scientific nomenclature.

This survey contains some deficiencies that were recognized during the survey planning but which could not then be avoided conveniently. Other deficiencies were detected during summarization and evaluation. Probably some of these can be corrected in future surveys. Nevertheless, the report as it stands satisfies, at least in part, most of the objectives it was designed to meet.

## CHEMICAL WEED CONTROL BY FARMERS

(See General Limitations)

The use of herbicides continues to increase in the United States. In 1965, nearly 120 million acres were treated with herbicides as compared with 70 million acres in 1962 and 53 million in 1959 (table 1). These estimates indicate that the use of herbicides is increasing exponentially. For example, the increase during the 3-year period, 1962-65, was 70 percent as compared with about 34

percent during the preceding 3-year period; 1959-62. The largest increases were on corn, small grain, cotton, soybeans, and sorghum.

Although much of the increase is a result of using larger quantities of such older organic herbicides as 2,4-D,<sup>6</sup> a considerable part of the increase is due to the use of some more recently developed herbicides, such as atrazine, trifluralin, and CDAA.<sup>7</sup> Many of the

<sup>6</sup> 2,4-dichlorophenoxyacetic acid.

<sup>7</sup> 2-chloro-4-ethylamino-6-isopropylamino-s-triazine (atrazine)  $\alpha, \alpha, \alpha$ -trifluoro-2,6-dinitro-N,N-dipropyl-p-toluidine(trifluralin) 2-chloro-N,N-diallylacetamide (CDAA).

<sup>4</sup> U.S. Agricultural Research Service and Federal Extension Service. A survey of extent and cost of weed control and specific weed problems. ARS 34-23. 1962.

<sup>5</sup> U.S. Agricultural Research Service and Federal Extension Service. A survey of extent and cost of weed control and specific weed problems. ARS 34-23-1. 1965.

Table 1.--Estimated extent and cost of chemical weed control in the United States, 1959, 1962, and 1965

| Crop or area                  | States reporting |             |             |             | Acres treated |             |                  |                  | Cost of herbicides including cost of application and materials for all treatments |             |             |             |             |             | Acreage treated by-- |         |         |         |         |         |         |
|-------------------------------|------------------|-------------|-------------|-------------|---------------|-------------|------------------|------------------|---|-------------|-------------|-------------|-------------|-------------|----------------------|---------|---------|---------|---------|---------|---------|
|                               | 1959             |             | 1962        |             | 1965          |             | 1959             |                  | 1962  |             | 1965        |             | Total       |             | Average per acre     |         | Farmers |         | Custom  |         |         |
|                               | Number           | Percent     | Number      | Percent     | Number        | Percent     | Number           | Percent          | Number  | Percent     | Number      | Percent     | Number      | Percent     | Dollars              | Dollars | Percent | Percent | Percent | Percent |         |
|                               | 1,000 acres      | 1,000 acres | 1,000 acres | 1,000 acres | 1,000 acres   | 1,000 acres | 1,000 acres      | 1,000 acres      | 1,000 acres   | 1,000 acres | 1,000 acres | 1,000 acres | 1,000 acres | 1,000 acres | \$1,000              | \$1,000 | Dollars | Dollars | Percent | Percent | Percent |
| Corn-----                     | 40               | 46          | 48          | 20,051      | 25,302        | 45,012      | 25               | 39               | 68  | 37,980      | 57,600      | 144,267     | 1.89        | 2.28        | 3.21                 | 82      | 83      | 80      | 18      | 17      | 20      |
| Cotton-----                   | 13               | 15          | 17          | 1,554       | 5,433         | 12,479      | 10               | 35               | 92  | 4,709       | 16,805      | 59,678      | 3.03        | 3.09        | 4.78                 | 92      | 91      | 90      | 8       | 9       | 10      |
| Soybeans-----                 | 15               | 28          | 29          | 596         | 2,827         | 7,832       | 2                | 10               | 23  | 2,315       | 10,835      | 35,249      | 4.16        | 3.83        | 4.50                 | 98      | 90      | 93      | 2       | 10      | 7       |
| Small grains-----             | 38               | 45          | 44          | 20,723      | 18,931        | 28,735      | 22               | 24               | 36  | 37,095      | 29,579      | 53,375      | 1.79        | 1.56        | 1.86                 | 75      | 65      | 58      | 25      | 35      | 42      |
| Rice-----                     | 4                | 6           | 5           | 502         | 940           | 1,390       | 32               | 53               | 78  | 889         | 6,250       | 12,038      | 1.77        | 6.65        | 9.09                 | 13      | 10      | 8       | 87      | 90      | 92      |
| Peanuts-----                  | 5                | 8           | 9           | 35          | 310           | 797         | 2                | 22               | 55  | 116         | 2,565       | 6,337       | 3.31        | 8.27        | 7.95                 | 100     | 97      | 88      | --      | 3       | 12      |
| Sugarbeets-----               | 11               | 15          | 15          | 125         | 362           | 495         | 14               | 33               | 40  | 625         | 2,237       | 4,179       | 5.00        | 6.18        | 8.44                 | 94      | 90      | 92      | 6       | 10      | 8       |
| Sorghum-----                  | 14               | 25          | 24          | 2,093       | 2,665         | 5,391       | 14               | 23               | 32  | 6,512       | 5,258       | 22,121      | 3.11        | 1.97        | 4.10                 | 40      | 66      | 74      | 60      | 34      | 26      |
| Forage seeds-----             | 14               | 20          | 15          | 282         | 439           | 221         | 8                | 16               | 9   | 1,868       | 2,416       | 1,927       | 6.62        | 5.50        | 6.91                 | 80      | 62      | 78      | 20      | 38      | 22      |
| Sweet corn-----               | --               | 1           | 21          | --          | 30            | 308         | --               | 5                | 56  | --          | 187         | 1,750       | --          | 6.23        | 5.68                 | --      | 95      | 81      | --      | 5       | 19      |
| Other vegetables <sup>3</sup> | 20               | 36          | 36          | 276         | 1,164         | 779         | 10               | 18               | 13  | 1,418       | 10,415      | 7,969       | 5.14        | 8.95        | 10.23                | 84      | 79      | 72      | 16      | 21      | 28      |
| Fruits and nuts--             | 12               | 21          | 21          | 10          | 267           | 540         | 5                | 10               | 19  | 98          | 2,397       | 7,029       | 9.80        | 8.98        | 13.02                | 99      | 86      | 86      | 1       | 14      | 14      |
| Ornamentals-----              | 6                | 15          | 15          | 2           | 51            | 84          | 1                | 25               | 40  | 45          | 969         | 1,743       | 22.50       | 19.00       | 20.75                | 70      | 34      | 42      | 30      | 66      | 58      |
| Lawns-----                    | 17               | 23          | 29          | 60          | 672           | 1,134       | 1                | 5                | 14  | 1,489       | 15,368      | 26,750      | 24.82       | 22.87       | 23.59                | 82      | 83      | 58      | 18      | 17      | 42      |
| Hay-----                      | 20               | 33          | 35          | 272         | 412           | 1,269       | ( <sup>4</sup> ) | ( <sup>4</sup> ) | 2   | 1,692       | 1,794       | 5,224       | 6.22        | 4.35        | 4.12                 | 81      | 78      | 79      | 19      | 22      | 21      |
| Pastures <sup>5</sup> -----   | 34               | 45          | 40          | 2,400       | 4,714         | 6,671       | ( <sup>4</sup> ) | ( <sup>4</sup> ) | 2   | 5,789       | 13,340      | 16,551      | 2.41        | 2.83        | 2.48                 | 74      | 64      | 84      | 26      | 36      | 16      |
| Hangeland <sup>6</sup> -----  | 13               | 20          | 17          | 2,011       | 2,262         | 3,156       | ( <sup>4</sup> ) | ( <sup>4</sup> ) | ( <sup>4</sup> )  | 6,174       | 6,265       | 15,748      | 3.07        | 2.77        | 4.99                 | 37      | 37      | 13      | 63      | 63      | 87      |
| Forest plantings-             | --               | 18          | 17          | --          | 274           | 117         | --               | --               | --  | --          | 2,752       | 1,492       | --          | 10.04       | 12.75                | --      | 34      | 57      | --      | 66      | 43      |
| Noncropland-----              | 27               | 31          | 27          | 1,971       | 3,612         | 3,306       | --               | --               | --  | 19,738      | 83,714      | 68,470      | 10.01       | 23.18       | 20.71                | 30      | 26      | 39      | 70      | 74      | 61      |
| Aquatics-----                 | --               | --          | 13          | --          | --            | 84          | --               | --               | --  | --          | --          | 1,922       | --          | --          | 22.88                | --      | --      | 44      | --      | --      | 56      |
| Total or average              | 41               | 50          | 50          | 52,923      | 70,667        | 119,800     | --               | --               | --  | 128,552     | 270,746     | 494,019     | 2.43        | 3.83        | 4.12                 | --      | --      | --      | --      | --      | --      |

<sup>1</sup> Includes acres treated preemergence plus acres treated postemergence; those acres treated both pre- and postemergence are counted twice.

<sup>2</sup> This double counting lowers the average cost per acre.

<sup>3</sup> Harvested acreage where crops were harvested (see table 2).

<sup>4</sup> Root crops, cucurbits, vegetable legumes, and solanaceous crops in 1965 and all vegetables except sweet corn in 1959 and 1962. See tables 27, 29, 31, and 33.

<sup>5</sup> Less than 1.

<sup>6</sup> Annual, improved perennial, and unimproved perennial. See individual tables for more detailed information.

Mountain, prairie, arid, and rainbelt. See individual tables for more detailed information.

newer herbicides possess various properties that make them useful for controlling a broad range of weeds or for controlling specific weeds in many crops and under different soil and climatic conditions.

Herbicidal control of weeds is an essential part of improved crop production technology that also includes the use of fertilizers, and of larger and newer types of machinery and equipment. Many of the recent developments have reduced labor requirements and at the same time have increased the attractiveness of using more herbicides. The use of herbicides helps to reduce the risk of weeds that cannot be controlled because of unfavorable weather conditions. For example, the use of herbicides as preemergence<sup>8</sup> treatments allows the grower several opportunities to control weeds. If the preemergence application is not effective, he still has the alternatives of using herbicides as postemergence treatments or cultivation, or both.

The use of herbicides alone or combined with other methods of weed control offers unusual promise for increasing crop yields. Effective weed control also improves crop quality and reduces costs of harvesting and processing the crop.

Herbicide use affects overall crop production patterns in the choice of crops grown and the variety of crops planted. It influences seedbed preparation, methods of seeding, seeding rates, row spacing, plant spacing in the row, and plant populations per acre. It facilitates the modification of associated fertilizer practices, which include the type of fertilizer used, the time of application, and the placement of fertilizer. More directly, the use of herbicides affects the cultivation practices, such as the number and type of cultivations. The use of herbicides also facilitates irrigation practices, harvesting procedures, seed cleaning operations, erosion control, and fallow practices for weed control. In addition, the extensive use of herbicides helps to improve disease and insect control practices and land and equipment utilization.

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<sup>8</sup> Preemergence--prior to emergence of specified weed or crop; postemergence--after emergence of specified weed or crop.

Weed specialists estimate that farmers treated 69 percent more acres in 1965 than in 1962 and that the directly related costs of materials and the cost of application for all herbicide treatments increased about 82 percent. Thus, average costs per acre increased only slightly, from \$3.83 to \$4.12 per acre. In 1965 costs ranged from less than \$2.00 per acre for treatments on small grains to more than \$20.00 per acre for treatments on lawns, ornamentals, and noncropland. The higher costs for herbicides are offset by reduced labor needs, improved crop quality and yields, and improvements in other farming operations. Benefits resulting from the use of herbicides continue to attract interest in herbicides that will further reduce yield losses and increase the efficiency of crop production.

Farmers generally treat most of the acreages themselves. This is especially true for the more important row crops--corn, cotton, soybeans, and sorghum--as well as fruits and nuts and most vegetables. Large acreages of small grains and rangeland are often treated by aircraft that generally are owned and furnished by custom operators. Some specialty crops, e.g., rice (which requires flooding and irrigation), are conventionally treated by aircraft.

Herbicides used preemergence continue to grow in importance. Acreage treated preemergence constituted only 7 percent of the total treated acreage of all crops in 1959, but increased to 22 percent in 1962 and to 30 percent in 1965 (table 2). The increase is especially noticeable on such crops as corn and soybeans. From 1962 to 1965, the acres of corn treated preemergence increased from 25 percent to 35 percent of the total acres treated.

Herbicides are still used extensively post-emergence. This usage accounts for nearly all of the treated acreage of small grains, most of the treated acreages of sorghum, pasture and rangeland, and about two-thirds of the corn acreage treated.

The average cost of application and materials for herbicides used preemergence is more than twice as much as for those used postemergence (table 3). Most of this difference results from higher costs, or higher



Table 3.--Estimated cost of chemical weed control in the United States, 1959, 1962, and 1965  
[Costs are for herbicides and application]

| Crop or area                        | Total cost <sup>1</sup> |         |         |               |         |         | Average cost per acre <sup>2</sup> |         |         |               |         |         |
|-------------------------------------|-------------------------|---------|---------|---------------|---------|---------|------------------------------------|---------|---------|---------------|---------|---------|
|                                     | Preemergence            |         |         | Postemergence |         |         | Preemergence                       |         |         | Postemergence |         |         |
|                                     | 1959                    | 1962    | 1965    | 1959          | 1962    | 1965    | 1959                               | 1962    | 1965    | 1959          | 1962    | 1965    |
|                                     | \$1,000                 | \$1,000 | \$1,000 | \$1,000       | \$1,000 | \$1,000 | Dollars                            | Dollars | Dollars | Dollars       | Dollars | Dollars |
| Corn-----                           | 8,226                   | 28,274  | 87,526  | 29,754        | 29,326  | 56,741  | 3.68                               | 4.43    | 5.50    | 1.67          | 1.55    | 1.95    |
| Cotton-----                         | 3,222                   | 10,228  | 33,398  | 1,487         | 6,577   | 26,280  | 3.22                               | 3.04    | 5.05    | 2.69          | 3.18    | 4.48    |
| Soybeans-----                       | 2,297                   | 9,993   | 32,980  | 18            | 842     | 2,269   | 4.21                               | 4.16    | 4.84    | 1.80          | 1.98    | 2.23    |
| Small grains-----                   | --                      | 76      | 5,769   | 37,095        | 29,503  | 47,606  | --                                 | 4.00    | 4.74    | 1.79          | 1.56    | 1.73    |
| Rice-----                           | --                      | --      | 4,078   | 889           | 6,250   | 8,560   | --                                 | --      | 10.07   | 1.77          | 6.65    | 8.69    |
| Peanuts-----                        | 107                     | 1,188   | 3,065   | 9             | 1,377   | 3,272   | 3.34                               | 9.21    | 8.13    | 3.00          | 7.61    | 7.79    |
| Sugarbeets-----                     | 428                     | 2,091   | 3,821   | 197           | 146     | 358     | 5.22                               | 6.32    | 8.97    | 4.58          | 4.71    | 5.22    |
| Sorghum-----                        | 48                      | 700     | 11,385  | 6,464         | 4,558   | 10,736  | 6.00                               | 2.91    | 7.73    | 3.10          | 1.88    | 2.74    |
| Forage seeds-----                   | --                      | 668     | 545     | 1,868         | 1,748   | 982     | --                                 | 10.77   | 12.17   | 6.62          | 4.64    | 5.58    |
| Sweet corn-----                     | --                      | 112     | 1,268   | --            | 75      | 482     | --                                 | 7.47    | 5.65    | --            | 5.00    | 5.75    |
| Other vegetables <sup>3</sup> ----- | 582                     | 6,720   | 6,392   | 836           | 3,695   | 1,577   | 8.08                               | 10.20   | 12.66   | 4.10          | 7.32    | 5.76    |
| Fruits and nuts-----                | 35                      | 923     | 3,080   | 63            | 1,474   | 3,949   | 17.50                              | 8.63    | 11.87   | 7.87          | 9.21    | 14.06   |
| Ornamentals-----                    | 2                       | 97      | 353     | 43            | 872     | 1,390   | --                                 | 13.86   | 24.19   | 21.50         | 19.82   | 20.24   |
| Lawns-----                          | 680                     | 5,163   | 8,323   | 809           | 10,205  | 18,427  | 226.67                             | 49.64   | 32.36   | 14.19         | 17.97   | 20.77   |
| Hay-----                            | --                      | 199     | 1,072   | 1,692         | 1,595   | 4,152   | --                                 | 7.96    | 9.54    | 6.22          | 4.12    | 3.59    |
| Pastures <sup>4</sup> -----         | 30                      | 135     | 377     | 5,759         | 13,205  | 16,174  | 4.00                               | 4.22    | 5.46    | 2.43          | 2.82    | 2.45    |
| Rangeland <sup>5</sup> -----        | --                      | --      | --      | 6,174         | 6,265   | 15,748  | --                                 | --      | --      | 3.07          | 2.77    | 4.99    |
| Forest plantings-----               | --                      | 336     | 126     | --            | 2,416   | 1,366   | --                                 | 11.20   | 6.23    | --            | 9.90    | 14.08   |
| Noncropland-----                    | 2,596                   | 33,915  | 36,631  | 17,142        | 49,799  | 31,839  | 96.15                              | 22.73   | 32.40   | 8.82          | 23.49   | 14.64   |
| Aquatics-----                       | --                      | --      | 113     | --            | --      | 1,809   | --                                 | --      | 43.65   | --            | --      | 22.33   |
| Total or average-----               | 18,253                  | 100,818 | 240,302 | 110,299       | 169,928 | 253,717 | 4.54                               | 6.55    | 6.70    | 2.26          | 3.07    | 3.02    |

<sup>1</sup> Calculated from the average costs (incurred by farmers and other landowners in the States reporting) times the acres treated as shown on individual tables.

<sup>2</sup> Total costs divided by acreage treated (see table 2) do not always equal average costs, because acreages and costs are rounded in summary tables.

<sup>3</sup> Root crops, cucurbits, vegetable legumes, and solanaceous crops in 1965 and all vegetables except sweet corn in 1959 and 1962.

<sup>4</sup> Annual, improved perennial, and unimproved perennial.

<sup>5</sup> Mountain, foothills, arid, and rainbelt.

rates (or both) of materials for preemergence weed control, particularly on corn, soybeans, small grains, sorghum, and most of the vegetables. On cotton, rice, and peanuts, differences between the costs of using herbicides preemergence and postemergence are not so great. However, preemergence use of herbicides is still slightly more expensive.

Weed specialists reported that the available herbicides were generally effective in controlling weeds in most crops (table 4). However, reports from many states indicate an urgent need for better herbicides on certain crops, particularly soybeans, sugarbeets, hay, and pasture (table 5). Herbicides applied to corn, sorghum, vegetables, fruits and nuts,

hay, and pastures are still resulting in some soil residues that are injurious to either treated crops or succeeding crops. Specialists indicated persistence problems in about half the States reporting on corn, cotton, sugarbeets, sorghum, sweet corn, other vegetables, and ornamentals. There appeared to be little difficulty with persistence of herbicides used in small grains, rice, peanuts, and forage seed crops.

Overall trends of herbicide usage still continue upward. However, specialists in some States report that the use of herbicides in 1965 was lower than in 1962. Lower usage was most often reported for small grain, sweet corn, other vegetables, hay, and pasture.

Table 4.--Effectiveness of herbicides and residue problems, by number of States reporting, 1959, 1962, and 1965

| Crop<br>or<br>Area                  | Effectiveness of herbicides |      |      |      |      |      |      |      |      |               |      |      |      |      |      |      |      |      | Problems of herbicide persistence in 1962 and 1965 <sup>1</sup> |      |      |      |    |    |    |   |    |    |   |    |
|-------------------------------------|-----------------------------|------|------|------|------|------|------|------|------|---------------|------|------|------|------|------|------|------|------|---|------|------|------|----|----|----|---|----|----|---|----|
|                                     | Preemergence                |      |      |      |      |      |      |      |      | Postemergence |      |      |      |      |      |      |      |      | Yes   |      | No   |      |    |    |    |   |    |    |   |    |
|                                     | Good                        |      |      | Fair |      |      | Poor |      |      | Good          |      |      | Fair |      |      | Poor |      |      | 1962  | 1965 | 1962 | 1965 |    |    |    |   |    |    |   |    |
|                                     | 1959                        | 1962 | 1965 | 1959 | 1962 | 1965 | 1959 | 1962 | 1965 | 1959          | 1962 | 1965 | 1959 | 1962 | 1965 | 1959 | 1962 | 1965 | 1962  | 1965 | 1962 | 1965 |    |    |    |   |    |    |   |    |
| Corn-----                           | 15                          | 34   | 32   | 15   | 7    | 15   | 2    | 1    | 1    | 1             | 24   | 31   | 31   | 13   | 13   | 17   | 0    | 0    | 0   | 28   | 27   | 17   | 21 |    |    |   |    |    |   |    |
| Cotton-----                         | 4                           | 6    | 13   | 7    | 5    | 4    | 0    | 2    | -    | 5             | 6    | 9    | 3    | 6    | 6    | 0    | 0    | 0    | -   | 9    | 8    | 5    | 9  |    |    |   |    |    |   |    |
| Soybeans-----                       | 1                           | 5    | 7    | 12   | 19   | 17   | 2    | 3    | 5    | -             | 2    | 4    | -    | 7    | 7    | -    | 6    | 5    | 2   | 3    | 25   | 26   | 26 |    |    |   |    |    |   |    |
| Small grains-----                   | -                           | 2    | 3    | -    | 2    | 3    | -    | 0    | 0    | 24            | 40   | 25   | 11   | 13   | 18   | 0    | 0    | 1    | 3   | 3    | 41   | 41   | 41 |    |    |   |    |    |   |    |
| Rice-----                           | -                           | -    | 2    | -    | -    | -    | -    | -    | -    | 4             | 5    | 4    | 0    | 1    | -    | 0    | 0    | -    | 1   | 0    | 5    | 5    | 5  |    |    |   |    |    |   |    |
| Peanuts-----                        | 0                           | 3    | 5    | 2    | 4    | 4    | 1    | 0    | -    | 0             | 3    | 2    | 1    | 1    | 4    | 0    | 0    | 1    | 0   | 1    | 6    | 8    | 8  |    |    |   |    |    |   |    |
| Sugarbeets-----                     | 3                           | 2    | 4    | 4    | 12   | 10   | 3    | 1    | 1    | 1             | 3    | 2    | 4    | 6    | 8    | 0    | 2    | 2    | 4   | 7    | 11   | 8    | 8  |    |    |   |    |    |   |    |
| Sorghum-----                        | 1                           | 3    | 11   | 1    | 6    | 9    | 1    | 2    | 1    | 8             | 14   | 11   | 4    | 9    | 11   | 1    | 1    | 1    | 4   | 4    | 12   | 19   | 12 |    |    |   |    |    |   |    |
| Forage seed-----                    | 0                           | 3    | 2    | 1    | 4    | 2    | 0    | 1    | 0    | 3             | 7    | 5    | 6    | 9    | 8    | 3    | 2    | 1    | 3   | 4    | 17   | 11   | 11 |    |    |   |    |    |   |    |
| Sweet corn-----                     | -                           | 1    | 14   | -    | 0    | 3    | -    | 0    | 1    | -             | 1    | 8    | -    | 0    | 7    | -    | 0    | 0    | 0   | 0    | 15   | 1    | 6  |    |    |   |    |    |   |    |
| Other vegetables <sup>2</sup> ----- | 5                           | 15   | 3    | 25   | 9    | 13   | 3    | 28   | 1    | 3             | 3    | 9    | 5    | 16   | 3    | 16   | 1    | 8    | 3   | 12   | 0    | 1    | 3  | 2  | 16 | 3 | 18 | 19 | 3 | 32 |
| Fruits and nuts-----                | 0                           | 3    | 7    | 5    | 5    | 5    | 0    | 0    | -    | 2             | 10   | 10   | 8    | 10   | 9    | 0    | 0    | -    | 12  | 8    | 8    | 13   | 13 | 13 |    |   |    |    |   |    |
| Ornamentals-----                    | 1                           | 5    | 7    | 2    | 4    | 6    | 0    | 1    | 1    | 0             | 3    | 4    | 4    | 6    | 6    | 1    | 3    | 2    | 7   | 9    | 8    | 6    | 6  |    |    |   |    |    |   |    |
| Lawns-----                          | 2                           | 7    | 17   | 2    | 6    | 4    | 1    | 0    | -    | 8             | 13   | 23   | 7    | 9    | 6    | 2    | 1    | -    | 7   | 6    | 16   | 23   | 23 |    |    |   |    |    |   |    |
| Hay-----                            | 1                           | 2    | 5    | 0    | 2    | 8    | 0    | 0    | 0    | 10            | 9    | 10   | 6    | 17   | 22   | 2    | 6    | 2    | 6   | 10   | 27   | 25   | 25 |    |    |   |    |    |   |    |
| Pastures <sup>4</sup> -----         | 2                           | 1    | 3    | 2    | 0    | 3    | 5    | 0    | 0    | 19            | 17   | 3    | 21   | 15   | 33   | 3    | 24   | 1    | 2   | 3    | 1    | 7    | 3  | 15 | 35 | 3 | 30 | 30 |   |    |
| Rangeland <sup>5</sup> -----        | -                           | -    | -    | -    | -    | -    | -    | -    | -    | 6             | 11   | 3    | 12   | 6    | 7    | 3    | 9    | 1    | 0   | -    | 2    | 3    | 4  | 15 |    |   |    |    |   |    |
| Forest plantings-----               | -                           | 4    | 4    | -    | 2    | 3    | -    | 0    | 0    | -             | 3    | 8    | -    | 12   | 6    | -    | 0    | 2    | 3   | 4    | 14   | 13   | 13 |    |    |   |    |    |   |    |
| Noncropland-----                    | 1                           | 5    | 4    | 1    | 4    | 4    | 0    | 0    | -    | 8             | 12   | 14   | 17   | 15   | 11   | 0    | 2    | -    | 7   | 5    | 24   | 22   | 22 |    |    |   |    |    |   |    |
| Aquatics-----                       | -                           | -    | -    | -    | -    | 4    | -    | -    | -    | -             | -    | 3    | -    | 10   | -    | -    | -    | -    | 7   | -    | -    | 6    | 6  |    |    |   |    |    |   |    |

\*Zeros (0) mean that, of the states reporting the use of herbicides or a residue problem, none reported in this category. Dashes (-) mean that no states reported the use of either preemergence, postemergence, or residue problems.

<sup>1</sup> Identifies problem areas needing additional research.

<sup>2</sup> Root crops, cucurbits, vegetable legumes, and solanaceous crops in 1965 and all vegetables except sweet corn in 1959 and 1962.

<sup>3</sup> Totals of 4 groupings for vegetables, 3 groupings for pasture, and 4 groupings for rangeland. Each state counted only once in each column; however, within each grouping individual states could report in more than one column under each major heading. See individual tables for more detailed information.

<sup>4</sup> Annual, improved perennial, and unimproved perennial.

<sup>5</sup> Mountain, foothills, arid, and rainbelt.

Table 5.---Herbicide usage trend and need for better herbicides, by number of States reporting, 1959, 1962, and 1965

| Crop or Area                  | Herbicide-usage trend |        |        |            |        |        |        |        |        |        |        |        | Need for better herbicides <sup>1</sup> |        |        |        |        |        |      |
|-------------------------------|-----------------------|--------|--------|------------|--------|--------|--------|--------|--------|--------|--------|--------|---|--------|--------|--------|--------|--------|------|
|                               | Up                    |        |        | Stationary |        |        | Down   |        |        | Urgent |        |        | Some                                    |        |        | Little |        |        |      |
|                               | 1959                  | 1962   | 1965   | 1959       | 1962   | 1965   | 1959   | 1962   | 1965   | 1959   | 1962   | 1965   | 1959                                    | 1962   | 1965   | 1959   | 1962   | 1965   |      |
|                               | Number                | Number | Number | Number     | Number | Number | Number | Number | Number | Number | Number | Number | Number                                  | Number | Number | Number | Number | Number |      |
| Corn-----                     | 37                    | 42     | 43     | 1          | 3      | 5      | 0      | 0      | 0      | 0      | 0      | 7      | 11                                      | 8      | 27     | 33     | 4      | 32     | 7    |
| Cotton-----                   | 11                    | 14     | 16     | 2          | 0      | 1      | 0      | 0      | 0      | 0      | 0      | 2      | 5                                       | 2      | 11     | 13     | 0      | 8      | 2    |
| Soybeans-----                 | 14                    | 27     | 29     | 1          | 0      | --     | 0      | 0      | 0      | 0      | 0      | 11     | 24                                      | 16     | 4      | 12     | 0      | 3      | 1    |
| Small grains-----             | 26                    | 29     | 26     | 9          | 15     | 18     | 0      | 1      | 1      | 0      | 0      | 3      | 12                                      | 6      | 22     | 30     | 11     | 31     | 8    |
| Rice-----                     | 2                     | 6      | 5      | 2          | 0      | --     | 0      | 0      | 0      | 0      | 0      | 1      | 2                                       | --     | 3      | 4      | 0      | 4      | 1    |
| Peanuts-----                  | 2                     | 7      | 8      | 0          | 0      | 1      | 0      | 0      | 0      | 0      | 0      | 2      | 4                                       | 1      | 1      | 6      | 0      | 2      | 2    |
| Sugarbeets-----               | 9                     | 14     | 14     | 2          | 1      | 1      | 0      | 0      | 0      | 0      | 0      | 5      | 12                                      | 10     | 6      | 5      | 0      | 2      | --   |
| Sorghum-----                  | 10                    | 13     | 20     | 4          | 11     | 4      | 0      | 0      | 0      | 0      | 0      | 6      | 14                                      | 6      | 6      | 14     | 2      | 8      | 4    |
| Forage seeds-----             | 8                     | 15     | 12     | 2          | 6      | 3      | 0      | 0      | 0      | 0      | 0      | 8      | 15                                      | 5      | 4      | 8      | 0      | 6      | 2    |
| Sweet corn-----               | --                    | 0      | 11     | --         | 1      | 10     | --     | 0      | 0      | 0      | 0      | --     | 0                                       | 3      | --     | 14     | --     | 1      | 4    |
| Other vegetables <sup>2</sup> | 16                    | 29     | 3 29   | 4          | 7      | 3 20   | 0      | 0      | 0      | 0      | 0      | 8      | 25                                      | 3 24   | 12     | 3 31   | 0      | 10     | 3 10 |
| Fruit and nuts--              | 10                    | 20     | 19     | 2          | 1      | 2      | 0      | 0      | 0      | 0      | 0      | 6      | 15                                      | 8      | 6      | 13     | 0      | 4      | --   |
| Ornamentals-----              | 5                     | 14     | 14     | 1          | 1      | 1      | 0      | 0      | 0      | 0      | 0      | 2      | 10                                      | 4      | 4      | 10     | 0      | 4      | 1    |
| Lawns-----                    | 18                    | 22     | 27     | 1          | 1      | 2      | 0      | 0      | 0      | 0      | 0      | 7      | 10                                      | 7      | 10     | 15     | 3      | 12     | 7    |
| Hay-----                      | 14                    | 24     | 23     | 4          | 8      | 12     | 0      | 0      | 0      | 0      | 0      | 8      | 19                                      | 17     | 9      | 14     | 1      | 14     | 4    |
| Pastures <sup>4</sup> -----   | 31                    | 34     | 3 28   | 3          | 10     | 3 17   | 0      | 0      | 0      | 0      | 0      | 5      | 16                                      | 3 13   | 24     | 3 23   | 5      | 24     | 3 9  |
| Rangeland <sup>5</sup> -----  | 10                    | 18     | 3 14   | 2          | 1      | 3 5    | 0      | 0      | 0      | 0      | 0      | 3      | 9                                       | 3 7    | 8      | 3 11   | 2      | 9      | 3 4  |
| Forest planting-              | --                    | 10     | 14     | --         | 0      | 2      | --     | 0      | 0      | 0      | 0      | --     | 11                                      | 4      | --     | 9      | --     | 6      | 4    |
| Noncropland-----              | 22                    | 27     | 22     | 2          | 4      | 5      | 0      | 0      | 0      | 0      | 0      | 7      | 12                                      | 2      | 15     | 20     | 2      | 17     | 5    |
| Aquatics-----                 | --                    | --     | 9      | --         | --     | 4      | --     | --     | --     | --     | --     | --     | --                                      | 5      | --     | 8      | --     | --     | --   |

\*Zeros (0) mean that of the states reporting the use of herbicides or a residue problem, none reported in this category. Dashes (-) mean that no states reported the use of either preemergence, postemergence, or residue problems.

<sup>1</sup> Identifies problem areas needing additional research.

<sup>2</sup> Root crops, cucurbits, vegetable legumes, and solanaceous crops in 1965 and all vegetables except sweet corn in 1959 and 1962.

<sup>3</sup> Total for 4 groupings of vegetables, 3 groupings for pasture, and 4 groupings for rangeland. Each state counted only once in each column; however, within each grouping individual states could report in more than one column under each major heading. See individual tables for more detailed information.

<sup>4</sup> Annual, improved perennial, and unimproved perennial.

<sup>5</sup> Mountain, foothills, arid, and rainbelt.



# NATIONAL AND REGIONAL IMPORTANCE OF SPECIFIC WEEDS

(See General Limitations)

By design, this survey was limited to only the most serious weeds in the 28 crop, commodity, or land usage areas surveyed. Only the five most important weeds were listed by State specialists for each crop or area. State specialists listed 392 separate weeds, either distinct species or complexes (see even-numbered tables 8 through 62 and Appendix).

From a national standpoint, 34 weeds stand out as important problems because of their occurrence in four of the five groups of crops, commodities, or types of land usage (table 6). In order of their total frequency of listing, the top ten weeds were pigweed, crabgrass, lambsquarters, quackgrass, nutsedge, johnsongrass, foxtail, Canada thistle, ragweed, and barnyardgrass. These weeds were listed as major problems in about two thirds of the individual commodity areas. The fact that they were not listed in the other third does not necessarily imply that any one weed is not a problem or that it does not occur in certain crops, but only that five other weeds are more important in these crops. The same is true for different States and different parts of the same State reporting on a given crop; a weed that is a primary problem in one geographical area may be only of secondary importance in another.

In general, the relative rank of the principal weeds of agronomic and horticultural crops (crops of tilled areas) follows the national order for all groups (table 6). How-

ever, within the other commodity area groups a number of weeds were listed more frequently than many of those included in the top ten nationally. Also, the relative importance of a given weed differs greatly from region to region. By frequency rank, the eight principal weeds of the different regions are as follows:

- Northeastern States--quackgrass, crabgrass, lambsquarters, pigweed, nutsedge, ragweed, foxtail, and wild mustard;
- North Central States--quackgrass, Canada thistle, foxtail, pigweed, lambsquarters, giant foxtail, ragweed, and crabgrass;
- Southern States--crabgrass, pigweed, johnsongrass, morningglory, nutsedge, ragweed, bermudagrass, and dock;
- Western States--lambsquarters, pigweed, barnyardgrass, Canada thistle, quackgrass, nutsedge, wild oats, and foxtail.

Frequencies of reporting provide only a partial analysis of the seriousness of specific weed problems. Information on the intensity of the infestation (percent of acreage infested) and on the infestation trend (up, down, or stationary) was also provided for each weed reported. These data are considered in delineating the relative importance of major weeds in each of the crop or commodity areas discussed in the rest of this report. Detailed analyses of all of the weed data are beyond the scope of the current survey.

Table 6.--National and regional importance of 34 weed species or complexes reported as problems in four out of five groups of crops, commodities, or types of land usage

| Weed                          | Number of reports in all crop and commodity areas |               |          |         | Number of areas and number of reports by crop groups <sup>1</sup> |         |                                  |         |                                    |         |  |         |                           |
|-------------------------------|---|---------------|----------|---------|---|---------|----------------------------------|---------|------------------------------------|---------|--|---------|---------------------------|
|                               | Total reports for U.S.                            |               | Region   |         | Agronomic Crops <sup>2</sup>                                      |         | Horticultural Crops <sup>3</sup> |         | Lawns, Hay & Pastures <sup>4</sup> |         | Rangelands, Forest Plantings, & Noncropland <sup>5</sup> |         | Total areas in all groups |
|                               | North-eastern                                     | North-Central | Southern | Western | Areas   | Reports | Areas                            | Reports | Areas                              | Reports | Areas  | Reports |                           |
| 1. Pigweed-----               | 40  | 46            | 68       | 53      | 8   | 92      | 7                                | 108     | 3                                  | 17      | 2  | 8       | 20                        |
| 2. Crabgrass-----             | 52  | 24            | 101      | 8       | 7   | 60      | 7                                | 88      | 4                                  | 34      | 2  | 3       | 20                        |
| 3. Lambsquarters-----         | 51  | 41            | 14       | 55      | 7   | 55      | 7                                | 88      | 3                                  | 15      | 2  | 3       | 19                        |
| 4. Quackgrass-----            | 57  | 49            | 7        | 29      | 6   | 35      | 7                                | 53      | 5                                  | 39      | 2  | 15      | 20                        |
| 5. Nutsedge-----              | 30  | 8             | 46       | 25      | 6   | 39      | 7                                | 59      | 2                                  | 9       | 2  | 2       | 17                        |
| 6. Johnsongrass-----          | 5   | 21            | 61       | 19      | 7   | 63      | 7                                | 21      | 3                                  | 11      | 1  | 11      | 18                        |
| 7. Foxtail-----               | 22  | 47            | 12       | 21      | 6   | 38      | 7                                | 43      | 5                                  | 18      | 2  | 3       | 20                        |
| 8. Thistle, Canada-----       | 12  | 49            | --       | 31      | 6   | 22      | 7                                | 21      | 3                                  | 30      | 4  | 19      | 20                        |
| 9. Ragweed-----               | 27  | 27            | 35       | 2       | 6   | 19      | 7                                | 32      | 4                                  | 30      | 3  | 10      | 20                        |
| 10. Barnyardgrass-----        | 15  | 12            | 7        | 49      | 7   | 35      | 7                                | 40      | 3                                  | 7       | 1  | 1       | 18                        |
| 11. Morningglory-----         | 6   | 7             | 52       | 11      | 7   | 51      | 7                                | 21      | 2                                  | 2       | 1  | 2       | 17                        |
| 12. Mustard, wild-----        | 18  | 19            | 12       | 16      | 6   | 37      | 5                                | 13      | 5                                  | 13      | 2  | 2       | 18                        |
| 13. Bermudagrass-----         | 1   | --            | 27       | 12      | 5   | 7       | 7                                | 22      | 4                                  | 7       | 1  | 3       | 17                        |
| 14. Foxtail, giant-----       | 5   | 32            | 2        | --      | 6   | 19      | 7                                | 12      | 3                                  | 5       | 2  | 3       | 18                        |
| 15. Garlic, wild-----         | 7   | 6             | 20       | 2       | 2   | 19      | 2                                | 3       | 5                                  | 12      | 1  | 1       | 10                        |
| 16. Sandbur-----              | --  | 4             | 19       | 11      | 6   | 13      | 4                                | 6       | 4                                  | 13      | 1  | 2       | 15                        |
| 17. Smartweed-----            | 8   | 17            | 7        | 1       | 5   | 8       | 6                                | 15      | 2                                  | 9       | 1  | 1       | 14                        |
| 18. Dock-----                 | 1   | 3             | 24       | 4       | 2   | 7       | 3                                | 3       | 5                                  | 20      | 1  | 2       | 11                        |
| 19. Oats, wild-----           | --  | 6             | --       | 24      | 4   | 19      | 3                                | 8       | 2                                  | 2       | 1  | 1       | 10                        |
| 20. Dock, curly-----          | 5   | 6             | 10       | 8       | 3   | 8       | 2                                | 4       | 3                                  | 16      | 1  | 1       | 9                         |
| 21. Horsenettle-----          | 10  | 4             | 13       | --      | 4   | 5       | 3                                | 6       | 4                                  | 15      | 1  | 1       | 12                        |
| 22. Bromegrasses, weed-----   | 1   | 11            | 4        | 14      | 1   | 2       | 2                                | 2       | 3                                  | 8       | 4  | 15      | 10                        |
| 23. Bindweed, field-----      | --  | 9             | 4        | 12      | 3   | 13      | 2                                | 6       | 1                                  | 1       | 2  | 5       | 8                         |
| 24. Kochia-----               | --  | 8             | --       | 16      | 5   | 13      | 3                                | 3       | 2                                  | 3       | 2  | 5       | 12                        |
| 25. Foxtail, green-----       | --  | 16            | --       | 7       | 6   | 11      | 5                                | 8       | 2                                  | 2       | 2  | 2       | 15                        |
| 26. Grasses, annual-----      | 11  | 4             | 2        | 2       | 1   | 1       | 4                                | 13      | 3                                  | 3       | 1  | 2       | 9                         |
| 27. Sunflower-----            | --  | 8             | 1        | 9       | 4   | 10      | 2                                | 2       | 3                                  | 5       | 1  | 1       | 10                        |
| 28. Thistle, Russian-----     | --  | 1             | 2        | 11      | 4   | 6       | 1                                | 1       | 1                                  | 1       | 3  | 6       | 9                         |
| 29. Milkweed-----             | 5   | 4             | --       | 1       | 1   | 1       | 1                                | 2       | 2                                  | 6       | 1  | 1       | 5                         |
| 30. Buttonweed-----           | 8   | 6             | --       | 2       | 2   | 2       | 3                                | 3       | 1                                  | 1       | 2  | 2       | 8                         |
| 31. Puncturevine-----         | --  | --            | 1        | 7       | 2   | 2       | 2                                | 2       | 2                                  | 2       | 1  | 2       | 7                         |
| 32. Cheat-----                | 6   | 2             | 4        | --      | 2   | 2       | 1                                | 1       | 2                                  | 2       | 1  | 1       | 6                         |
| 33. Sedges <sup>6</sup> ----- | 6   | --            | 1        | 5       | 1   | 1       | --                               | --      | 2                                  | 2       | 1  | 2       | 5                         |
| 34. Cinquefoil-----           | 5   | 4             | --       | --      | 1   | 1       | 1                                | 1       | 1                                  | 2       | 1  | 1       | 4                         |

<sup>1</sup> Aquatic Areas, a fifth group of crops, commodities, or types of land usage, is not shown here. Of the 34 weeds, only one (sedges) was reported in Aquatic Areas.  
<sup>2</sup> Includes 9 crop or commodity areas: corn, cotton, soybeans, small grains, rice, peanuts, sugarbeets, sorghum, and forage seed crops.  
<sup>3</sup> Includes 5 crop or commodity areas: sweet corn, root crops, cucurbits, vegetable legumes, solanaceous crops, fruits and nuts, and ornamentals.  
<sup>4</sup> Includes 5 crop or land use areas: lawns, hay, annual pastures, perennial improved pastures, and perennial unimproved pastures.  
<sup>5</sup> Includes 6 land use areas: mountain rangeland, foothills (prairie), arid rangeland, rainbelt rangeland, forest plantings, and noncropland.  
<sup>6</sup> Figures for Total reports for U.S., Southern Region, and Total areas in all groups include 1 report of sedges as a problem in a single land use area, Aquatics (see footnote 1).

# AGRONOMIC CROPS

## (See General Limitations)

The 1965 survey included nine agronomic crops--corn, cotton, soybeans, small grains, rice, peanuts, sugarbeets, sorghum, and forage seed crops. The survey did not include sugarcane or tobacco.

In 1965, producers of agronomic crops treated more than 33 million acres with herbicides before the crop emerged. The 1965 acreage treated preemergence is 257 percent of that treated in 1962. The acreage treated with herbicides after the crop emerged also increased from 1962 to 1965, but the rate of increase was less than that for preemergence treatments. In 1965, slightly more than 69 million acres were treated with herbicides after the crop emerged. This is 156 percent of the acreage treated postemergence in 1962.

The total cost of herbicides and their application also rose from 1962 to 1965. This increase in cost exceeded that accounted for by the increase in the number of acres treated. Costs of herbicides and their application for preemergence treatments rose 343 percent from approximately \$53 million in 1962 to more than \$182 million in 1965. Expenditures for postemergence herbicides and their application rose 195 percent, from approximately \$80 million in 1962 to almost \$157 million in 1965.

In 1962, the ratio of acres treated postemergence for each acre treated preemergence was 3.42. In 1965, this ratio had dropped to 2.07. In 1962, \$1.51 was spent for postemergence treatments for each dollar spent for preemergence treatments. In 1965, only \$0.86 was spent for postemergence treatments for each dollar spent for preemergence treatments, despite the fact that twice as many acres were treated postemergence as preemergence.

One part of the discussion that follows, points out important weeds for which infestations appear to be decreasing in a significant portion of the affected crop acreage. Although reports of such decreases indicate that progress is being made toward the solution of problems caused by these weeds, the infestations of these same weeds may be

increasing in other States. Also, other weeds may be increasing or may be stationary at high levels of infestation in all regions. Another factor in interpreting these trends is that herbicides that are highly effective in crops grown in one geographical area may be ineffective or unsuitable for similar use in another.

In some instances, reports indicate that a particular weed infests 100 percent of a crop production area and that the trend of infestation is either up or down. This indicates that the intensity of the infestation is either increasing or decreasing and that the entire acreage of the particular crop is infested. In situations involving less than 100 percent infestations, a downward trend could mean that the intensity on infested acres is decreasing, that the actual percentage of fields infested is decreasing, or that both types of decreases are occurring simultaneously.

Tables 1 to 5 present national aspects of the extent, cost, effectiveness, usage trends, and persistence problems associated with herbicides used in individual crops. Odd-numbered tables 7 to 23 present similar data on a State and regional basis. Even-numbered tables 8 through 24 provide information by States and regions on the five most important weeds within each of the nine agronomic crops. Each crop is discussed separately.

## Corn

In 1965, corn producers treated 24 percent of the harvested corn acreage with herbicides before the crop emerged, and 44 percent after emergence. They treated almost 16 million acres preemergence at an average cost of \$5.50 per acre, and treated slightly more than 29 million acres postemergence at an average cost of \$1.95 per acre. Farmers treated 80 percent of the treated acres with their own equipment, and custom operators treated the remaining 20 percent. (Tables 1 to 5, 7, and 8.)

TABLE 1.--Continued. Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and Geographic Divisions, 1965

| State and region    | Acres treated |                | Average cost per acre <sup>1</sup> |                | Acreage treated by-- |                  | Effectiveness of herbicides  |                    | Herbicides usage trend <sup>2</sup> | Need for better herbicides      | Persistence problem |
|---------------------|---------------|----------------|------------------------------------|----------------|----------------------|------------------|------------------------------|--------------------|-------------------------------------|---------------------------------|---------------------|
|                     | Pre-emergence | Post-emergence | Pre-emergence                      | Post-emergence | Farmers              | Custom operators | Pre-emergence                | Post-emergence     |                                     |                                 |                     |
|                     | 1,000 acres   | 1,000 acres    | Dollars                            | Dollars        | Percent              | Percent          |                              |                    |                                     |                                 |                     |
| Connecticut-----    | 25            | 8              | 7.00                               | 6.00           | 50                   | 50               | Good                         | Good               | Up                                  | Urgent                          | No                  |
| Delaware-----       | 70            | 50             | 3.00                               | 2.50           | 90                   | 50               | Good                         | Good               | Up                                  | Some                            | Yes                 |
| Illinois-----       | 12            | 1              | 3.50                               | 2.50           | 70                   | 30               | Good                         | Good               | Up                                  | Some                            | No                  |
| Indiana-----        | 23            | 300            | 7.00                               | 2.00           | 65                   | 15               | Good                         | Good               | Up                                  | Some                            | No                  |
| Iowa-----           | 15            | 0              | 8.00                               | 8.50           | 23                   | 75               | Fair                         | Fair               | Up                                  | Urgent                          | Yes                 |
| Mississippi-----    | 3             | 16             | 4.50                               | 2.00           | 88                   | 0                | Good                         | Good               | Up                                  | Little                          | No                  |
| New Hampshire-----  | 20            | 100            | 13.00                              | 7.00           | 70                   | 30               | Good                         | Fair               | Up                                  | Some                            | No                  |
| New Jersey-----     | 400           | 550            | 5.50                               | 6.50           | 80                   | 20               | Fair                         | Fair               | Up                                  | Some                            | No                  |
| New York-----       | 400           | 550            | 8.00                               | 6.00           | 90                   | 10               | Fair                         | Fair               | Up                                  | Some                            | No                  |
| Rhode Island-----   | 4             | 1              | 7.50                               | 7.50           | 75                   | 25               | Good                         | Good               | Up                                  | Some                            | No                  |
| Vermont-----        | 12            | 5              | 6.00                               | 3.00           | 95                   | 5                | Good                         | Good               | Up                                  | Some                            | Yes                 |
| West Virginia-----  | 1,202         | 1,060          | 7.50                               | 5.00           | 77                   | 23               | 9-Good<br>3-Fair             | 8-Good<br>4-Fair   | 12-Up                               | 2-Urgent<br>9-Some<br>1-Little  | 4-Yes<br>8-No       |
| Northeastern-----   | 3,400         | 3,900          | 4.00                               | 1.25           | 95                   | 5                | Fair                         | Good               | Up                                  | Some                            | Yes                 |
| Illinois-----       | 960           | 2,400          | 4.00                               | 1.60           | 100                  | --               | Fair                         | Fair               | Up                                  | Some                            | Yes                 |
| Indiana-----        | 3,000         | 6,000          | 3.00                               | 3.00           | 90                   | 10               | Fair                         | Fair               | Up                                  | Some                            | No                  |
| Iowa-----           | 100           | 500            | 7.50                               | 1.85           | 70                   | 30               | Fair                         | Fair               | Up                                  | Some                            | Yes                 |
| Kansas-----         | 250           | 1,000          | 7.00                               | 2.50           | 80                   | 20               | Good                         | Good               | Sta.                                | Little                          | Yes                 |
| Michigan-----       | 1,100         | 3,500          | 4.50                               | 2.00           | 75                   | 25               | Good                         | Good               | Up                                  | Little                          | Yes                 |
| Minnesota-----      | 1,000         | 600            | 5.00                               | 1.50           | 63                   | 37               | Fair                         | Good               | Up                                  | Some                            | Yes                 |
| Missouri-----       | 1,500         | 3,500          | 3.50                               | 4.00           | 65                   | 35               | Good                         | Good               | Up                                  | Some                            | Yes                 |
| Nebraska-----       | 22            | 54             | 4.50                               | 1.50           | 99                   | 1                | Fair                         | Good               | Up                                  | Some                            | Yes                 |
| North Dakota-----   | 820           | 1,115          | 3.80                               | 1.55           | 80                   | 20               | Good                         | Good               | Up                                  | Some                            | No                  |
| South Dakota-----   | 700           | 2,500          | 4.00                               | 1.50           | 40                   | 60               | Good                         | Good               | Up                                  | Some                            | Yes                 |
| Wisconsin-----      | 525           | 785            | 7.20                               | 3.60           | 70                   | 30               | Good                         | Fair               | Up                                  | Some                            | Yes                 |
| North Central-----  | 13,377        | 25,854         | 5.32                               | 1.78           | 80                   | 20               | 6-Good<br>6-Fair             | 8-Good<br>4-Fair   | 11-Up<br>1-Sta.                     | 10-Some<br>2-Little             | 10-Yes<br>2-No      |
| Alabama-----        | 81            | 58             | 4.00                               | 2.00           | 90                   | 10               | Good                         | Fair               | Up                                  | Urgent                          | No                  |
| Arkansas-----       | 15            | 18             | 4.00                               | 2.75           | 99                   | 1                | Good                         | Good               | Up                                  | Some                            | Yes                 |
| Florida-----        | 20            | 40             | 4.50                               | 3.00           | 50                   | 50               | Poor                         | Fair               | Up                                  | Urgent                          | No                  |
| Georgia-----        | 82            | 84             | 9.00                               | 3.00           | 90                   | 10               | Good                         | Good               | Up                                  | Some                            | No                  |
| Kentucky-----       | 110           | 170            | 4.70                               | 2.00           | 92                   | 8                | Good                         | Good               | Up                                  | Some                            | No                  |
| Louisiana-----      | 36            | 72             | 3.25                               | 1.00           | 90                   | 10               | Fair                         | Fair               | Up                                  | Some                            | No                  |
| Mississippi-----    | 100           | 325            | 3.00                               | 4.00           | 85                   | 15               | Good                         | Good               | Up                                  | Some                            | No                  |
| North Carolina----- | 315           | 636            | 6.00                               | 2.00           | 90                   | 10               | Good                         | Good               | Up                                  | Little                          | No                  |
| Alabama-----        | 10            | 1              | 2.50                               | 1.50           | 100                  | --               | Fair                         | Good               | Up                                  | Some                            | No                  |
| Georgia-----        | 79            | 125            | 7.50                               | 3.00           | 75                   | 25               | Good                         | Good               | Up                                  | Little                          | No                  |
| Tennessee-----      | 170           | 80             | 3.50                               | 1.50           | 60                   | 40               | Good                         | Good               | Up                                  | Some                            | Yes                 |
| Texas-----          | 13            | 15             | 2.00                               | 2.00           | 60                   | 40               | Fair                         | Fair               | Up                                  | Urgent                          | Yes                 |
| Virginia-----       | 218           | 163            | 3.25                               | 3.20           | 70                   | 30               | Fair                         | Good               | Up                                  | Some                            | No                  |
| Southern-----       | 1,407         | 1,787          | 3.43                               | 2.51           | 82                   | 18               | 8-Good<br>4-Fair<br>1-Poor   | 10-Good<br>3-Fair  | 11-Up<br>2-Sta.                     | 3-Urgent<br>8-Some<br>2-Little  | 4-Yes<br>9-No       |
| Arizona-----        | 1             | 1              | 5.00                               | 3.00           | 75                   | 25               | Good                         | Good               | Sta.                                | Little                          | Yes                 |
| California-----     | 10            | 75             | 7.00                               | 3.50           | 60                   | 40               | Fair                         | Good               | Up                                  | Urgent                          | Yes                 |
| Colorado-----       | 20            | 175            | 3.00                               | 1.50           | 90                   | 10               | Good                         | Fair               | Up                                  | Some                            | Yes                 |
| Idaho-----          | 5             | 50             | 6.30                               | 3.00           | 60                   | 40               | Good                         | Good               | Up                                  | Some                            | Yes                 |
| Montana-----        | 2             | 11             | 3.00                               | 1.25           | 95                   | --               | Good                         | Good               | Up                                  | Urgent                          | Yes                 |
| New Mexico-----     | 2             | 9              | 5.00                               | 1.75           | 100                  | --               | Good                         | Fair               | Up                                  | Urgent                          | Yes                 |
| Utah-----           | 5             | 20             | 7.00                               | 3.00           | 90                   | 10               | Good                         | Good               | Up                                  | Little                          | Yes                 |
| Washington-----     | 15            | 16             | 8.00                               | 2.50           | 80                   | 20               | Fair                         | Fair               | Up                                  | Urgent                          | Yes                 |
| Wyoming-----        | 20            | 5              | 5.00                               | 2.00           | 90                   | 10               | Good                         | Fair               | Up                                  | Some                            | Yes                 |
| Western-----        | 2             | 35             | 7.06                               | 2.50           | 50                   | 50               | Good                         | Fair               | Up                                  | Some                            | Yes                 |
| Western-----        | 3             | 1.1            | 20.00                              | 25.00          | 100                  | --               | Good                         | Good               | Up                                  | Some                            | No                  |
| Western-----        | 67.8          | 397.1          | 5.04                               | 2.28           | 78                   | 22               | 9-Good<br>2-Fair             | 6-Good<br>5-Fair   | 9-Up<br>2-Sta.                      | 3-Urgent<br>6-Some<br>2-Little  | 9-Yes<br>2-No       |
| United States-----  | 15,913.8      | 29,098.1       | 5.50                               | 1.95           | 80                   | 20               | 32-Good<br>15-Fair<br>1-Poor | 32-Good<br>16-Fair | 43-Up<br>5-Sta.                     | 3-Urgent<br>33-Some<br>7-Little | 27-Yes<br>21-No     |

1. Includes herbicide, application equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.

2. Sta., stationary.

Table 8.---Corn: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State  | Weed                | Infestation |           | Weed                  | Infestation |           | Weed                   | Infestation |           | Weed                | Infestation |           |
|-------------------|---------------------|-------------|-----------|-----------------------|-------------|-----------|------------------------|-------------|-----------|---------------------|-------------|-----------|
|                   |                     | Acres       | Trend (1) |                       | Acres       | Trend (1) |                        | Acres       | Trend (1) |                     | Acres       | Trend (1) |
| Northeastern:     |                     |             |           |                       |             |           |                        |             |           |                     |             |           |
| Connecticut---    | Barnyardgrass---    | Pct.        | Up        | Crabgrass---          | Pct.        | Up        | Nutsedge---            | Pct.        | Up        | Panicum---          | Pct.        | Up        |
| Delaware---       | Crabgrass---        | 15          | Up        | Foxtail---            | 30          | Up        | Johnsongrass---        | 5           | Up        | Pigweed---          | 15          | Up        |
| Maine---          | Barnyardgrass---    | 70          | Up        | Crabgrass---          | 50          | Sta.      | Lambquarters---        | 30          | Down      | Crabgrass---        | 60          | Sta.      |
| Maryland---       | Canada thistle---   | 60          | Sta.      | Curly dock---         | 40          | Up        | Johnsongrass---        | 35          | Up        | Panicum---          | 40          | Up        |
| Massachusetts---  | Crabgrass---        | 25          | Up        | Lambquarters---       | 80          | Sta.      | Nutsedge---            | 20          | Up        | Crabgrass---        | 25          | Sta.      |
| New Hampshire---  | Crabgrass---        | 60          | Sta.      | Lambquarters---       | 60          | Sta.      | Lambquarters---        | 15          | Up        | Pigweed---          | 60          | Sta.      |
| New Jersey---     | Crabgrass---        | --          | Up        | Giant foxtail---      | --          | Up        | Lambquarters---        | --          | Sta.      | Pigweed---          | --          | Sta.      |
| New York---       | Crabgrass---        | 50          | Up        | Horsenettle---        | 30          | Up        | Lambquarters---        | 70          | Sta.      | Nutsedge---         | 40          | Up        |
| Pennsylvania---   | Common milkweed---  | 4           | Up        | Giant foxtail---      | 20          | Up        | Horsenettle---         | 5           | Up        | Nutsedge---         | 25          | Up        |
| Rhode Island---   | Crabgrass---        | 60          | Up        | Foxtail---            | 60          | Up        | Nutsedge---            | 20          | Up        | Crabgrass---        | 60          | Sta.      |
| Vermont---        | Crabgrass---        | 25          | Up        | Lambquarters---       | 25          | Down      | Nutsedge---            | 20          | Up        | Pigweed---          | 30          | Down      |
| West Virginia---  | Foxtail---          | 10          | Up        | Johnsongrass---       | 5           | Up        | Nutsedge---            | 10          | Up        | Crabgrass---        | 10          | Up        |
| North Central:    |                     |             |           |                       |             |           |                        |             |           |                     |             |           |
| Illinois---       | Canada thistle---   | 15          | Down      | Giant foxtail---      | 70          | Up        | Johnsongrass---        | 20          | Sta.      | Velvetleaf---       | 30          | Down      |
| Indiana---        | Canada thistle---   | 1           | Down      | Johnsongrass---       | 4           | Up        | Crabgrass---           | 2           | Sta.      | Wild cane---        | 1           | Sta.      |
| Iowa---           | Buttweed---         | 70          | Sta.      | Fall panicum---       | 50          | Up        | Giant foxtail---       | 50          | Up        | Swamp smartweed---  | 5           | Sta.      |
| Kansas---         | Crabgrass---        | 60          | Sta.      | Giant foxtail---      | 60          | Up        | Johnsongrass---        | 20          | Up        | Pigweed---          | 75          | Sta.      |
| Michigan---       | Barnyardgrass---    | 60          | Up        | Fall panicum---       | 60          | Up        | Foxtail---             | 95          | Sta.      | Nutsedge---         | 15          | Up        |
| Minnesota---      | Canada thistle---   | 60          | ---       | Foxtail---            | 100         | Up        | Lambquarters---        | 95          | Sta.      | Pigweed---          | 95          | Sta.      |
| Missouri---       | Cocklebur---        | 65          | Sta.      | Crabgrass---          | 65          | Up        | Giant foxtail---       | 95          | Up        | Johnsongrass---     | 15          | Up        |
| Nebraska---       | Crabgrass---        | 65          | Up        | Foxtail---            | 95          | Sta.      | Pigweed---             | 95          | Sta.      | Velvetleaf---       | 30          | Sta.      |
| North Dakota---   | Green foxtail---    | 100         | Sta.      | Kochia---             | 40          | Up        | Redroot pigweed---     | 40          | Sta.      | Wild mustard---     | 90          | Sta.      |
| Ohio---           | Canada thistle---   | 15          | Sta.      | Foxtail---            | 40          | Up        | Johnsongrass---        | 5           | Up        | Nutsedge---         | 10          | Up        |
| South Dakota---   | Canada thistle---   | 2           | Up        | Cocklebur---          | 50          | Sta.      | Foxtail---             | 100         | Sta.      | Crabgrass---        | 5           | Sta.      |
| Wisconsin---      | Foxtail---          | 100         | Up        | Lambquarters---       | 100         | Sta.      | Pigweed---             | 100         | Sta.      | Crabgrass---        | 60          | Down      |
| Southern:         |                     |             |           |                       |             |           |                        |             |           |                     |             |           |
| Alabama---        | Cocklebur---        | 50          | Up        | Crabgrass---          | 100         | Sta.      | Johnsongrass---        | 40          | Up        | Morningglory---     | 75          | Sta.      |
| Arkansas---       | Cocklebur---        | 10          | Sta.      | Crabgrass---          | 70          | Up        | Johnsongrass---        | 25          | Sta.      | Morningglory---     | 20          | Up        |
| Florida---        | Crabgrass---        | 100         | Sta.      | Crotalaria---         | 10          | Down      | Florida purslane---    | 100         | Sta.      | Sicklepod---        | 20          | Sta.      |
| Georgia---        | Cocklebur---        | 50          | Up        | Johnsongrass---       | 40          | Up        | Nutsedge---            | 50          | Up        | Sandbar---          | 20          | Up        |
| Kentucky---       | Barnyardgrass---    | 15          | Up        | Crabgrass---          | 60          | Sta.      | Giant foxtail---       | 40          | Sta.      | Johnsongrass---     | 30          | Up        |
| Louisiana---      | Cocklebur---        | 70          | Down      | Crabgrass---          | 80          | Sta.      | Johnsongrass---        | 60          | Up        | Morningglory---     | 50          | Sta.      |
| Mississippi---    | Cocklebur---        | 70          | Up        | Crabgrass---          | 40          | Sta.      | Hemp sesbania---       | 30          | Up        | Morningglory---     | 60          | Sta.      |
| North Carolina--- | Cocklebur---        | 40          | Sta.      | Crabgrass---          | 95          | Down      | Lambquarters---        | 90          | Down      | Nutsedge---         | 50          | Up        |
| Oklahoma---       | Crabgrass---        | 100         | Up        | Johnsongrass---       | 90          | Up        | Lambquarters---        | 90          | Up        | Pigweed---          | 100         | Up        |
| South Carolina--- | Bermudagrass---     | 20          | Up        | Cocklebur---          | 60          | Up        | Johnsongrass---        | 20          | Sta.      | Nutsedge---         | 15          | Up        |
| Tennessee---      | Cocklebur---        | 15          | Up        | Crabgrass---          | 95          | Down      | Johnsongrass---        | 20          | Up        | Morningglory---     | 25          | Sta.      |
| Texas---          | Browntop panicum--- | 40          | Sta.      | Crabgrass---          | 80          | Up        | Johnsongrass---        | 80          | Up        | Pigweed---          | 80          | Up        |
| Virginia---       | Crabgrass---        | 65          | Sta.      | Fall panicum---       | 5           | Up        | Johnsongrass---        | 5           | Up        | Morningglory---     | 15          | Sta.      |
| Western:          |                     |             |           |                       |             |           |                        |             |           |                     |             |           |
| Arizona---        | Pigweed---          | 50          | Sta.      | Watergrass complex--- | 30          | Sta.      | Wild cane---           | 30          | Sta.      | ---                 | --          | ---       |
| California---     | Barnyardgrass---    | 70          | Sta.      | Crabgrass---          | 40          | Up        | Jimsonweed---          | 25          | Sta.      | Pigweed---          | 70          | Sta.      |
| Colorado---       | Field bindweed---   | 40          | Up        | Foxtail---            | 85          | Sta.      | Kochia---              | 75          | Sta.      | Redroot pigweed---  | 70          | Up        |
| Idaho---          | Barnyardgrass---    | 30          | Sta.      | Puncturevine---       | 30          | Up        | Sandbar---             | 50          | Up        | ---                 | --          | ---       |
| Montana---        | Canada thistle---   | 25          | Up        | Kochia---             | 50          | Sta.      | Lambquarters---        | 50          | Sta.      | Pigweed---          | 50          | Sta.      |
| Nevada---         | Barnyardgrass---    | 75          | Sta.      | Hairy white top---    | 10          | Down      | Pigweed---             | 75          | Sta.      | Russian knapweed--- | 10          | Up        |
| New Mexico---     | Bindweed---         | 10          | Sta.      | Johnsongrass---       | 15          | Down      | Lambquarters---        | 80          | Down      | Pigweed---          | 15          | Down      |
| Oregon---         | Barnyardgrass---    | 75          | Down      | Lambquarters---       | 15          | Down      | Pigweed---             | 75          | Down      | Crabgrass---        | 15          | Down      |
| Utah---           | Barnyardgrass---    | 50          | Up        | Green foxtail---      | 50          | Up        | Morningglory---        | 25          | Down      | Crabgrass---        | 20          | Up        |
| Washington---     | Barnyardgrass---    | 50          | Up        | Lambquarters---       | 75          | Up        | Pigweed---             | 75          | Up        | Crabgrass---        | 40          | Sta.      |
| Wyoming---        | Green foxtail---    | 90          | Sta.      | Redroot pigweed---    | 90          | Sta.      | Sunflower---           | 50          | Sta.      | Switchgrass---      | 70          | Up        |
| Hawaii---         | Bermudagrass---     | 15          | Up        | Bristly foxtail---    | 25          | Up        | Feather fingergrass--- | 15          | Up        | Spiny amaranth---   | 15          | Up        |

<sup>1</sup>Sta., stationary

Reports on the effectiveness of herbicides indicate that treatments in 1965 were approximately equal to those used in 1962. Eight States reported an urgent need for better herbicides, 33 reported some need and seven reported little need for better herbicides. Problems of herbicides persisting in the soil in 1965 appear to be about the same as in 1962. In 1965, 27 States reported problems of herbicide persistence, whereas 21 States reported no major problems with persistence. The herbicide-usage trend was up in 43 States, stationary in five, and down in none.

Weeds listed as being one of the five most important in at least four States were barnyardgrass, wild cane, cocklebur, crabgrass, foxtails, johnsongrass, lambsquarters, morningglory, nutsedges, pigweeds, sandbur, Canada thistle, and velvetleaf. Of these nationally or regionally important weeds, those for which the infestation was reported to be decreasing in at least two States were lambsquarters, pigweeds, quackgrass, and Canada thistle.

### Cotton

In 1965, cotton producers treated approximately 49 percent of the harvested cotton acreage with herbicides before the crop emerged, and 43 percent after emergence. Although the use of preemergence treatments more than doubled from 1962 to 1965, the percentage of cotton treated postemergence increased even more. Cotton producers treated more than 6.6 million acres pre-emergence at an average cost of \$5.05 per acre, and treated about 5.9 million acres postemergence at an average cost of \$4.48 per acre. Farmers applied the herbicides on 90 percent of the treated acres with their own equipment, and custom operators treated 10 percent. (Tables 1 to 5, 9, and 10.)

Reports on the effectiveness of herbicides indicate that treatments in 1965 were more effective than those used in 1962. Two States reported an urgent need for better herbicides, 13 reported some need, and only two reported little need. Problems of herbicides persisting in the soil appear to be about the same as in 1962. Eight States reported problems with herbicides persisting in the soil while nine reported no significant problems with per-

sistence. The usage trend was up in 16 States, stationary in one, and down in none.

Weeds listed as being one of the five most important in at least four States were barnyardgrass, cocklebur, crabgrass, johnsongrass, morningglory, nutsedges, and pigweeds. Of these nationally or regionally important weeds, those for which the infestation was reported to be declining in at least two States were crabgrass, johnsongrass, morningglory, and pigweeds.

### Soybeans

In 1965, soybean producers treated almost 20 percent of the harvested acreage with herbicides before the crop emerged, but treated less than 3 percent after emergence. They treated slightly more than 6.8 million acres preemergence at an average cost of \$4.84 per acre, and treated slightly over 1.0 million acres postemergence at an average cost of \$2.23 per acre. Farmers applied the treatments on 93 percent of the treated acreage with their own equipment, and custom operators treated only 7 percent. (Tables 1 to 5, 11, and 12.)

Reports on the effectiveness of herbicides indicate that treatments in 1965 were only slightly more effective than those used in 1962. Sixteen States reported an urgent need for better herbicides, 12 reported some need, and only one State reported little need. Problems of herbicides persisting in the soil appear to be about the same as in 1962. Three States reported problems with herbicide persistence, and 26 reported no significant problems with persistence. The usage trend for herbicides was up in 29 States and stationary or down in none.

Weeds listed as being one of the five most important in at least four States were cocklebur, crabgrass, foxtails, johnsongrass, lambsquarters, morningglory, nutsedges, pigweeds, velvetleaf, jimsonweed, ragweed, and red sorrel. There were no reports that infestations of any of these nationally or regionally important weeds were declining. This may be related to the small number of acres treated postemergence. The large number of important weeds infesting soybeans is undoubtedly related to the fact that soybeans are grown in States from the extreme southern border to the northern border of the United States.

Table 9.--Cotton: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region    | Acres treated |              | Average cost per acre <sup>1</sup> |              | Acres treated by-- |                  | Effectiveness of herbicides |                  | Herbicides usage trend <sup>2</sup> | Need for better herbicides      | Persistence problem |
|---------------------|---------------|--------------|------------------------------------|--------------|--------------------|------------------|-----------------------------|------------------|-------------------------------------|---------------------------------|---------------------|
|                     | Postemergence | Preemergence | Postemergence                      | Preemergence | Farmers            | Custom operators | Preemergence                | Postemergence    |                                     |                                 |                     |
|                     | 1,000 acres   | 1,000 acres  | Dollars                            | Dollars      | Percent            | Percent          | Good                        | Good             | Up                                  | Some                            | No                  |
| Missouri-----       | 150           | 100          | 5.00                               | 2.00         | 80                 | 20               | Good                        | Good             | 1-Up                                | 1-Some                          | 1-No                |
| North Central-----  | 150           | 100          | 5.00                               | 2.00         | 80                 | 20               | 1-Good                      | 1-Good           | 1-Up                                | 1-Some                          | 1-No                |
| Alabama-----        | 525           | 200          | 6.00                               | 3.50         | 95                 | 5                | Good                        | Good             | Up                                  | Some                            | No                  |
| Arkansas-----       | 1,050         | 1,000        | 3.50                               | 10.00        | 99                 | 1                | Good                        | Good             | Up                                  | Some                            | Yes                 |
| Florida-----        | 1,000         | 1,000        | 6.00                               | 3.00         | 50                 | 50               | Good                        | Good             | Up                                  | Some                            | No                  |
| Georgia-----        | 403           | 100          | 8.00                               | 3.00         | 70                 | 30               | Good                        | Good             | Up                                  | Some                            | No                  |
| Kentucky-----       | 1,000         | 466          | 5.00                               | 2.10         | 88                 | 12               | Good                        | Good             | Up                                  | Little                          | No                  |
| Louisiana-----      | 420           | 446          | 3.50                               | 1.50         | 98                 | 2                | Good                        | Good             | Up                                  | Little                          | No                  |
| Mississippi-----    | 1,250         | 1,000        | 4.00                               | 5.00         | 90                 | 10               | Good                        | Good             | Up                                  | Some                            | Yes                 |
| North Carolina----- | 240           | 25           | 6.50                               | 1.75         | 95                 | 5                | Fair                        | Fair             | Up                                  | Some                            | No                  |
| Oklahoma-----       | 100           | 20           | 7.00                               | 1.50         | 75                 | 25               | Good                        | Good             | Up                                  | Little                          | Yes                 |
| South Carolina----- | 425           | 250          | 6.50                               | 4.50         | 90                 | 10               | Fair                        | Fair             | Up                                  | Some                            | No                  |
| Tennessee-----      | 400           | 143          | 3.50                               | 4.00         | 90                 | 10               | Good                        | Good             | Up                                  | Some                            | Yes                 |
| Texas-----          | 1,250         | 2,250        | 5.00                               | 2.50         | 95                 | 5                | Good                        | Good             | Up                                  | Urgent                          | Yes                 |
| Virginia-----       | 4             | --           | 6.00                               | --           | 100                | --               | Fair                        | Fair             | Up                                  | Some                            | No                  |
| Southern-----       | 6,068.5       | 5,436        | 4.82                               | 4.43         | 92                 | 8                | 9-Good<br>4-Fair            | 5-Good<br>6-Fair | 13-Up                               | 1-Urgent<br>10-Some<br>2-Little | 5-Yes<br>8-No       |
| Arizona-----        | 75            | 200          | 6.00                               | 6.00         | 80                 | 20               | Good                        | Good             | Up                                  | Some                            | Yes                 |
| California-----     | 300           | 100          | 9.50                               | 7.50         | 60                 | 40               | Good                        | Good             | Up                                  | Some                            | Yes                 |
| New Mexico-----     | 20            | 30           | 6.00                               | 2.50         | 80                 | 20               | Good                        | Good             | Sta.                                | Urgent                          | Yes                 |
| Western-----        | 395           | 330          | 8.66                               | 6.14         | 69                 | 31               | 3-Good                      | 3-Good           | 2-Up<br>1-Sta.                      | 1-Urgent<br>2-Some              | 3-Yes               |
| United States-----  | 6,613.5       | 5,866        | 5.05                               | 4.48         | 90                 | 10               | 13-Good<br>4-Fair           | 9-Good<br>6-Fair | 16-Up<br>1-Sta.                     | 2-Urgent<br>13-Some<br>2-Little | 8-Yes<br>9-No       |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.

<sup>2</sup> Sta., stationary.

Table 10.--Cotton: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State    | Weed               | Infestation |           | Weed              | Infestation |           | Weed               | Infestation |           | Weed                  | Infestation |           | Weed                | Infestation |           |
|---------------------|--------------------|-------------|-----------|-------------------|-------------|-----------|--------------------|-------------|-----------|-----------------------|-------------|-----------|---------------------|-------------|-----------|
|                     |                    | Acres       | Trend (%) |                   | Acres       | Trend (%) |                    | Acres       | Trend (%) |                       | Acres       | Trend (%) |                     | Acres       | Trend (%) |
|                     |                    | Pct.        | Pct.      |                   | Pct.        | Pct.      |                    | Pct.        | Pct.      |                       | Pct.        | Pct.      |                     |             |           |
| North Central:      | Barnyardgrass----- | 85          | Sta.      | Cocklebur-----    | 70          | Sta.      | Johnsongrass-----  | 40          | Up        | Pigweed-----          | 70          | Sta.      | Morningglory-----   | 70          | Sta.      |
| Southern:           | Cocklebur-----     | 40          | Up        | Johnsongrass----- | 80          | Sta.      | Morningglory-----  | 40          | Up        | Nutsedge-----         | 30          | Sta.      | Stinkpod-----       | 65          | Up        |
| Alabama-----        | Cocklebur-----     | 40          | Up        | Johnsongrass----- | 20          | Down      | Morningglory-----  | 90          | Up        | Prickly sida-----     | 30          | Up        | Nutsedge-----       | 30          | Up        |
| Arkansas-----       | Barnyardgrass----- | 30          | Up        | Bermudagrass----- | 20          | Sta.      | Crabgrass-----     | 100         | Sta.      | Florida purslane----- | 100         | Sta.      | Nutsedge-----       | 5           | Up        |
| Florida-----        | Cocklebur-----     | 60          | Up        | Johnsongrass----- | 15          | Sta.      | Nutsedge-----      | 50          | Up        | Sandbur-----          | 20          | Up        | Stinkpod-----       | 5           | Sta.      |
| Georgia-----        | Crabgrass-----     | 35          | Sta.      | Foxtail-----      | 25          | Up        | Johnsongrass-----  | 45          | Up        | Pigweed-----          | 10          | Sta.      | Nutsedge-----       | --          | --        |
| Kentucky-----       | Cocklebur-----     | 30          | Up        | Crabgrass-----    | 90          | Sta.      | Johnsongrass-----  | 40          | Down      | Morningglory-----     | 75          | Up        | Nutsedge-----       | 25          | Up        |
| Louisiana-----      | Cocklebur-----     | 60          | Sta.      | Crabgrass-----    | 75          | Down      | Johnsongrass-----  | 50          | Down      | Morningglory-----     | 50          | Sta.      | Nutsedge-----       | 30          | Up        |
| Mississippi-----    | Cocklebur-----     | 75          | Sta.      | Crabgrass-----    | 20          | Sta.      | Johnsongrass-----  | 80          | Up        | Morningglory-----     | 30          | Up        | Pigweed-----        | 90          | Down      |
| North Carolina----- | Cocklebur-----     | 20          | Up        | Crabgrass-----    | 100         | Up        | Morningglory-----  | 80          | Up        | Pigweed-----          | 40          | Up        | Texas panicum-----  | 40          | Up        |
| Oklahoma-----       | Crabgrass-----     | 60          | Down      | Johnsongrass----- | 20          | Sta.      | Nutsedge-----      | 20          | Sta.      | Pigweed-----          | 40          | Up        | Trampetreeper-----  | 40          | Up        |
| South Carolina----- | Crabgrass-----     | 90          | Down      | Johnsongrass----- | 20          | Sta.      | Morningglory-----  | 25          | Sta.      | Pigweed-----          | 50          | Down      | Trampetreeper-----  | 25          | Sta.      |
| Tennessee-----      | Crabgrass-----     | 60          | Up        | Pigweed-----      | 60          | Up        | Texas panicum----- | 20          | Sta.      | Trampetreeper-----    | 10          | Sta.      | Nutsedge-----       | --          | --        |
| Texas-----          | Johnsongrass-----  | 60          | Up        | Crabgrass-----    | 60          | Sta.      | Johnsongrass-----  | 10          | Up        | Nutsedge-----         | --          | --        | Trampetreeper-----  | --          | --        |
| Virginia-----       | Bermudagrass-----  | 20          | Up        | Crabgrass-----    | 60          | Sta.      | Johnsongrass-----  | 10          | Up        | Nutsedge-----         | --          | --        | Trampetreeper-----  | --          | --        |
| Western:            | Barnyardgrass----- | 50          | Up        | Groundcherry----- | 45          | Down      | Johnsongrass-----  | 15          | Down      | Morningglory-----     | 25          | Down      | Pigweed-----        | 50          | Down      |
| Arizona-----        | Barnyardgrass----- | 80          | Down      | Crabgrass-----    | 50          | Sta.      | Johnsongrass-----  | 15          | Up        | Morningglory-----     | 15          | Up        | Nutsedge-----       | 25          | Up        |
| California-----     | Barnyardgrass----- | 100         | Sta.      | Johnsongrass----- | 10          | Up        | Lambquarters-----  | 50          | Sta.      | Pigweed-----          | 75          | Sta.      | Nutsedge-----       | 25          | Down      |
| Nevada-----         | Johnsongrass-----  | 25          | Down      | Morningglory----- | 45          | Down      | Nutsedge-----      | 45          | Down      | Pigweed-----          | 60          | Down      | Texas blueweed----- | 15          | Sta.      |

<sup>1</sup> Sta., stationary.

Table 11.--Soybeans: Estimated extent, cost and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and Geographic divisions, 1965

| State and region    | Acres treated |               | Average cost per acre <sup>1</sup> |               | Acreage treated by-- |                  | Effectiveness of herbicides |                            | Herbicides usage trend <sup>2</sup> | Need for better herbicides       | Persistence problem |
|---------------------|---------------|---------------|------------------------------------|---------------|----------------------|------------------|-----------------------------|----------------------------|-------------------------------------|----------------------------------|---------------------|
|                     | Preemergence  | Postemergence | Preemergence                       | Postemergence | Farmers              | Custom operators | Preemergence                | Postemergence              |                                     |                                  |                     |
|                     | 1,000 acres   | 1,000 acres   | Dollars                            | Dollars       | Percent              | Percent          |                             |                            |                                     |                                  |                     |
| Delaware-----       | 40            | --            | 4.00                               | --            | 85                   | 15               | ---                         | ---                        | Up                                  | Urgent                           | No                  |
| Maryland-----       | 80            | --            | 3.50                               | --            | 90                   | 10               | ---                         | ---                        | Up                                  | Some                             | No                  |
| New Jersey-----     | 28            | --            | 3.00                               | --            | 95                   | 5                | ---                         | ---                        | Up                                  | Some                             | No                  |
| New York-----       | 2             | 1             | 12.00                              | 10.00         | 70                   | 30               | Fair                        | Fair                       | Up                                  | Some                             | Yes                 |
| Pennsylvania-----   | 3             | --            | 4.50                               | --            | 100                  | --               | ---                         | ---                        | Up                                  | Urgent                           | No                  |
| Northeastern-----   | 153           | 1             | 3.67                               | 10.00         | 89                   | 11               | 1-Good<br>4-Fair            | 1-Fair                     | 5-Up                                | 2-Urgent<br>3-Some               | 1-Yes<br>4-No       |
| Illinois-----       | 1,800         | 30            | 4.50                               | 2.00          | 95                   | 5                | Fair                        | Fair                       | Up                                  | Some                             | No                  |
| Indiana-----        | 540           | --            | 5.00                               | --            | 100                  | --               | Poor                        | ---                        | Up                                  | Urgent                           | No                  |
| Iowa-----           | 1,000         | 80            | 3.00                               | 1.50          | 90                   | 10               | Good                        | Good                       | Up                                  | Some                             | No                  |
| Kansas-----         | 70            | --            | 9.00                               | --            | 80                   | 20               | Fair                        | ---                        | Up                                  | Some                             | Yes                 |
| Michigan-----       | 100           | --            | 4.00                               | --            | 85                   | 15               | Good                        | ---                        | Up                                  | Some                             | No                  |
| Minnesota-----      | 360           | 6             | 6.00                               | 2.00          | 95                   | 5                | Good                        | Poor                       | Up                                  | Little                           | No                  |
| Missouri-----       | 350           | 10            | 7.00                               | 1.00          | 83                   | 17               | Good                        | Poor                       | Up                                  | Some                             | No                  |
| Nebraska-----       | 280           | --            | 9.00                               | --            | 90                   | 10               | ---                         | ---                        | Up                                  | Urgent                           | Yes                 |
| North Dakota-----   | 20            | 5             | 5.00                               | 2.50          | 100                  | --               | Fair                        | Fair                       | Up                                  | Some                             | No                  |
| Ohio-----           | 350           | 12            | 4.50                               | 4.50          | 85                   | 15               | Fair                        | Poor                       | Up                                  | Urgent                           | No                  |
| South Dakota-----   | 30            | .5            | 6.00                               | 4.00          | 40                   | 60               | Good                        | Fair                       | Up                                  | Urgent                           | No                  |
| Wisconsin-----      | 19            | --            | 5.40                               | --            | 70                   | 30               | Fair                        | ---                        | Up                                  | Urgent                           | No                  |
| North Central-----  | 4,919         | 143.5         | 4.91                               | 1.88          | 92                   | 8                | 5-Good<br>6-Fair<br>1-Poor  | 1-Good<br>3-Fair<br>3-Poor | 12-Up                               | 5-Urgent<br>6-Some<br>1-Little   | 2-Yes<br>10-No      |
| Arkansas-----       | 515           | 315           | 3.50                               | 2.00          | 99                   | 1                | Fair                        | Good                       | Up                                  | Urgent                           | No                  |
| Florida-----        | 6             | --            | 6.00                               | --            | 100                  | --               | Fair                        | ---                        | Up                                  | Some                             | No                  |
| Georgia-----        | 17            | --            | 9.00                               | --            | 100                  | --               | Fair                        | ---                        | Up                                  | Some                             | No                  |
| Kentucky-----       | 40            | 20            | 5.00                               | 1.90          | 95                   | 5                | Fair                        | Poor                       | Up                                  | Urgent                           | No                  |
| Louisiana-----      | 46            | 150           | 5.00                               | 2.25          | 96                   | 4                | Fair                        | Fair                       | Up                                  | Urgent                           | No                  |
| Mississippi-----    | 800           | 250           | 5.50                               | 3.00          | 95                   | 5                | Fair                        | Fair                       | Up                                  | Urgent                           | No                  |
| North Carolina----- | 55            | 48            | 5.00                               | 2.00          | 95                   | 5                | Fair                        | Good                       | Up                                  | Urgent                           | No                  |
| Oklahoma-----       | 10            | --            | 5.25                               | --            | 95                   | 5                | Good                        | ---                        | Up                                  | Some                             | No                  |
| South Carolina----- | 100           | 50            | 4.25                               | 1.50          | 85                   | 15               | Poor                        | Fair                       | Up                                  | Urgent                           | No                  |
| Tennessee-----      | 86            | 32            | 4.00                               | 1.00          | 90                   | 10               | Poor                        | Poor                       | Up                                  | Urgent                           | No                  |
| Texas-----          | 12            | --            | 4.50                               | --            | 90                   | 10               | Poor                        | ---                        | Up                                  | Urgent                           | No                  |
| Virginia-----       | 55            | 8             | 4.80                               | 4.00          | 70                   | 30               | Poor                        | Good                       | Up                                  | Urgent                           | No                  |
| Southern-----       | 1,742         | 873           | 4.73                               | 2.28          | 95                   | 5                | 1-Good<br>7-Fair<br>4-Poor  | 3-Good<br>3-Fair<br>2-Poor | 12-Up                               | 9-Urgent<br>3-Some               | 12-No               |
| United States-----  | 6,814         | 1,017.5       | 4.84                               | 2.23          | 93                   | 7                | 7-Good<br>17-Fair<br>5-Poor | 4-Good<br>7-Fair<br>5-Poor | 29-Up                               | 16-Urgent<br>12-Some<br>1-Little | 3-Yes<br>26-No      |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.

<sup>2</sup> Sta., stationary.



Table 12.--Soybeans: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State | Weed           | Infestation |           | Weed             | Infestation |           | Weed             | Infestation |           | Weed         | Infestation |           |                 |    |      |
|------------------|----------------|-------------|-----------|------------------|-------------|-----------|------------------|-------------|-----------|--------------|-------------|-----------|-----------------|----|------|
|                  |                | Acres       | Trend (↑) |                  | Acres       | Trend (↑) |                  | Acres       | Trend (↑) |              | Acres       | Trend (↑) |                 |    |      |
| Northeastern:    |                |             |           |                  |             |           |                  |             |           |              |             |           |                 |    |      |
| Delaware         | Crabgrass      | 50          | Up        | Foxtail          | 30          | Up        | Jimsonweed       | 20          | Up        | Morningglory | 30          | Up        | Pigweed         | 50 | Down |
| Maryland         | Horsenettle    | 15          | Up        | Jimsonweed       | 35          | Sta.      | Johnsongrass     | 20          | Up        | Morningglory | 40          | Up        | Ragweed         | 40 | Up   |
| New Jersey       | Lambsquarters  | --          | Sta.      | Nutsedge         | --          | Sta.      | Pigweed          | --          | Sta.      | Ragweed      | --          | Up        | Velvetleaf      | -- | Up   |
| New York         | Lambsquarters  | 70          | Sta.      | Nutsedge         | 40          | Sta.      | Pigweed          | 60          | Sta.      | Quackgrass   | 80          | Sta.      | Ragweed         | 70 | Sta. |
| Pennsylvania     | Giant foxtail  | 35          | Up        | Lambsquarters    | 80          | Sta.      | Morningglory     | 6           | Up        | Pigweed      | 80          | Sta.      | Ragweed         | 30 | Sta. |
| North Central:   |                |             |           |                  |             |           |                  |             |           |              |             |           |                 |    |      |
| Illinois         | Cocklebur      | 15          | Sta.      | Giant foxtail    | 70          | Up        | Jimsonweed       | 15          | Sta.      | Morningglory | 20          | Sta.      | Red sorrel      | 25 | Up   |
| Indiana          | Canada thistle | 1           | Down      | Jimsonweed       | 10          | Up        | Johnsongrass     | 1           | Sta.      | Morningglory | 2           | Sta.      | Quackgrass      | 1  | Down |
| Iowa             | Buttonweed     | 50          | Sta.      | Cocklebur        | 20          | Sta.      | Giant foxtail    | 75          | Up        | Pigweed      | 25          | Sta.      | Ragweed         | 25 | Sta. |
| Kansas           | Foxtail        | 75          | Sta.      | Giant foxtail    | 50          | Up        | Johnsongrass     | 20          | Up        | Pigweed      | 20          | Sta.      | Wild cane       | 20 | Up   |
| Michigan         | Jimsonweed     | 30          | Up        | Nutsedge         | 30          | Up        | Quackgrass       | 60          | Sta.      | Velvetleaf   | 50          | Up        |                 | -- | --   |
| Minnesota        | Canada thistle | 60          | Sta.      | Cocklebur        | 40          | Up        | Foxtail          | 100         | Up        | Red sorrel   | 50          | Sta.      | Velvetleaf      | 25 | Up   |
| Missouri         | Cocklebur      | 65          | Sta.      | Giant foxtail    | 65          | Up        | Johnsongrass     | 20          | Up        | Morningglory | 50          | Sta.      | Pigweed         | 65 | Sta. |
| Nebraska         | Crabgrass      | 80          | Up        | Foxtail          | 90          | Up        | Pigweed          | 80          | Sta.      | Red sorrel   | 55          | Sta.      | Velvetleaf      | 40 | Up   |
| North Dakota     | Green foxtail  | 95          | Sta.      | Lambsquarters    | 60          | Sta.      | Redroot pigweed  | 75          | Sta.      | Wild mustard | 75          | Down      | Yellow foxtail  | 95 | Sta. |
| Ohio             | Canada thistle | 15          | Sta.      | Foxtail          | 60          | Sta.      | Jimsonweed       | 20          | Up        | Red sorrel   | 65          | Sta.      | Velvetleaf      | 20 | Up   |
| South Dakota     | Cocklebur      | 15          | Sta.      | Foxtail          | 18          | Sta.      | Lambsquarters    | 10          | Sta.      | Sunflower    | 20          | Sta.      | Velvetleaf      | 3  | Sta. |
| Wisconsin        | Barnyardgrass  | 80          | Up        | Foxtail          | 100         | Sta.      | Lambsquarters    | 100         | Sta.      | Pigweed      | 100         | Sta.      | Velvetleaf      | 70 | Up   |
| Southern:        |                |             |           |                  |             |           |                  |             |           |              |             |           |                 |    |      |
| Arkansas         | Barnyardgrass  | 10          | Up        | Cocklebur        | 30          | Up        | Johnsongrass     | 55          | Sta.      | Morningglory | 85          | Up        | Pigweed         | 40 | Up   |
| Florida          | Cocklebur      | 20          | Sta.      | Crabgrass        | 100         | Sta.      | Florida purslane | 100         | Sta.      | Morningglory | 10          | Up        | Sicklepod       | 20 | Sta. |
| Georgia          | Cocklebur      | 60          | Up        | Johnsongrass     | 20          | Up        | Pigweed          | 60          | Up        | Sandbur      | 20          | Sta.      | Sicklepod       | 30 | Up   |
| Kentucky         | Cocklebur      | 10          | Down      | Foxtail          | 60          | Up        | Johnsongrass     | 20          | Up        | Pigweed      | 60          | Up        | Smartweed       | 20 | Up   |
| Louisiana        | Crabgrass      | 50          | Down      | Hemp sesbania    | 30          | Sta.      | Johnsongrass     | 30          | Sta.      | Morningglory | 70          | Up        | Pigweed         | 40 | Up   |
| Mississippi      | Cocklebur      | 60          | Sta.      | Hemp sesbania    | 35          | Up        | Johnsongrass     | 70          | Up        | Morningglory | 75          | Sta.      | Pigweed         | 50 | Up   |
| North Carolina   | Cocklebur      | 90          | Up        | Morningglory     | 85          | Up        | Nutsedge         | 15          | Up        | Pigweed      | 95          | Down      | Sicklepod       | 30 | Sta. |
| Oklahoma         | Cocklebur      | 30          | Up        | Crabgrass        | 95          | Up        | Johnsongrass     | 80          | Up        | Morningglory | 25          | Up        | Pigweed         | 90 | Up   |
| South Carolina   | Cocklebur      | 60          | Up        | Florida purslane | 30          | Up        | Nutsedge         | 20          | Up        | Pigweed      | 40          | Up        | Ragweed         | 30 | Up   |
| Tennessee        | Cocklebur      | 45          | Up        | Crabgrass        | 95          | Sta.      | Johnsongrass     | 40          | Up        | Morningglory | 20          | Sta.      | Pigweed         | 40 | Up   |
| Texas            | Crabgrass      | 45          | Sta.      | Morningglory     | 10          | Sta.      | Nutsedge         | 25          | Sta.      | Pigweed      | 50          | Sta.      | Ragweed         | 30 | Sta. |
| Virginia         | Cocklebur      | 20          | Up        | Jimsonweed       | 20          | Up        | Morningglory     | 45          | Up        | Ragweed      | 25          | Sta.      | Redroot pigweed | 40 | Sta. |
| Western:         |                |             |           |                  |             |           |                  |             |           |              |             |           |                 |    |      |
| New Mexico       | Barnyardgrass  | 15          | Down      | Johnsongrass     | 15          | Sta.      | Pigweed          | 50          | Down      |              | --          | --        |                 | -- | --   |

1 Sta., stationary.

## Small Grains

In 1965, producers of small grains treated only 1.5 percent of the harvested acreage with herbicides before emergence of the crop, but treated almost 35 percent after emergence. They treated 1.2 million acres pre-emergence at an average cost of \$4.74 per acre and treated 27.5 million acres post-emergence at an average cost of \$1.73 per acre. Farmers treated 58 percent of the treated acreage with their own equipment, and custom operators treated 42 percent. (Tables 1 to 5, 13, and 14.)

Reports on the effectiveness of herbicides indicate that treatments in 1965 were less effective than those used in 1962. This may indicate that weeds resistant to postemergence applications of 2,4-D are increasing. Only six States reported an urgent need for better herbicides, 30 reported some need, and eight reported little need. Problems of herbicides persisting in the soil appear to be remaining constant at the same low level reported in 1962. Only three States reported problems involving persistence while 41 States reported no problems. The usage trend was up in 26 States, stationary in 18, and down in none.

Weeds listed as one of the five most important in at least four States were foxtails, lambsquarters, quackgrass, ragweed, red sorrel, field bindweed, downy brome, wild buckwheat, chickweed, docks, wild garlic, henbit, knawel, mustards, and wild oats. Of these nationally or regionally important weeds, those for which the infestation was reported to be declining in at least two States were lambsquarters, wild garlic, mustards, and wild oats. More problem weeds infest small grains than any other agronomic crop. Undoubtedly, this is related to the fact that small grains are grown in all geographic regions of the United States and are subject to infestation by both cold-season and warm-season weeds during a single growing season.

## Rice

In 1965, rice producers treated almost 23 percent of the harvested rice acreage with herbicides before the crop emerged, and almost 55 percent after emergence. The

percentage treated postemergence increased very little as compared with the amount treated in 1962, but there was practically no preemergence treatment of rice in 1962. Rice producers treated 405,000 acres pre-emergence at an average cost of \$10.07 per acre and they treated 985,000 acres post-emergence at an average cost of \$8.69 per acre. The continual rise in cost per acre for postemergence treatments that has occurred since 1959 is related to the development of newer herbicides that are more effective as postemergence treatments for control of grasses. Farmers treated only 8 percent of their treated acres with their own equipment, and custom operators treated 92 percent. Of all agronomic crops, rice has the highest percentage of the herbicide applications made by custom operators. This, of course, is because most of the applications are made with aerial equipment. (Tables 1 to 5, 15, and 16.)

Reports on the effectiveness of herbicides indicate that treatments in 1965 were more effective than those used in 1962. This is primarily because of the development of chemicals satisfactory for use before the crop emerges. No State reported an urgent need for better herbicides, four States reported some need, and only one reported little need. Problems of herbicides persisting in the soil appear to be about the same as in 1962. No State reported problems with persistence in 1965 and only one State reported problems in 1962. Five States reported that herbicide-usage trends were up and no State reported that usage trends were stationary or down.

Weeds listed as being one of the five most important in at least two States were barnyardgrass, ducksalad, northern jointvetch, red rice, and hemp sesbania. Of these nationally or regionally important weeds, only barnyardgrass was reported to be declining in at least two States.

## Peanuts

In 1965, peanut producers treated approximately 26 percent of the harvested acreage with herbicides before the crop emerged, and approximately 29 percent after emergence. They treated 377,000 acres preemergence at an average cost of \$8.13 per acre, and treated

Table 13.--Small grains: Estimated extent, cost and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1963<sup>1</sup>

| State and region   | Acres treated |               | Average cost per acre <sup>2</sup> |               | Percentage treated by-- |                  | Effectiveness of herbicides |                  | Herbicides usage trend <sup>3</sup>   | Need for better herbicides | Persistence problem |
|--------------------|---------------|---------------|------------------------------------|---------------|-------------------------|------------------|-----------------------------|------------------|---|----------------------------|---------------------|
|                    | Preemergence  | Postemergence | Preemergence                       | Postemergence | Farmers                 | Custom operators | Preemergence                | Postemergence    |   |                            |                     |
|                    | 1,000 acres   | 1,000 acres   | Dollars                            | Dollars       | Percent                 | Percent          |                             |                  |   |                            |                     |
| Delaware-----      | --            | 20            | --                                 | 2.00          | 100                     | --               | ----                        | Fair             | Up  | Some                       | No                  |
| Maryland-----      | --            | 25            | --                                 | 1.75          | 70                      | --               | ----                        | Fair             | Up  | Urgent                     | No                  |
| Massachusetts----- | --            | 1             | --                                 | 3.00          | 45                      | 55               | ----                        | Fair             | Up  | Some                       | No                  |
| New Jersey-----    | --            | 16            | --                                 | 1.75          | 95                      | 5                | ----                        | Good             | Up  | Some                       | No                  |
| New York-----      | --            | 400           | --                                 | 6.50          | 70                      | 30               | ----                        | Good             | Up  | Some                       | Yes                 |
| Pennsylvania-----  | --            | 375           | --                                 | 3.75          | 90                      | 10               | ----                        | Good             | Up  | Little                     | No                  |
| Rhode Island-----  | --            | .2            | --                                 | 5.00          | 90                      | 10               | ----                        | Good             | Up  | Some                       | No                  |
| Vermont-----       | --            | 2             | --                                 | 3.50          | 75                      | 25               | ----                        | Good             | Sta.  | Some                       | No                  |
| West Virginia----- | --            | 2             | --                                 | 2.00          | 100                     | --               | ----                        | Fair             | Up  | Some                       | No                  |
| Northwestern-----  | --            | 841.2         | --                                 | 4.91          | 80                      | 20               | ----                        | 5-Good<br>4-Fair | 8-Up<br>1-5-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58-59-60-61-62-63-64-65-66-67-68-69-70-71-72-73-74-75-76-77-78-79-80-81-82-83-84-85-86-87-88-89-90-91-92-93-94-95-96-97-98-99-100-101-102-103-104-105-106-107-108-109-110-111-112-113-114-115-116-117-118-119-120-121-122-123-124-125-126-127-128-129-130-131-132-133-134-135-136-137-138-139-140-141-142-143-144-145-146-147-148-149-150-151-152-153-154-155-156-157-158-159-160-161-162-163-164-165-166-167-168-169-170-171-172-173-174-175-176-177-178-179-180-181-182-183-184-185-186-187-188-189-190-191-192-193-194-195-196-197-198-199-200-201-202-203-204-205-206-207-208-209-210-211-212-213-214-215-216-217-218-219-220-221-222-223-224-225-226-227-228-229-230-231-232-233-234-235-236-237-238-239-240-241-242-243-244-245-246-247-248-249-250-251-252-253-254-255-256-257-258-259-260-261-262-263-264-265-266-267-268-269-270-271-272-273-274-275-276-277-278-279-280-281-282-283-284-285-286-287-288-289-290-291-292-293-294-295-296-297-298-299-300-301-302-303-304-305-306-307-308-309-310-311-312-313-314-315-316-317-318-319-320-321-322-323-324-325-326-327-328-329-330-331-332-333-334-335-336-337-338-339-340-341-342-343-344-345-346-347-348-349-350-351-352-353-354-355-356-357-358-359-360-361-362-363-364-365-366-367-368-369-370-371-372-373-374-375-376-377-378-379-380-381-382-383-384-385-386-387-388-389-390-391-392-393-394-395-396-397-398-399-400-401-402-403-404-405-406-407-408-409-410-411-412-413-414-415-416-417-418-419-420-421-422-423-424-425-426-427-428-429-430-431-432-433-434-435-436-437-438-439-440-441-442-443-444-445-446-447-448-449-450-451-452-453-454-455-456-457-458-459-460-461-462-463-464-465-466-467-468-469-470-471-472-473-474-475-476-477-478-479-480-481-482-483-484-485-486-487-488-489-490-491-492-493-494-495-496-497-498-499-500-501-502-503-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600-601-602-603-604-605-606-607-608-609-610-611-612-613-614-615-616-617-618-619-620-621-622-623-624-625-626-627-628-629-630-631-632-633-634-635-636-637-638-639-640-641-642-643-644-645-646-647-648-649-650-651-652-653-654-655-656-657-658-659-660-661-662-663-664-665-666-667-668-669-670-671-672-673-674-675-676-677-678-679-680-681-682-683-684-685-686-687-688-689-690-691-692-693-694-695-696-697-698-699-700-701-702-703-704-705-706-707-708-709-710-711-712-713-714-715-716-717-718-719-720-721-722-723-724-725-726-727-728-729-730-731-732-733-734-735-736-737-738-739-740-741-742-743-744-745-746-747-748-749-750-751-752-753-754-755-756-757-758-759-760-761-762-763-764-765-766-767-768-769-770-771-772-773-774-775-776-777-778-779-780-781-782-783-784-785-786-787-788-789-790-791-792-793-794-795-796-797-798-799-800-801-802-803-804-805-806-807-808-809-810-811-812-813-814-815-816-817-818-819-820-821-822-823-824-825-826-827-828-829-830-831-832-833-834-835-836-837-838-839-840-841-842-843-844-845-846-847-848-849-850-851-852-853-854-855-856-857-858-859-860-861-862-863-864-865-866-867-868-869-870-871-872-873-874-875-876-877-878-879-880-881-882-883-884-885-886-887-888-889-890-891-892-893-894-895-896-897-898-899-900-901-902-903-904-905-906-907-908-909-910-911-912-913-914-915-916-917-918-919-920-921-922-923-924-925-926-927-928-929-930-931-932-933-934-935-936-937-938-939-940-941-942-943-944-945-946-947-948-949-950-951-952-953-954-955-956-957-958-959-960-961-962-963-964-965-966-967-968-969-970-971-972-973-974-975-976-977-978-979-980-981-982-983-984-985-986-987-988-989-990-991-992-993-994-995-996-997-998-999-1000-1001-1002-1003-1004-1005-1006-1007-1008-1009-1010-1011-1012-1013-1014-1015-1016-1017-1018-1019-1020-1021-1022-1023-1024-1025-1026-1027-1028-1029-1030-1031-1032-1033-1034-1035-1036-1037-1038-1039-1040-1041-1042-1043-1044-1045-1046-1047-1048-1049-1050-1051-1052-1053-1054-1055-1056-1057-1058-1059-1060-1061-1062-1063-1064-1065-1066-1067-1068-1069-1070-1071-1072-1073-1074-1075-1076-1077-1078-1079-1080-1081-1082-1083-1084-1085-1086-1087-1088-1089-1090-1091-1092-1093-1094-1095-1096-1097-1098-1099-1100-1101-1102-1103-1104-1105-1106-1107-1108-1109-1110-1111-1112-1113-1114-1115-1116-1117-1118-1119-1120-1121-1122-1123-1124-1125-1126-1127-1128-1129-1130-1131-1132-1133-1134-1135-1136-1137-1138-1139-1140-1141-1142-1143-1144-1145-1146-1147-1148-1149-1150-1151-1152-1153-1154-1155-1156-1157-1158-1159-1160-1161-1162-1163-1164-1165-1166-1167-1168-1169-1170-1171-1172-1173-1174-1175-1176-1177-1178-1179-1180-1181-1182-1183-1184-1185-1186-1187-1188-1189-1190-1191-1192-1193-1194-1195-1196-1197-1198-1199-1200-1201-1202-1203-1204-1205-1206-1207-1208-1209-1210-1211-1212-1213-1214-1215-1216-1217-1218-1219-1220-1221-1222-1223-1224-1225-1226-1227-1228-1229-1230-1231-1232-1233-1234-1235-1236-1237-1238-1239-1240-1241-1242-1243-1244-1245-1246-1247-1248-1249-1250-1251-1252-1253-1254-1255-1256-1257-1258-1259-1260-1261-1262-1263-1264-1265-1266-1267-1268-1269-1270-1271-1272-1273-1274-1275-1276-1277-1278-1279-1280-1281-1282-1283-1284-1285-1286-1287-1288-1289-1290-1291-1292-1293-1294-1295-1296-1297-1298-1299-1300-1301-1302-1303-1304-1305-1306-1307-1308-1309-1310-1311-1312-1313-1314-1315-1316-1317-1318-1319-1320-1321-1322-1323-1324-1325-1326-1327-1328-1329-1330-1331-1332-1333-1334-1335-1336-1337-1338-1339-1340-1341-1342-1343-1344-1345-1346-1347-1348-1349-1350-1351-1352-1353-1354-1355-1356-1357-1358-1359-1360-1361-1362-1363-1364-1365-1366-1367-1368-1369-1370-1371-1372-1373-1374-1375-1376-1377-1378-1379-1380-1381-1382-1383-1384-1385-1386-1387-1388-1389-1390-1391-1392-1393-1394-1395-1396-1397-1398-1399-1400-1401-1402-1403-1404-1405-1406-1407-1408-1409-1410-1411-1412-1413-1414-1415-1416-1417-1418-1419-1420-1421-1422-1423-1424-1425-1426-1427-1428-1429-1430-1431-1432-1433-1434-1435-1436-1437-1438-1439-1440-1441-1442-1443-1444-1445-1446-1447-1448-1449-1450-1451-1452-1453-1454-1455-1456-1457-1458-1459-1460-1461-1462-1463-1464-1465-1466-1467-1468-1469-1470-1471-1472-1473-1474-1475-1476-1477-1478-1479-1480-1481-1482-1483-1484-1485-1486-1487-1488-1489-1490-1491-1492-1493-1494-1495-1496-1497-1498-1499-1500-1501-1502-1503-1504-1505-1506-1507-1508-1509-1510-1511-1512-1513-1514-1515-1516-1517-1518-1519-1520-1521-1522-1523-1524-1525-1526-1527-1528-1529-1530-1531-1532-1533-1534-1535-1536-1537-1538-1539-1540-1541-1542-1543-1544-1545-1546-1547-1548-1549-1550-1551-1552-1553-1554-1555-1556-1557-1558-1559-1560-1561-1562-1563-1564-1565-1566-1567-1568-1569-1570-1571-1572-1573-1574-1575-1576-1577-1578-1579-1580-1581-1582-1583-1584-1585-1586-1587-1588-1589-1590-1591-1592-1593-1594-1595-1596-1597-1598-1599-1600-1601-1602-1603-1604-1605-1606-1607-1608-1609-1610-1611-1612-1613-1614-1615-1616-1617-1618-1619-1620-1621-1622-1623-1624-1625-1626-1627-1628-1629-1630-1631-1632-1633-1634-1635-1636-1637-1638-1639-1640-1641-1642-1643-1644-1645-1646-1647-1648-1649-1650-1651-1652-1653-1654-1655-1656-1657-1658-1659-1660-1661-1662-1663-1664-1665-1666-1667-1668-1669-1670-1671-1672-1673-1674-1675-1676-1677-1678-1679-1680-1681-1682-1683-1684-1685-1686-1687-1688-1689-1690-1691-1692-1693-1694-1695-1696-1697-1698-1699-1700-1701-1702-1703-1704-1705-1706-1707-1708-1709-1710-1711-1712-1713-1714-1715-1716-1717-1718-1719-1720-1721-1722-1723-1724-1725-1726-1727-1728-1729-1730-1731-1732-1733-1734-1735-1736-1737-1738-1739-1740-1741-1742-1743-1744-1745-1746-1747-1748-1749-1750-1751-1752-1753-1754-1755-1756-1757-1758-1759-1760-1761-1762-1763-1764-1765-1766-1767-1768-1769-1770-1771-1772-1773-1774-1775-1776-1777-1778-1779-1780-1781-1782-1783-1784-1785-1786-1787-1788-1789-1790-1791-1792-1793-1794-1795-1796-1797-1798-1799-1800-1801-1802-1803-1804-1805-1806-1807-1808-1809-1810-1811-1812-1813-1814-1815-1816-1817-1818-1819-1820-1821-1822-1823-1824-1825-1826-1827-1828-1829-1830-1831-1832-1833-1834-1835-1836-1837-1838-1839-1840-1841-1842-1843-1844-1845-1846-1847-1848-1849-1850-1851-1852-1853-1854-1855-1856-1857-1858-1859-1860-1861-1862-1863-1864-1865-1866-1867-1868-1869-1870-1871-1872-1873-1874-1875-1876-1877-1878-1879-1880-1881-1882-1883-1884-1885-1886-1887-1888-1889-1890-1891-1892-1893-1894-1895-1896-1897-1898-1899-1900-1901-1902-1903-1904-1905-1906-1907-1908-1909-1910-1911-1912-1913-1914-1915-1916-1917-1918-1919-1920-1921-1922-1923-1924-1925-1926-1927-1928-1929-1930-1931-1932-1933-1934-1935-1936-1937-1938-1939-1940-1941-1942-1943-1944-1945-1946-1947-1948-1949-1950-1951-1952-1953-1954-1955-1956-1957-1958-1959-1960-1961-1962-1963-1964-1965-1966-1967-1968-1969-1970-1971-1972-1973-1974-1975-1976-1977-1978-1979-1980-1981-1982-1983-1984-1985-1986-1987-1988-1989-1990-1991-1992-1993-1994-1995-1996-1997-1998-1999-2000-2001-2002-2003-2004-2005-2006-2007-2008-2009-2010-2011-2012-2013-2014-2015-2016-2017-2018-2019-2020-2021-2022-2023-2024-2025-2026-2027-2028-2029-2030-2031-2032-2033-2034-2035-2036-2037-2038-2039-2040-2041-2042-2043-2044-2045-2046-2047-2048-2049-2050-2051-2052-2053-2054-2055-2056-2057-2058-2059-2060-2061-2062-2063-2064-2065-2066-2067-2068-2069-2070-2071-2072-2073-2074-2075-2076-2077-2078-2079-2080-2081-2082-2083-2084-2085-2086-2087-2088-2089-2090-2091-2092-2093-2094-2095-2096-2097-2098-2099-2100-2101-2102-2103-2104-2105-2106-2107-2108-2109-2110-2111-2112-2113-2114-2115-2116-2117-2118-2119-2120-2121-2122-2123-2124-2125-2126-2127-2128-2129-2130-2131-2132-2133-2134-2135-2136-2137-2138-2139-2140-2141-2142-2143-2144-2145-2146-2147-2148-2149-2150-2151-2152-2153-2154-2155-2156-2157-2158-2159-2160-2161-2162-2163-2164-2165-2166-2167-2168-2169-2170-2171-2172-2173-2174-2175-2176-2177-2178-2179-2180-2181-2182-2183-2184-2185-2186-2187-2188-2189-2190-2191-2192-2193-2194-2195-2196-2197-2198-2199-2200-2201-2202-2203-2204-2205-2206-2207-2208-2209-2210-2211-2212-2213-2214-2215-2216-2217-2218-2219-2220-2221-2222-2223-2224-2225-2226-2227-2228-2229-2230-2231-2232-2233-2234-2235-2236-2237-2238-2239-2240-2241-2242-2243-2244-2245-2246-2247-2248-2249-2250-2251-2252-2253-2254-2255-2256-2257-2258-2259-2260-2261-2262-2263-2264-2265-2266-2267-2268-2269-2270-2271-2272-2273-2274-2275-2276-2277-2278-2279-2280-2281-2282-2283-2284-2285-2286-2287-2288-2289-2290-2291-2292-2293-2294-2295-2296-2297-2298-2299-2300-2301-2302-2303-2304-2305-2306-2307-2308-2309-2310-2311-2312-2313-2314-2315-2316-2317-2318-2319-2320-2321-2322-2323-2324-2325-2326-2327-2328-2329-2330-2331-2332-2333-2334-2335-2336-2337-2338-2339-2340-2341-2342-2343-2344-2345-2346-2347-2348-2349-2350-2351-2352-2353-2354-2355-2356-2357-2358-2359-2360-2361-2362-2363-2364-2365-2366-2367-2368-2369-2370-2371-2372-2373-2374-2375-2376-2377-2378-2379-2380-2381-2382-2383-2384-2385-2386-2387-2388-2389-2390-2391-2392-2393-2394-2395-2396-2397-2398-2399-2400-2401-2402-2403-2404-2405-2406-2407-2408-2409-2410-2411-2412-2413-2414-2415-2416-2417-2418-2419-2420-2421-2422-2423-2424-2425-2426-2427-2428-2429-2430-2431-2432-2433-2434- |                            |                     |

Table 14.--Small Grains: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965.

| Region and State      | Weed               |           | Infestation |                     | Weed  |           | Infestation        |           | Weed  |                     | Infestation |           | Weed               |           | Infestation |           |
|-----------------------|--------------------|-----------|-------------|---------------------|-------|-----------|--------------------|-----------|-------|---------------------|-------------|-----------|--------------------|-----------|-------------|-----------|
|                       | Acres              | Trend (1) | Acres       | Trend (1)           | Acres | Trend (1) | Acres              | Trend (1) | Acres | Trend (1)           | Acres       | Trend (1) | Acres              | Trend (1) | Acres       | Trend (1) |
| <b>Northeastern:</b>  |                    |           |             |                     |       |           |                    |           |       |                     |             |           |                    |           |             |           |
| Delaware-----         | Chickweed-----     | 30        | Sta.        | Dogfennel-----      | 25    | Up        | Knawel-----        | 10        | Up    | Wild garlic-----    | 40          | Sta.      | Wild mustard-----  | 50        | Up          |           |
| Maine-----            | Annual grasses---  | 40        | Up          | Lambquarters---     | 30    | Sta.      | Redroot pigweed--- | 35        | Sta.  | Wild mustard-----   | 30          | Sta.      | Wild radish-----   | 20        | Sta.        |           |
| Maryland-----         | Cheat-----         | 70        | Up          | Corn cockle-----    | 45    | Up        | Corn cockle-----   | 90        | Sta.  | Knawel-----         | 85          | Down      | Quackgrass-----    | 15        | Up          |           |
| Massachusetts---      | Crabgrass-----     | 70        | Up          | Foxtail-----        | 60    | Sta.      | Lambquarters-----  | 70        | Sta.  | Redroot pigweed---  | 90          | Down      | Smartweed-----     | 30        | Sta.        |           |
| New Jersey-----       | Corn chamomile---  | 70        | Down        | Knawel-----         | 18    | Up        | Wild garlic-----   | 80        | Sta.  | Wild mustard-----   | 70          | Down      | Yellow rocket----- | 60        | Sta.        |           |
| New York-----         | Lambquarters---    | 60        | Sta.        | Quackgrass-----     | 60    | Sta.      | Ragweed-----       | 70        | Up    | Wild garlic-----    | 15          | Down      | Yellow foxtail---  | 20        | Down        |           |
| Pennsylvania---       | Canada thistle---  | 10        | Down        | Nutsedge-----       | 18    | Up        | Ragweed-----       | 80        | Sta.  | Wild radish-----    | 90          | Sta.      | Yellow rocket----- | 60        | Sta.        |           |
| Rhode Island---       | Shepherdspurse---  | 60        | Sta.        | White cockle---     | 60    | Sta.      | Wild mustard-----  | 20        | Sta.  | Ragweed-----        | 30          | Down      | Wild mustard-----  | 50        | Down        |           |
| Vermont-----          | Crabgrass-----     | 20        | Sta.        | Foxtail-----        | 20    | Sta.      | Nutsedge-----      | 20        | Up    | Wild garlic-----    | 25          | Up        | Wild mustard-----  | 30        | Up          |           |
| West Virginia---      | Canada thistle---  | 15        | Up          | Foxtail-----        | 25    | Up        | Quackgrass-----    | 10        | Up    | Wild garlic-----    | 25          | Up        | Wild mustard-----  | 30        | Up          |           |
| <b>North Central:</b> |                    |           |             |                     |       |           |                    |           |       |                     |             |           |                    |           |             |           |
| Illinois-----         | Canada thistle---  | 15        | Down        | Milkweed-----       | 20    | Down      | Wild garlic-----   | 15        | Down  | Wild mustard-----   | 25          | Down      | Wintercress-----   | 20        | Down        |           |
| Indiana-----          | Canada thistle---  | --        | Sta.        | Field pepperweed--- | --    | Down      | Smartweed-----     | --        | Down  | Wild garlic-----    | --          | Down      | Wintercress-----   | --        | Down        |           |
| Iowa-----             | Giant foxtail---   | 50        | Sta.        | Green foxtail---    | 50    | Sta.      | Ragweed-----       | 25        | Sta.  | Swamp smartweed---  | 20          | Sta.      | Yellow foxtail---  | 50        | Sta.        |           |
| Kansas-----           | Bindweed-----      | 15        | Sta.        | Lambquarters---     | 20    | Sta.      | Pigweed-----       | 20        | Sta.  | Sunflower-----      | 20          | Sta.      | Wild buckwheat---  | 20        | Sta.        |           |
| Michigan-----         | Quackgrass-----    | 35        | Sta.        | Red sorrel-----     | 40    | Sta.      | Wild garlic-----   | 15        | Up    | Wild mustard-----   | 75          | Sta.      | Wild oats-----     | 20        | Sta.        |           |
| Minnesota---          | Foxtail-----       | 50        | Up          | Red sorrel-----     | 25    | Up        | Wild buckwheat---  | 25        | Up    | Morningglory-----   | 35          | Sta.      | Pigweed-----       | 100       | Sta.        |           |
| Missouri-----         | Cocklebur-----     | 35        | Sta.        | Foxtail-----        | 100   | Up        | Johnsongrass-----  | 10        | Up    | Morningglory-----   | 35          | Sta.      | Pigweed-----       | 100       | Sta.        |           |
| Nebraska-----         | Buckhorn plantain  | --        | Up          | Downy brome-----    | --    | Up        | Foxtail-----       | --        | Sta.  | Pennygrass-----     | --          | Sta.      | Shepherdspurse---  | --        | Sta.        |           |
| North Dakota---       | Field bindweed---  | 30        | Sta.        | Kochia-----         | 30    | Up        | Wild buckwheat---  | 75        | Sta.  | Wild mustard-----   | 85          | Down      | Wild oats-----     | 85        | Sta.        |           |
| Ohio-----             | Canada thistle---  | 20        | Up          | Red sorrel-----     | 50    | Sta.      | Wild garlic-----   | 10        | Sta.  | Wild mustard-----   | 15          | Sta.      | Yellow rocket----- | 15        | Sta.        |           |
| South Dakota---       | Canada thistle---  | 10        | Up          | Downy brome-----    | 40    | Sta.      | Wild buckwheat---  | 100       | Up    | Wild mustard-----   | 100         | Up        | Wild oats-----     | 90        | Sta.        |           |
| Wisconsin-----        | Lambquarters---    | 100       | Sta.        | Quackgrass-----     | 50    | Sta.      | Red sorrel-----    | 30        | Sta.  | Wild mustard-----   | 40          | Sta.      | Wild radish-----   | 20        | Sta.        |           |
| <b>Southern:</b>      |                    |           |             |                     |       |           |                    |           |       |                     |             |           |                    |           |             |           |
| Alabama-----          | Chickweed-----     | 75        | Up          | Curly dock-----     | 90    | Up        | Henbit-----        | 75        | Up    | Wild garlic-----    | 90          | Up        | Wild mustard-----  | 50        | Up          |           |
| Arkansas-----         | Corn cockle-----   | 5         | Sta.        | Dock-----           | 10    | Sta.      | Wild garlic-----   | 15        | Sta.  | Pepperweed-----     | 40          | Sta.      | Wild mustard-----  | 10        | Sta.        |           |
| Florida-----          | Carolina geranium  | 20        | Up          | Eveningprimrose---  | 50    | Sta.      | Henbit-----        | 40        | Sta.  | Pepperweed-----     | 40          | Sta.      | Wild mustard-----  | 10        | Sta.        |           |
| Georgia-----          | Blessed thistle--- | 20        | Up          | Dock-----           | 35    | Up        | Pepperweed-----    | 25        | Sta.  | Curly dock-----     | 25          | Sta.      | Wild garlic-----   | 20        | Up          |           |
| Kentucky-----         | Bindweed-----      | 15        | Sta.        | Chickweed-----      | 80    | Sta.      | Curly dock-----    | 20        | Down  | Henbit-----         | 20          | Down      | Wild garlic-----   | 80        | Up          |           |
| Louisiana-----        | Common chickweed   | 10        | Sta.        | Curly dock-----     | 80    | Sta.      | Henbit-----        | 20        | Down  | Knawel-----         | 15          | Down      | Wild mustard-----  | 50        | Sta.        |           |
| North Carolina---     | Dock-----          | 40        | Sta.        | Meadow campion---   | 70    | Sta.      | Thistles-----      | 60        | Sta.  | Wild garlic-----    | 80          | Sta.      | Wild mustard-----  | 50        | Sta.        |           |
| Oklahoma-----         | Bindweed-----      | 50        | Up          | Lambquarters---     | 40    | Up        | Pigweed-----       | 50        | Up    | Vetch-----          | 30          | Sta.      | Wild mustard-----  | 20        | Sta.        |           |
| South Carolina---     | Blessed thistle--- | 15        | Sta.        | Common chickweed--- | 15    | Up        | Little barley---   | 20        | Up    | Wild garlic-----    | 30          | Sta.      | Wild mustard-----  | 35        | Sta.        |           |
| Tennessee-----        | Curly dock-----    | 20        | Sta.        | Henbit-----         | 20    | Sta.      | Knawel-----        | 30        | Sta.  | Wild garlic-----    | 75          | Up        | Wild mustard-----  | 20        | Sta.        |           |
| Texas-----            | Bindweed-----      | 25        | Sta.        | Pepperweed-----     | 45    | Sta.      | Ragweed-----       | 50        | Sta.  | Texas blueweed---   | 25          | Sta.      | Wild mustard-----  | 50        | Sta.        |           |
| Virginia-----         | Chickweed-----     | 25        | Up          | Dock-----           | 10    | Sta.      | Henbit-----        | 20        | Sta.  | Knawel-----         | 20          | Up        | Wild garlic-----   | 35        | Sta.        |           |
| <b>Western:</b>       |                    |           |             |                     |       |           |                    |           |       |                     |             |           |                    |           |             |           |
| Arizona-----          | Johnsongrass---    | 10        | Sta.        | Lambquarters---     | 25    | Sta.      | London rocket---   | 60        | Sta.  | Sow thistle-----    | 10          | Sta.      | Wild oats-----     | 40        | Sta.        |           |
| California---         | Bindweed-----      | 25        | Sta.        | Douglas fiddleneck  | 30    | Sta.      | Russian rocket---  | 30        | Sta.  | Tansymustard---     | 20          | Sta.      | Wild oats-----     | 25        | Sta.        |           |
| Colorado-----         | Downy brome-----   | 60        | Up          | Lambquarters---     | 60    | Sta.      | Russian thistle--- | 90        | Sta.  | Wild mustard-----   | 90          | Sta.      | Wild oats-----     | 75        | Up          |           |
| Idaho-----            | Blue mustard---    | 10        | Up          | Canada thistle---   | 80    | Down      | Field bindweed---  | 20        | Sta.  | Pennygrass-----     | 30          | Sta.      | Wild oats-----     | 60        | Down        |           |
| Montana-----          | Cow cockle-----    | 30        | Up          | Downy brome-----    | 50    | Up        | Kochia-----        | 25        | Up    | Wild buckwheat---   | 50          | Up        | Wild oats-----     | 40        | Down        |           |
| Nevada-----           | Flixweed-----      | 60        | Down        | Hairy whitetop---   | 30    | Down      | Lambquarters---    | 60        | Down  | Russian knapweed--- | 10          | Up        | Wild mustard-----  | 60        | Sta.        |           |
| New Mexico---         | Bindweed-----      | 5         | Sta.        | Curly dock-----     | 5     | Down      | Lambquarters---    | 10        | Down  | Sunflower-----      | 10          | Down      | Wild oats-----     | 5         | Sta.        |           |
| Oregon-----           | Bindweed-----      | 8         | Sta.        | Blue mustard-----   | 1     | Sta.      | Downy brome-----   | 50        | Up    | Fiddleneck-----     | 50          | Sta.      | Rye grasses-----   | 15        | Down        |           |
| Utah-----             | Morningglory---    | 15        | Up          | Prickly lettuce---  | 50    | Sta.      | Sunflower-----     | 50        | Sta.  | Wild mustard-----   | 100         | Down      | Wild oats-----     | 20        | Down        |           |
| Washington---         | Canada thistle---  | 10        | Up          | Downy brome-----    | 25    | Sta.      | Fiddleneck-----    | 50        | Sta.  | Field bindweed---   | 10          | Sta.      | Russian thistle--- | 25        | Sta.        |           |
| Wyoming-----          | Downy brome-----   | 40        | Up          | Redroot pigweed---  | 80    | Sta.      | Sunflower-----     | 70        | Sta.  | Wild buckwheat---   | 30          | Up        | Wild mustard-----  | 40        | Up          |           |
| Alaska-----           | Chickweed-----     | 100       | Sta.        | Hempettle-----      | 20    | Up        | Lambquarters---    | 100       | Sta.  | Wild buckwheat---   | 50          | Up        | Wild mustard-----  | 80        | Up          |           |

1 Sta., stationary

Table 15.--Rice: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region   | Acres treated |               | Average cost per acre <sup>1</sup> |               | Acreage treated by-- |                  | Effectiveness of herbicides |               | Herbicides usage trend <sup>2</sup> | Need for better herbicides | Persistence problem |
|--------------------|---------------|---------------|------------------------------------|---------------|----------------------|------------------|-----------------------------|---------------|-------------------------------------|----------------------------|---------------------|
|                    | Preemergence  | Postemergence | Preemergence                       | Postemergence | Farmers              | Custom operators | Preemergence                | Postemergence |                                     |                            |                     |
|                    | 1,000 acres   | 1,000 acres   | Dollars                            | Dollars       | Percent              | Percent          |                             |               |                                     |                            |                     |
| Arkansas-----      | --            | 540           | --                                 | 9.00          | 1                    | 99               | ----                        | Good          | Up                                  | Little                     | No                  |
| Louisiana-----     | --            | 250           | --                                 | 10.00         | 1                    | 99               | ----                        | Good          | Up                                  | Some                       | No                  |
| Mississippi-----   | --            | 45            | --                                 | 10.00         | 20                   | 80               | ----                        | Good          | Up                                  | Some                       | No                  |
| Texas-----         | 400           | --            | 10.00                              | --            | 25                   | 75               | Good                        | ----          | Up                                  | Some                       | No                  |
| Southern-----      | 400           | 835           | 10.00                              | 9.35          | 9                    | 91               | 1-Good                      | 3-Good        | 4-Up                                | 3-Some<br>1-Little         | 4-No                |
| California-----    | 5             | 150           | 16.00                              | 5.00          | 3                    | 97               | Good                        | Good          | Up                                  | Some                       | No                  |
| Western-----       | 5             | 150           | 16.00                              | 5.00          | 3                    | 97               | 1-Good                      | 1-Good        | 1-Up                                | 1-Some                     | 1-No                |
| United States----- | 405           | 985           | 10.07                              | 8.69          | 8                    | 92               | 2-Good                      | 4-Good        | 5-Up                                | 4-Some<br>1-Little         | 5-No                |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.

<sup>2</sup> Sta., stationary.

Table 16.--Rice: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State | Weed           | Infestation |           | Weed           | Infestation |           | Weed            | Infestation |           | Weed                | Infestation |           |                     |    |      |
|------------------|----------------|-------------|-----------|----------------|-------------|-----------|-----------------|-------------|-----------|---------------------|-------------|-----------|---------------------|----|------|
|                  |                | Acres       | Trend (1) |                | Acres       | Trend (1) |                 | Acres       | Trend (1) |                     | Acres       | Trend (1) |                     |    |      |
|                  |                | Pct.        |           |                |             | Pct.      |                 |             |           | Pct.                |             |           |                     |    |      |
| Southern:        |                |             |           |                |             |           |                 |             |           |                     |             |           |                     |    |      |
| Arkansas-----    | Barnyardgrass- | 90          | Up        | Ducksalad----- | 80          | Up        | Hemp sesbania-  | 90          | Sta.      | Morningglory-----   | 10          | Up        | Northern jointvetch | 90 | Sta. |
| Louisiana-----   | Barnyardgrass- | 100         | Sta.      | Ducksalad----- | 25          | Up        | Goosegrass----- | 25          | Up        | Red rice-----       | 100         | Sta.      | Sedges-----         | 25 | Up   |
| Texas-----       | Barnyardgrass- | 50          | Down      | Baronetgrass-- | 50          | Down      | Hemp sesbania-  | 25          | Down      | Northern jointvetch | 25          | Down      | Red rice-----       | 30 | Down |
| Western:         |                |             |           |                |             |           |                 |             |           |                     |             |           |                     |    |      |
| California-----  | Algae-----     | 20          | Sta.      | Barnyardgrass- | 60          | Down      | Bullrushes----- | 20          | Up        | Cattail-----        | 20          | Up        | Sprangletop-----    | 15 | Up   |

<sup>1</sup> Sta., stationary.

420,000 acres postemergence at an average cost of \$7.79 per acre. Farmers treated 88 percent of the treated acreage with their own equipment, and custom operators treated 12 percent. (Tables 1 to 5, 17, and 18.)

Reports on the effectiveness of herbicides indicate that treatments in 1965 were slightly more effective than those used in 1962. Only one State reported an urgent need for better herbicides, six reported some need, and only two reported little need. Problems of herbicides persisting in the soil were about the same as in 1962, except that one State indicated some problems in 1965 whereas no problems were reported in 1962. Eight States reported no problems with persistence. The herbicide-usage trend was up in eight states, stationary in one, and down in none.

Weeds listed as being one of the five most important in at least three States were crabgrass, morningglory, nutsedges, pigweeds, sandbur, Texas panicum, and sicklepod. None of these nationally or regionally important weeds were reported to be declining in more than one State.

### Sugarbeets

In 1965, sugarbeet producers treated about 34 percent of the harvested acreage with herbicides before the crop emerged, and treated 5.5 percent after emergence. They treated 426,000 acres preemergence at an average cost of \$8.97 per acre, and treated 69,000 acres postemergence at an average cost of \$5.22 per acre. Farmers treated 92 percent of the treated acreage with their own equipment, and custom operators treated 8 percent. (Tables 1 to 5, 19, and 20.)

Reports on the effectiveness of herbicides indicate that treatments in 1965 were slightly more effective than those used in 1962. Ten States reported an urgent need for better herbicides, five reported some need, and no State reported little need for better herbicides. Problems of herbicides persisting in the soil appear to be increasing as compared with the situation in 1962. Seven states now report problems of herbicide persistence whereas in 1962 only four States reported problems. Fourteen States reported that the use of herbicides was up in 1965, one State reported that the use was stationary, and

no State reported a decrease in the use of herbicides.

Weeds listed as being one of the five most important in at least four States were barnyardgrass, foxtails, lambsquarters, pigweeds, mustards, wild oats, and kochia. Of these nationally or regionally important weeds, those for which the infestation was reported to be declining in at least two States were barnyardgrass, lambsquarters, pigweeds, mustards, and wild oats. One difficulty in developing improved methods for controlling weeds in sugarbeets is the wide difference in species of weeds that infest the crop in different areas of the country. These differences hinder a concerted, nationwide effort against a particular species of weed. Currently, it appears that different systems of control will need to be developed for each of the different geographical areas.

### Sorghum

In 1965, sorghum producers treated slightly less than 9 percent of the harvested acreage with herbicides before the crop emerged, and slightly more than 23 percent after emergence. They treated almost 1.5 million acres preemergence at an average cost of \$7.73 per acre, and treated more than 3.9 million acres postemergence at an average cost of \$2.74 per acre. Farmers treated 74 percent of the treated acreage with their own equipment, and custom operators treated 26 percent. (Tables 1 to 5, 21, and 22.)

Reports on the effectiveness of herbicides indicate that treatments in 1965 were generally more effective than those used in 1962, although there was a slight decline in reports expressing a high degree of satisfaction with postemergence treatments. Six States reported an urgent need for better herbicides, 14 reported some need, and four reported little need. Problems of herbicides persisting in the soil appear to have increased sharply as compared with the situation in 1962. Twelve States reported problems of herbicide persistence in 1965 as compared with only four in 1962. Twenty States reported that the use of herbicides was increasing, four reported that the use was stationary, while no State reported a decrease in the use of herbicides.

Table 17.--Peanuts: Estimated extent, cost and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems by States and geographic divisions, 1965.

| State and region    | Acres treated |                | Average cost per acre <sup>1</sup> |                | Acreage treated by-- |                  | Effectiveness of herbicides |                            | Herbicides usage trend <sup>2</sup> | Need for better herbicides     | Persistence problem |
|---------------------|---------------|----------------|------------------------------------|----------------|----------------------|------------------|-----------------------------|----------------------------|-------------------------------------|--------------------------------|---------------------|
|                     | Pre-emergence | Post-emergence | Pre-emergence                      | Post-emergence | Farmers              | Custom operators | Pre-emergence               | Post-emergence             |                                     |                                |                     |
|                     | 1,000 acres   | 1,000 acres    | Dollars                            | Dollars        | Percent              | Percent          |                             |                            |                                     |                                |                     |
| Alabama-----        | 33            | 68             | 7.00                               | 7.00           | 95                   | 5                | Good                        | Good                       | Up                                  | Some                           | No                  |
| Florida-----        | 40            | 20             | 8.00                               | 8.00           | 60                   | 40               | Fair                        | Fair                       | Up                                  | Some                           | No                  |
| Georgia-----        | 67            | 290            | 8.00                               | 8.00           | 95                   | 5                | Good                        | Good                       | Up                                  | Some                           | No                  |
| North Carolina----- | 115           | 5              | 9.00                               | 3.00           | 80                   | 20               | Fair                        | Fair                       | Up                                  | Some                           | No                  |
| Oklahoma-----       | 33            | 2              | 5.25                               | 3.00           | 100                  | --               | Good                        | Good                       | Up                                  | Little                         | No                  |
| South Carolina----- | 7             | ---            | 5.00                               | ---            | 40                   | 60               | Fair                        | Fair                       | Up                                  | Urgent                         | Yes                 |
| Texas-----          | 40            | 34             | 5.50                               | 6.40           | 85                   | 15               | Fair                        | Fair                       | Up                                  | Some                           | No                  |
| Virginia-----       | 37            |                | 9.90                               | 8.50           |                      |                  |                             |                            |                                     |                                |                     |
| Southern-----       | 372           | 420            | 7.84                               | 7.79           | 88                   | 12               | 4-Good<br>4-Fair            | 2-Good<br>4-Fair<br>1-Poor | 8-Up                                | 1-Urgent<br>6-Some<br>1-Little | 1-Yes<br>7-No       |
| Hawaii-----         | 5             | ---            | 30.00                              | --             | 100                  | --               | Good                        | ---                        | Sta.                                | Little                         | No                  |
| Western-----        | 5             | ---            | 30.00                              | --             | 100                  | --               | 1-Good                      | ---                        | 1-Sta.                              | 1-Little                       | 1-No                |
| United States-----  | 377           | 420            | 8.13                               | 7.79           | 88                   | 12               | 5-Good<br>4-Fair            | 2-Good<br>4-Fair<br>1-Poor | 8-Up<br>1-Sta.                      | 1-Urgent<br>6-Some<br>2-Little | 1-Yes<br>8-No       |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides.  
<sup>2</sup> Sta., stationary.

Table 18.--Peanuts: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and States   | Weed              | Infestation |           | Weed               | Infestation |           | Weed              | Infestation |           | Weed               | Infestation |           | Infestation        |    |      |
|---------------------|-------------------|-------------|-----------|--------------------|-------------|-----------|-------------------|-------------|-----------|--------------------|-------------|-----------|--------------------|----|------|
|                     |                   | Acres       | Trend (1) |                    | Acres       | Trend (1) |                   | Acres       | Trend (1) |                    | Acres       | Trend (1) |                    |    |      |
|                     |                   | Pct.        | Pct.      | Pct.               | Pct.        | Pct.      | Pct.              | Pct.        | Pct.      |                    |             |           |                    |    |      |
| Southern:           | Crabgrass-----    | 100         | Sta.      | Florida purslane-- | 100         | Sta.      | Morningglory----- | 20          | Up        | Nutsedge-----      | 5           | Up        | Sicklepod-----     | 20 | Sta. |
| Florida-----        | Nutsedge-----     | 50          | Up        | Sandbur-----       | 20          | Up        | Sicklepod-----    | 15          | Up        | Texas panicum----- | 25          | Up        | Smartweed-----     | 80 | Down |
| Georgia-----        | Cocklebur-----    | 40          | Sta.      | Crabgrass-----     | 90          | Down      | Morningglory----- | 45          | Sta.      | Nutsedge-----      | 20          | Up        | Texas panicum----- | 50 | Up   |
| North Carolina----- | Crabgrass-----    | 95          | Up        | Johnsongrass-----  | 95          | Up        | Morningglory----- | 25          | Up        | Pigweed-----       | 80          | Up        | Sicklepod-----     | 20 | Sta. |
| Oklahoma-----       | Crabgrass-----    | 60          | Sta.      | Florida purslane-- | 40          | Sta.      | Nutsedge-----     | 25          | Up        | Sandbur-----       | 20          | Up        | Texas panicum----- | 90 | Up   |
| South Carolina----- | Bermudagrass----- | 50          | Up        | Crabgrass-----     | 100         | Up        | Pigweed-----      | 50          | Up        | Signalgrass-----   | 20          | Up        | Smartweed-----     | 15 | Sta. |
| Texas-----          | Crabgrass-----    | 75          | Sta.      | Horsenettle-----   | 25          | Sta.      | Morningglory----- | 60          | Sta.      | Nutsedge-----      | 40          | Up        |                    |    |      |
| Virginia-----       |                   |             |           |                    |             |           |                   |             |           |                    |             |           |                    |    |      |
| Western:            | Barryagrass-----  | 30          | Sta.      | Puncturevine-----  | 30          | Sta.      | Sandbur-----      | 70          | Sta.      |                    |             |           |                    |    |      |
| Arizona-----        | Junglerice-----   | 15          | Down      | Pigweed-----       | 60          | Down      | Sandbur-----      | 10          | Sta.      | Smallflower        | 20          | Up        | Red tasselflower-- | 25 | Up   |
| New Mexico-----     | Goosegrass-----   | 30          | Sta.      | Little mallow----- | 20          | Up        | Nutsedge-----     | 30          | Up        | galinsoga          |             |           |                    |    |      |
| Hawaii-----         |                   |             |           |                    |             |           |                   |             |           |                    |             |           |                    |    |      |

Table 19. --Sugarbeets: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region   | Acres treated |               | Average cost per acre <sup>1</sup> |               | Acres treated by -- |                  | Effectiveness of herbicides |               | Herbicides usage trend <sup>2</sup> |           | Need for better herbicides |            | Residue problem |         |
|--------------------|---------------|---------------|------------------------------------|---------------|---------------------|------------------|-----------------------------|---------------|-------------------------------------|-----------|----------------------------|------------|-----------------|---------|
|                    | Preemergence  | Postemergence | Dollars                            | Postemergence | Farmers             | Custom operators | Preemergence                | Postemergence | Up                                  | Down      | Urgent                     | Not urgent | Yes             | No      |
|                    | 1,000 acres   | 1,000 acres   | Dollars                            | Percent       | Percent             | Percent          | Percent                     | Percent       | Percent                             | Percent   | Percent                    | Percent    | Percent         | Percent |
| New York-----      | 18            | --            | 12.00                              | 70            | 30                  | 30               | Fair                        | ---           | ---                                 | Up        | Urgent                     | Yes        | Yes             | 1-Yes   |
| Northwestern-----  | 18            | --            | 12.00                              | 70            | 30                  | 30               | 1-Fair                      | ---           | ---                                 | 1-Up      | 1-Urgent                   | Yes        | Yes             | 1-Yes   |
| Iowa-----          | 4             | 1             | 3.00                               | 90            | 10                  | 10               | Fair                        | Fair          | Up                                  | Some      | Some                       | No         | No              | Some    |
| Michigan-----      | 65            | --            | 9.00                               | 95            | 5                   | 5                | Good                        | Good          | Up                                  | Urgent    | Urgent                     | No         | No              | Urgent  |
| Minnesota-----     | 84            | 30            | 5.00                               | 4.00          | 90                  | 10               | Good                        | Fair          | Up                                  | Urgent    | Urgent                     | Yes        | Yes             | Urgent  |
| Nebraska-----      | 30            | 7             | 15.00                              | 100           | --                  | --               | Fair                        | Fair          | Up                                  | Urgent    | Urgent                     | No         | No              | Urgent  |
| North Dakota-----  | 50            | 7             | 4.00                               | 97            | 3                   | 3                | Good                        | Good          | Up                                  | Urgent    | Urgent                     | No         | No              | Urgent  |
| North Central----- | 233           | 45            | 7.15                               | 94            | 6                   | 6                | 3-Good                      | 2-Good        | 5-Up                                | 3-Urgent  | 2-Some                     | 2-Yes      | 2-Yes           | 3-No    |
| California-----    | 50            | 1             | 12.00                              | 7.50          | 90                  | 10               | Fair                        | Poor          | Up                                  | Urgent    | Urgent                     | No         | No              | Urgent  |
| Colorado-----      | 15            | 5             | 10.00                              | 95            | 5                   | 5                | Fair                        | Fair          | Up                                  | Urgent    | Urgent                     | No         | No              | Urgent  |
| Idaho-----         | 30            | 10            | 20.00                              | 10.00         | 80                  | 20               | Good                        | Fair          | Up                                  | Some      | Some                       | Yes        | Yes             | Some    |
| Montana-----       | 27            | 2             | 5.00                               | 4.00          | 100                 | --               | Fair                        | Fair          | Up                                  | Some      | Some                       | Yes        | Yes             | Some    |
| New Mexico-----    | 1             | --            | --                                 | --            | 80                  | 20               | Fair                        | ---           | Up                                  | Urgent    | Urgent                     | Yes        | Yes             | Urgent  |
| Oregon-----        | 8             | 1             | 8.00                               | 3.00          | 90                  | 10               | Fair                        | Fair          | Up                                  | Urgent    | Urgent                     | Yes        | Yes             | Urgent  |
| Utah-----          | 2             | .5            | 15.00                              | 10.00         | 75                  | 25               | Fair                        | Fair          | Up                                  | Some      | Some                       | No         | No              | Some    |
| Washington-----    | 2             | 1             | 16.00                              | 15.00         | 90                  | 10               | Poor                        | Poor          | Up                                  | Urgent    | Urgent                     | Yes        | Yes             | Urgent  |
| Wyoming-----       | 40            | 3             | 8.00                               | 8.00          | 90                  | 10               | Fair                        | Fair          | Up                                  | Urgent    | Urgent                     | No         | No              | Urgent  |
| Western-----       | 175           | 23.5          | 11.08                              | 7.98          | 90                  | 10               | 1-Good                      | 6-Fair        | 8-Up                                | 6-Urgent  | 3-Some                     | 4-Yes      | 4-Yes           | 5-No    |
| United States----- | 426           | 68.5          | 8.97                               | 5.22          | 92                  | 8                | 4-Good                      | 2-Good        | 14-Up                               | 10-Urgent | 5-Some                     | 7-Yes      | 7-Yes           | 8-No    |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.

<sup>2</sup> Sta., stationary.

Table 20. --Sugarbeets: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and States | Weed               |           | Infestation |                     | Weed  |           | Infestation          |           | Weed  |                           | Infestation |           | Weed                     |           | Infestation |           |  |
|-------------------|--------------------|-----------|-------------|---------------------|-------|-----------|----------------------|-----------|-------|---------------------------|-------------|-----------|--------------------------|-----------|-------------|-----------|--|
|                   | Acres              | Trend (%) | Acres       | Trend (%)           | Acres | Trend (%) | Acres                | Trend (%) | Acres | Trend (%)                 | Acres       | Trend (%) | Acres                    | Trend (%) | Acres       | Trend (%) |  |
|                   | Pct.               |           | Pct.        |                     | Pct.  |           | Pct.                 |           | Pct.  |                           | Pct.        |           | Pct.                     |           | Pct.        |           |  |
| Northwestern:     | Foxtail-----       | 80        | Sta.        | Lambquarters-----   | 80    | Sta.      | Quackgrass-----      | 50        | Sta.  | Rugweed-----              | 80          | Sta.      | Wild mustard-----        | 80        | Sta.        | Pol.      |  |
| New York-----     |                    |           |             |                     |       |           |                      |           |       |                           |             |           |                          |           |             |           |  |
| North Central:    |                    |           |             |                     |       |           |                      |           |       |                           |             |           |                          |           |             |           |  |
| Iowa-----         | Giant foxtail----- | 90        | Up          | Green foxtail-----  | 75    | Up        | Lambquarters-----    | 90        | Sta.  | Pigweed-----              | 75          | Sta.      | Yellow foxtail-----      | 75        | Up          |           |  |
| Michigan-----     | Bindweed-----      | 15        | Up          | Canada thistle----- | 30    | Up        | Nightshade-----      | 10        | Up    | Quackgrass-----           | 55          | Sta.      | Sowthistle-----          | 30        | Up          |           |  |
| Minnesota-----    | Foxtail-----       | 100       | Sta.        | Lambquarters-----   | 65    | Sta.      | Pigweed-----         | 75        | Up    | Wild mustard-----         | 60          | Sta.      | Wild oats-----           | 45        | Sta.        |           |  |
| Nebraska-----     | Foxtail-----       | 95        | Sta.        | Kochia-----         | 90    | Up        | Lambquarters-----    | 90        | Sta.  | Pigweed-----              | 95          | Sta.      | Sandbur-----             | 15        | Sta.        |           |  |
| North Dakota----- | Green foxtail----- | 100       | Sta.        | Wild buckwheat----- | 90    | Sta.      | Wild mustard-----    | 50        | Down  | Wild oats-----            | 85          | Sta.      | Yellow foxtail-----      | 100       | Sta.        |           |  |
| Ohio-----         | Foxtail-----       | 50        | Sta.        | Lambquarters-----   | 40    | Sta.      | Pigweed-----         | 60        | Sta.  | Rugweed-----              | 40          | Sta.      | Red sorrel-----          | 80        | Sta.        |           |  |
| Western:          |                    |           |             |                     |       |           |                      |           |       |                           |             |           |                          |           |             |           |  |
| California-----   | Barnyardgrass----- | 45        | Sta.        | Jungler-----        | 10    | Sta.      | Lambquarters-----    | 60        | Sta.  | Nettleleaf goosefoot----- | 50          | Sta.      | Silverbeet knotweed----- | 25        | Sta.        |           |  |
| Colorado-----     | Foxtail-----       | 90        | Sta.        | Kochia-----         | 90    | Sta.      | Redroot pigweed----- | 80        | Up    | Russian thistle-----      | 60          | Sta.      | Wild oats-----           | 90        | Up          |           |  |
| Idaho-----        | Barnyardgrass----- | 50        | Up          | Foxtail-----        | 90    | Sta.      | Lambquarters-----    | 100       | Down  | Pigweed-----              | 100         | Down      | Wild oats-----           | 10        | Sta.        |           |  |
| Montana-----      | Kochia-----        | 30        | Up          | Nightshade-----     | 5     | Up        | Pigweed-----         | 20        | Sta.  | White top-----            | 90          | Sta.      | Wild oats-----           | 25        | Down        |           |  |
| Nevada-----       | Barnyardgrass----- | 100       | Sta.        | Pigweed-----        | 100   | Sta.      | Russet knogweed----- | 10        | Up    | White top-----            | 70          | Down      | Pigweed-----             | 90        | Down        |           |  |
| New Mexico-----   | Barnyardgrass----- | 60        | Down        | Foxtail-----        | 85    | Down      | Kochia-----          | 70        | Down  | Lambquarters-----         | 60          | Down      | Pigweed-----             | 90        | Down        |           |  |
| Oregon-----       | Barnyardgrass----- | 90        | Down        | Groundcherry-----   | 80    | Down      | Lambquarters-----    | 90        | Down  | Pigweed-----              | 90          | Down      | Wild mustard-----        | 90        | Down        |           |  |
| Utah-----         | Barnyardgrass----- | 20        | Up          | Lambquarters-----   | 60    | Sta.      | Redroot pigweed----- | 100       | Sta.  | Wild mustard-----         | 100         | Sta.      | Wild oats-----           | 50        | Down        |           |  |
| Washington-----   | Barnyardgrass----- | 75        | Sta.        | Lambquarters-----   | 75    | Sta.      | Pigweed-----         | 75        | Sta.  | Wild mustard-----         | 75          | Sta.      | Wild oats-----           | 50        | Down        |           |  |
| Wyoming-----      | Green foxtail----- | 100       | Sta.        | Kochia-----         | 30    | Up        | Lambquarters-----    | 90        | Sta.  | Nightshade-----           | 30          | Up        | Redroot pigweed-----     | 100       | Sta.        |           |  |

<sup>1</sup> Sta., stationary.



Table 21.--Sorghum: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region    | Acres treated |               | Average cost per acre <sup>1</sup> |               | Acreage treated by-- |                  | Effectiveness of herbicides |               | Herbicides usage trend <sup>2</sup> | Need for better herbicides | Persistence problem |
|---------------------|---------------|---------------|------------------------------------|---------------|----------------------|------------------|-----------------------------|---------------|-------------------------------------|----------------------------|---------------------|
|                     | Preemergence  | Postemergence | Preemergence                       | Postemergence | Farmers              | Custom operators | Preemergence                | Postemergence |                                     |                            |                     |
|                     | 1,000 acres   | 1,000 acres   | Dollars                            | Dollars       | Percent              | Percent          |                             |               |                                     |                            |                     |
| Massachusetts-----  | --            | 1             | --                                 | 3.00          | 70                   | 30               | ----                        | ----          | Up                                  | Some                       | Yes                 |
| New York-----       | 20            | 10            | 13.00                              | 7.00          | 70                   | 30               | Good                        | Fair          | Up                                  | Some                       | Yes                 |
| Northeastern-----   | 20            | 11            | 13.00                              | 6.64          | 70                   | 30               | 1-Good                      | 1-Fair        | 2-Up                                | 2-Some                     | 2-Yes               |
| Illinois-----       | 3             | 4             | 4.00                               | 1.25          | 95                   | 5                | Fair                        | Good          | Sta.                                | Some                       | No                  |
| Iowa-----           | 6             | 28            | 3.00                               | 1.00          | 90                   | 10               | Fair                        | Good          | Up                                  | Some                       | No                  |
| Kansas-----         | 200           | 2,000         | 7.50                               | 1.85          | 85                   | 15               | Fair                        | Fair          | Up                                  | Urgent                     | Yes                 |
| Minnesota-----      | .5            | 1             | 4.50                               | 2.00          | 100                  | --               | Good                        | Good          | Up                                  | Little                     | Yes                 |
| Missouri-----       | 50            | 50            | 7.00                               | 1.00          | 75                   | 25               | Good                        | Fair          | Up                                  | Little                     | No                  |
| Nebraska-----       | 500           | 1,500         | 12.00                              | 4.00          | 70                   | 30               | Good                        | Good          | Up                                  | Some                       | Yes                 |
| South Dakota-----   | 80            | 125           | 4.00                               | 1.50          | 50                   | 50               | Good                        | Good          | Up                                  | Some                       | Yes                 |
| North Central-----  | 839.5         | 3,708         | 9.77                               | 2.69          | 77                   | 23               | 4-Good                      | 5-Good        | 6-Up                                | 1-Urgent                   | 4-Yes               |
| Alabama-----        | --            | 1             | --                                 | 2.00          | 98                   | 2                | ----                        | Fair          | Sta.                                | Urgent                     | No                  |
| Arkansas-----       | 4             | 15            | 4.00                               | 1.50          | 99                   | 1                | Good                        | Good          | Up                                  | Urgent                     | Yes                 |
| Florida-----        | 1             | --            | 6.00                               | --            | 50                   | 50               | Fair                        | ----          | Up                                  | Some                       | No                  |
| Kentucky-----       | .8            | 1             | 3.00                               | 2.00          | 95                   | 5                | Good                        | Poor          | Up                                  | Little                     | No                  |
| Mississippi-----    | 5             | 8             | 2.50                               | 3.00          | 90                   | 10               | Good                        | Fair          | Up                                  | Some                       | No                  |
| North Carolina----- | 25            | 20            | 7.00                               | 2.00          | 99                   | 1                | Fair                        | Good          | Sta.                                | Some                       | No                  |
| Oklahoma-----       | 55            | 15            | 2.50                               | 1.50          | 90                   | 10               | Fair                        | Good          | Up                                  | Urgent                     | Yes                 |
| Tennessee-----      | 10            | 5             | 3.00                               | 1.50          | 95                   | 5                | Fair                        | Fair          | Up                                  | Some                       | No                  |
| Texas-----          | 500           | 1             | 5.00                               | 3.00          | 50                   | 50               | Good                        | Fair          | Up                                  | Urgent                     | Yes                 |
| Virginia-----       | .2            | 1             | 2.75                               | 2.00          | 95                   | 5                | Poor                        | Fair          | Up                                  | Some                       | No                  |
| Southern-----       | 601           | 67            | 4.79                               | 1.87          | 61                   | 39               | 4-Good                      | 3-Good        | 7-Up                                | 4-Urgent                   | 3-Yes               |
| Arizona-----        | 5             | 20            | 4.00                               | 5.00          | 50                   | 50               | 4-Fair                      | 5-Fair        | 3-Sta.                              | 5-Some                     | 7-No                |
| California-----     | --            | 75            | --                                 | 5.00          | 40                   | 60               | 1-Poor                      | 1-Poor        |                                     | 1-Little                   |                     |
| Colorado-----       | 5             | 20            | 3.00                               | 2.00          | 40                   | 60               | Fair                        | Good          | Up                                  | Little                     | Yes                 |
| New Mexico-----     | 2             | 17            | 3.50                               | 2.00          | 100                  | --               | Good                        | Fair          | Up                                  | Some                       | Yes                 |
| Hawaii-----         | .3            | .1            | 20.00                              | 25.00         | 100                  | --               | Good                        | Good          | Up                                  | Urgent                     | Yes                 |
| Western-----        | 12.3          | 132.1         | 3.90                               | 4.17          | 50                   | 50               | 2-Good                      | 3-Good        | 5-Up                                | 1-Urgent                   | 3-Yes               |
| United States-----  | 1,472.8       | 3,918.1       | 7.73                               | 2.74          | 74                   | 26               | 2-Fair                      | 2-Fair        |                                     | 3-Some                     | 2-No                |
|                     |               |               |                                    |               |                      |                  | 11-Good                     | 11-Good       | 20-Up                               | 6-Urgent                   | 12-Yes              |
|                     |               |               |                                    |               |                      |                  | 9-Fair                      | 10-Fair       | 4-Sta.                              | 14-Some                    | 12-No               |
|                     |               |               |                                    |               |                      |                  | 1-Poor                      | 1-Poor        |                                     | 4-Little                   |                     |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.

<sup>2</sup> Sta., stationary.

Table 22.--Sorghum: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State | Weed              | Infestation |              | Weed              | Infestation |              | Weed                      | Infestation |              | Weed               | Infestation |              | Pct.                      |     |       |
|------------------|-------------------|-------------|--------------|-------------------|-------------|--------------|---------------------------|-------------|--------------|--------------------|-------------|--------------|---------------------------|-----|-------|
|                  |                   | Acres       | Trend<br>(↑) |                   | Acres       | Trend<br>(↑) |                           | Acres       | Trend<br>(↑) |                    | Acres       | Trend<br>(↑) |                           |     |       |
| Northeastern:    |                   |             |              |                   |             |              |                           |             |              |                    |             |              |                           |     |       |
| New Jersey-----  | Crabgrass-----    | --          | Up           | Giant foxtail---- | --          | Up           | Lambsquarters----         | --          | Sta.         | Pigweed-----       | --          | Sta.         | Velvetleaf-----           | --  | Up    |
| New York-----    | Crabgrass-----    | 50          | Up           | Horsenettle-----  | 30          | Up           | Lambsquarters----         | 60          | Sta.         | Nutsedge-----      | 40          | Up           | Quackgrass-----           | 80  | Down  |
| North Central:   |                   |             |              |                   |             |              |                           |             |              |                    |             |              |                           |     |       |
| Illinois-----    | Giant foxtail---- | 50          | Sta.         | Jimsonweed-----   | 15          | Sta.         | Lambsquarters----         | 15          | Sta.         | Smartweed-----     | 25          | Sta.         | Velvetleaf-----           | 15  | Sta.  |
| Iowa-----        | Barnyardgrass---  | 25          | Sta.         | Giant foxtail---- | 50          | Sta.         | Green foxtail----         | 25          | Sta.         | -----              | --          | -----        | -----                     | --  | ----- |
| Kansas-----      | Foxtail-----      | 75          | Sta.         | Giant foxtail---- | 20          | Up           | Johnsongrass-----         | 20          | Up           | Pigweed-----       | 75          | Sta.         | Wild cane-----            | 20  | Up    |
| Minnesota-----   | Canada thistle--- | 60          | Sta.         | Foxtail-----      | 100         | Up           | Lambsquarters----         | 95          | Sta.         | Pigweed-----       | 95          | Sta.         | Smartweed-----            | 50  | Sta.  |
| Missouri-----    | Cocklebur-----    | 60          | Sta.         | Foxtail-----      | 60          | Sta.         | Johnsongrass-----         | 15          | Up           | Morningglory---    | 60          | Sta.         | Pigweed-----              | 60  | Sta.  |
| Nebraska-----    | Crabgrass-----    | 60          | Up           | Foxtail-----      | 95          | Up           | Pigweed-----              | 95          | Down         | Wild cane-----     | 20          | Up           | -----                     | --  | ----- |
| North Dakota---  | Green foxtail---- | 100         | Sta.         | Kochia-----       | 40          | Up           | Redroot pigweed---        | 40          | Sta.         | Wild mustard---    | 40          | Sta.         | Yellow foxtail---         | 100 | Sta.  |
| South Dakota---  | Barnyardgrass---  | 10          | Sta.         | Field bindweed--- | 5           | Sta.         | Foxtail-----              | 50          | Sta.         | Pigweed-----       | 10          | Sta.         | Sunflower-----            | 10  | Sta.  |
| Southern:        |                   |             |              |                   |             |              |                           |             |              |                    |             |              |                           |     |       |
| Arkansas-----    | Cocklebur-----    | 70          | Up           | Crabgrass-----    | 85          | Up           | Johnsongrass-----         | 15          | Sta.         | Morningglory---    | 75          | Sta.         | Pigweed-----              | 30  | Sta.  |
| Florida-----     | Bermudagrass---   | 30          | Up           | Crabgrass-----    | 100         | Sta.         | Crotalaria-----           | 10          | Down         | Florida purslane-- | 100         | Sta.         | Sicklepod-----            | 20  | Sta.  |
| Georgia-----     | Cocklebur-----    | 20          | Up           | Johnsongrass---   | 10          | Sta.         | Pigweed-----              | 5           | Sta.         | Sandbur-----       | 5           | Sta.         | Sicklepod-----            | 20  | Up    |
| Kentucky-----    | Crabgrass-----    | 60          | Sta.         | Pigweed-----      | 20          | Sta.         | -----                     | --          | -----        | -----              | --          | -----        | -----                     | --  | ----- |
| Mississippi---   | Cocklebur-----    | 60          | Sta.         | Crabgrass-----    | 80          | Sta.         | Morningglory---           | 35          | Sta.         | Pigweed-----       | 40          | Sta.         | Signalgrass-----          | 40  | Sta.  |
| North Carolina-  | Crabgrass-----    | 90          | Down         | Johnsongrass---   | 20          | Sta.         | Lambsquarters----         | 85          | Down         | Morningglory---    | 90          | Sta.         | Pigweed-----              | 90  | Down  |
| Oklahoma-----    | Cocklebur-----    | 50          | Up           | Crabgrass-----    | 90          | Up           | Johnsongrass-----         | 90          | Up           | Morningglory---    | 25          | Up           | Pigweed-----              | 85  | Up    |
| South Carolina-  | Cocklebur-----    | 50          | Sta.         | Crabgrass-----    | 80          | Sta.         | Morningglory---           | 25          | Up           | Pigweed-----       | 40          | Sta.         | Ragweed-----              | 40  | Sta.  |
| Tennessee-----   | Cocklebur-----    | 25          | Up           | Crabgrass-----    | 95          | Sta.         | Johnsongrass---           | 40          | Up           | Morningglory---    | 20          | Sta.         | Pigweed-----              | 20  | Up    |
| Texas-----       | Browntop panicum- | 40          | Sta.         | Johnsongrass---   | 60          | Sta.         | Morningglory---           | 10          | Sta.         | Pigweed-----       | 50          | Sta.         | Russian thistle--         | 35  | Down  |
| Virginia-----    | Crabgrass-----    | 20          | Sta.         | Foxtail-----      | 10          | Sta.         | Morningglory---           | 10          | Sta.         | Nutsedge-----      | 5           | Sta.         | -----                     | --  | ----- |
| Western:         |                   |             |              |                   |             |              |                           |             |              |                    |             |              |                           |     |       |
| Arizona-----     | Barnyardgrass---  | 75          | Sta.         | Cocklebur-----    | 15          | Sta.         | Johnsongrass---           | 15          | Sta.         | Morningglory---    | 15          | Sta.         | Pigweed-----              | 75  | Sta.  |
| California-----  | Barnyardgrass---  | 70          | Sta.         | Bindweed-----     | 15          | Sta.         | Pigweed-----              | 25          | Sta.         | -----              | --          | -----        | -----                     | --  | ----- |
| Colorado-----    | Field bindweed--- | 50          | Up           | Kochia-----       | 70          | Up           | Lambsquarters----         | 90          | Up           | Redroot pigweed--- | 90          | Up           | Sandbur-----              | 70  | Sta.  |
| Nevada-----      | Barnyardgrass---  | 100         | Sta.         | Johnsongrass---   | 25          | Up           | Lambsquarters----         | 50          | Sta.         | Pigweed-----       | 75          | Sta.         | -----                     | --  | ----- |
| New Mexico-----  | Bindweed-----     | 10          | Sta.         | Johnsongrass---   | 25          | Sta.         | Lambsquarters----         | 80          | Down         | Pigweed-----       | 50          | Down         | Sunflower-----            | 60  | Down  |
| Hawaii-----      | Bermudagrass---   | 15          | Up           | Bristly foxtail-- | 25          | Up           | Feather finger-<br>grass. | 15          | Up           | Spiny amaranth--   | 15          | Up           | Swollen finger-<br>grass. | 15  | Up    |

1 Sta., stationary.

Weeds listed as being one of the five most important in at least four States were barnyardgrass, cocklebur, crabgrass, foxtails, johnsongrass, lambsquarters, morningglory, and pigweeds. Of these nationally or regionally important weeds, only pigweed was reported to be decreasing in two or more States. The reports indicate that progress in control of major weeds in sorghum is less than the progress being made in control of weeds in corn. This may be related to the fact that a far greater proportion of the harvested corn acreage than sorghum acreage is treated with herbicides. Concurrently, this greater use of herbicides in corn probably indicates that the herbicides developed for use in corn are more satisfactory than the same or different herbicides used in sorghum.

### Forage Seed Crops

In considering the extent of herbicides used in forage crops grown for seed, it should be pointed out that reports for these crops in Oregon and Missouri are missing from the 1965 report. Collectively, these two States accounted for about half of the acreage treated in 1962. Of the States which reported on the number of acres treated in 1965, producers of

forage crops for seed treated slightly less than 2 percent of the harvested acreage with herbicides before the crop emerged, and slightly less than 7 percent after emergence. They treated 45,000 acres preemergence at an average cost of \$12.17, and treated 176,000 acres postemergence at an average cost of \$5.58 per acre. Farmers treated 78 percent of the acreage with their own equipment, and custom operators treated 22 percent. (Tables 1 to 5, 23, and 24.)

Reports on the effectiveness of herbicides indicate the treatments used in 1965 were slightly less effective than those used in 1962. Five States reported an urgent need for better herbicides in 1965, eight reported some need for better herbicides, and two reported little need for better herbicides. Four of 15 States reported problems of herbicide persistence in 1965, whereas only three of 20 States reported problems in 1962. Of the 15 States reporting, the usage trend for herbicides was up in 12 States, stationary in three, and down in none.

Weeds listed as being one of the five most important in at least three States were lambsquarters, pigweeds, field bindweed, docks, wild garlic, dodder, plantain, and wild radish. None of these nationally or regionally important weeds was reported as declining in more than one State.

Table 23.---Forage seeds: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region   | Acres treated |               | Average cost per acre <sup>1</sup> |               | Acreage treated by-- |                  | Effectiveness of herbicides |                            | Herbicides usage trend <sup>2</sup> | Need for better herbicides     | Persistence problem |
|--------------------|---------------|---------------|------------------------------------|---------------|----------------------|------------------|-----------------------------|----------------------------|-------------------------------------|--------------------------------|---------------------|
|                    | Preemergence  | Postemergence | Preemergence                       | Postemergence | Farmers              | Custom operators | Preemergence                | Postemergence              |                                     |                                |                     |
|                    | 1,000 acres   | 1,000 acres   | Dollars                            | Dollars       | Percent              | Percent          |                             |                            |                                     |                                |                     |
| Pennsylvania-----  | --            | 2             | --                                 | 5.50          | 100                  | --               | ----                        | Fair                       | Sta.                                | Some                           | No                  |
| Vermont-----       | .5            | 1             | 6.00                               | 4.00          | 25                   | 75               | Good                        | Good                       | Up                                  | Little                         | Yes                 |
| Northeastern-----  | .5            | 3             | 6.00                               | 5.00          | 68                   | 32               | 1-Good                      | 1-Good                     | 1-Up<br>1-Sta.                      | 1-Some<br>1-Little             | 1-Yes<br>1-No       |
| Illinois-----      | --            | 1             | --                                 | 2.00          | 95                   | 5                | ----                        | Fair                       | Up                                  | Some                           | No                  |
| Minnesota-----     | --            | 25            | --                                 | 2.50          | 85                   | 15               | ----                        | Fair                       | Up                                  | Urgent                         | No                  |
| North Dakota-----  | --            | .5            | --                                 | 1.50          | 100                  | --               | ----                        | Good                       | Sta.                                | Little                         | No                  |
| South Dakota-----  | --            | 5             | --                                 | 2.00          | 30                   | 70               | ----                        | Good                       | Up                                  | Some                           | No                  |
| North Central----- | --            | 31.5          | --                                 | 2.39          | 77                   | 23               | ----                        | 2-Good<br>2-Fair           | 3-Up<br>1-Sta.                      | 1-Urgent<br>2-Some<br>1-Little | 4-No                |
| Florida-----       | --            | 2             | --                                 | 1.50          | 50                   | 50               | ----                        | Fair                       | Up                                  | Some                           | No                  |
| Kentucky-----      | --            | 30            | --                                 | 2.00          | 95                   | 5                | ----                        | Fair                       | Sta.                                | Some                           | No                  |
| Texas-----         | --            | 6             | --                                 | 2.00          | 50                   | 50               | ----                        | Good                       | Up                                  | Some                           | No                  |
| Virginia-----      | --            | 2             | --                                 | 6.40          | 75                   | 25               | ----                        | Poor                       | Up                                  | Urgent                         | No                  |
| Southern-----      | --            | 40            | --                                 | 2.20          | 85                   | 15               | ----                        | 1-Good<br>2-Fair<br>1-Poor | 3-Up<br>1-Sta.                      | 1-Urgent<br>3-Some             | 4-No                |
| California-----    | 40            | 80            | 12.00                              | 9.00          | 75                   | 25               | Fair                        | Fair                       | Up                                  | Urgent                         | Yes                 |
| Montana-----       | .3            | .9            | 7.00                               | 1.75          | 100                  | --               | Good                        | Fair                       | Up                                  | Some                           | No                  |
| Nevada-----        | --            | .5            | --                                 | 30.00         | 60                   | 40               | ----                        | Fair                       | Up                                  | Urgent                         | Yes                 |
| Utah-----          | 4             | --            | 15.00                              | --            | 20                   | 80               | Fair                        | ----                       | Up                                  | Urgent                         | Yes                 |
| Washington-----    | --            | 20            | --                                 | 4.00          | 90                   | 10               | ----                        | Good                       | Up                                  | Some                           | No                  |
| Western-----       | 44.3          | 101.4         | 12.24                              | 7.92          | 76                   | 24               | 1-Good<br>2-Fair            | 1-Good<br>3-Fair           | 5-Up                                | 3-Urgent<br>2-Some             | 3-Yes<br>2-No       |
| United States----- | 44.8          | 175.9         | 12.17                              | 5.58          | 78                   | 22               | 2-Good<br>2-Fair            | 5-Good<br>8-Fair<br>1-Poor | 12-Up<br>3-Sta.                     | 5-Urgent<br>8-Some<br>2-Little | 4-Yes<br>11-No      |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.

<sup>2</sup> Sta., stationary.

Table 24.--Forage seeds: Five important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State              | Weed                | Infestation |           | Weed            | Infestation |           | Weed                   | Infestation |           | Weed               | Infestation |           | Pct.                |     |      |
|-------------------------------|---------------------|-------------|-----------|-----------------|-------------|-----------|------------------------|-------------|-----------|--------------------|-------------|-----------|---------------------|-----|------|
|                               |                     | Acres       | Trend (1) |                 | Acres       | Trend (1) |                        | Acres       | Trend (1) |                    | Acres       | Trend (1) |                     |     |      |
| Northeastern:<br>Pennsylvania | Buckhorn plantain.  | 20          | Up        | Lambsquarters   | 22          | Sta.      | Plantain               | 8           | Sta.      | White cockle       | 2           | Sta.      | Wild carrot         | 30  | Sta. |
|                               | Chickweed           | 50          | Sta.      | Chicory         | 75          | Down      | Cinquefoil             | 75          | Sta.      | Dandelion          | 75          | Up        | Quackgrass          | 95  | Sta. |
|                               | Buckhorn plantain.  | 15          | ---       | Canada thistle  | 15          | ---       | Curly dock             | 10          | ---       | Giant foxtail      | 10          | ---       | Quackgrass          | 15  | ---  |
|                               | Quackgrass          | --          | ---       | ---             | --          | ---       | ---                    | --          | ---       | ---                | --          | ---       | ---                 | --  | ---  |
|                               | Canada thistle      | 75          | Up        | Catchfly        | 75          | Up        | Perennial Sow-thistle. | 60          | Up        | Quackgrass         | 75          | Sta.      | White cockle        | 75  | Up   |
| North Central:<br>Illinois    | Crabgrass           | 100         | Up        | Dock            | 10          | Sta.      | Dodder                 | 2           | Sta.      | Pennycress         | 20          | Up        | Wild mustard        | 8   | Up   |
|                               | Bitter sneeze-weed. | 25          | Up        | Dodder          | 30          | Up        | Gumweed                | 40          | Up        | Ragweed            | 30          | Up        | Sumpweed            | 30  | Up   |
|                               | Cheat               | 5           | Sta.      | Dodder          | 20          | Sta.      | Plantain               | 30          | Sta.      | Ragweed            | 25          | Sta.      | Wild garlic         | 10  | Sta. |
|                               | Bermudagrass        | 10          | ---       | Bindweed        | 10          | ---       | Dock                   | 10          | ---       | Dodder             | 10          | ---       | Johnsongrass        | 15  | ---  |
|                               | Chicory             | 10          | Sta.      | Dock            | 5           | Up        | Dodder                 | 5           | Sta.      | Quackgrass         | 5           | Up        | Wild garlic         | 30  | Sta. |
| Southern:<br>Arkansas         | Buckhorn plantain.  | 35          | Sta.      | Curly dock      | 30          | Sta.      | Dodder                 | 25          | Up        | Volunteer alfalfa. | 50          | Sta.      | Weed brome-grasses. | 25  | Sta. |
|                               | Dodder              | 50          | Sta.      | Prickly lettuce | 80          | Up        | Tansymustard           | 80          | Up        | ---                | --          | ---       | ---                 | --  | ---  |
|                               | Dodder              | 1           | Up        | Green foxtail   | 30          | Sta.      | Lambsquarters          | 30          | Sta.      | Pigweed            | 30          | Sta.      | Weed brome-grasses. | 10  | Up   |
|                               | Bindweed            | 10          | Up        | Dodder          | 20          | Up        | Flixweed               | 100         | Sta.      | Pigweed            | 100         | Sta.      | Russian thistle     | 100 | Sta. |
|                               | Bindweed            | 5           | Sta.      | Dodder          | 5           | Down      | Johnsongrass           | 15          | Down      | Pigweed            | 10          | Down      | Texas blueweed      | 5   | Sta. |
| Western:<br>California        | Annual bluegrass    | 65          | Down      | Chickweed       | 35          | Down      | Red sorrel             | 15          | Down      | Ryegrasses         | 65          | Down      | Wild garlic         | 5   | Sta. |
|                               | Dodder              | 75          | Up        | Knotweed        | 15          | Up        | Kochia                 | 50          | Sta.      | Povertyweed        | 30          | Sta.      | Russian thistle     | 15  | Sta. |
|                               | Dodder              | 10          | Sta.      | Lambsquarters   | 30          | Sta.      | Pigweed                | 30          | Sta.      | Plantain           | 20          | Sta.      | Wild oats           | 25  | Sta. |

1 Sta., stationary.

## HORTICULTURAL CROPS

(See General Limitations)

Weeds are especially difficult to control in plantings of horticultural crops. The problem is due in part to the multitude of crop plant species and varieties involved and their differing responses to any single herbicide treatment, mechanical method, or cultural practice used to control weeds. In addition, the specialized production methods, climatic requirements, fertilization practices, and soil conditions further complicate the problem. Despite the complexity of the problems, diligent effort by weed scientists has given the farmer many useful chemical, mechanical, cultural, biological, and combination methods for controlling numerous weeds in plantings of a number of horticultural crops.

Rapid strides have been made in the mechanization of many phases of horticultural crop production. These include land preparation, fertilization, seeding, transplanting, cultivation, harvesting, hauling, drying, and processing. Weed research has been spurred on by the need for new and improved chemical and combination weed control methods that will facilitate the maximum utilization of these mechanical advances in other phases of production. Remarkable advances in weed control methods have been made and quickly accepted by the growers.

### Sweet Corn

Approximately 580,000 acres of sweet corn were grown in 21 States in 1965. Market value of the crop was \$94 million. Acreage treated with herbicides was 308,000 or about 56 percent of the total acreage harvested. Farmers treated 81 percent of the acreage and custom operators treated the remainder. Three-fourths of the treated acreage was treated before emergence of the crops and weeds. Total cost of herbicides including cost of application for all treatments was approximately 1.75 million. This amounts to an average of \$5.68 per acre for all treated acreage. Costs of preemergence and post-emergence treatments were approximately \$5.65 per acre and \$5.75 per acre, respectively. Reports of effectiveness of pre-

emergence treatments show that, in general, results were good. Results of postemergence treatments were fair to good. Problems in herbicide persistence were reported by 15 of the 21 States. Herbicide-usage trend in sweet corn is up in 11 States and stationary in 10 States. Three States report an urgent need for better herbicides; 14 States indicate some need; and 4 States indicate little need. (Tables 1 to 5, 25, and 26.)

Acreage treated preemergence ranked by regions was: North Central States 54 percent; Northeastern States 35 percent; Western States 6 percent; and Southern States 5 percent of total treated acreage. Acreage treated post-emergence ranked by regions was: North Central States 54 percent; Northeastern States 20 percent; Western States 19 percent; and Southern States 7 percent of total treated acreage.

Average cost per acre for preemergence treatments ranked by regions was: Southern States \$7.70; Northeastern States \$6.59; Western States \$5.77; and North Central States \$4.83.

Average cost per acre for postemergence treatments ranked by regions was: Southern States \$8.87; Northeastern States \$8.24; Western States \$5.19; and North Central States \$4.61. Average percent of acreage treated by farmers ranked by regions was: Northeastern States 91 percent; North Central States 80 percent; Southern States 77 percent; and Western States 62 percent of total treated acreage.

Annual weeds mentioned two or more times in reports from the various regions are: Northeastern States--crabgrass, foxtail, pigweed, and lambsquarters; North Central States--pigweed, lambsquarters, velvetleaf, barnyardgrass, giant foxtail, and foxtail; Southern States--crabgrass, lambsquarters, pigweed, cocklebur, morningglory, and foxtail; and Western States--barnyardgrass, lambsquarters, and pigweed.

Important perennial weeds mentioned in reports from the various regions are: Northeastern States--horsenettle, nutsedge, johnsongrass, orchardgrass, quackgrass, and bindweed; North Central States--Canada thistle,

Table 25.--Sweet corn: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region   | Acres treated |               | Average cost per acre <sup>1</sup> |               | Acreage treated by-- |                  | Effectiveness of herbicides |                  | Herbicides usage trend <sup>2</sup> | Need for better herbicides      | Persistence problem |
|--------------------|---------------|---------------|------------------------------------|---------------|----------------------|------------------|-----------------------------|------------------|-------------------------------------|---------------------------------|---------------------|
|                    | Preemergence  | Postemergence | Preemergence                       | Postemergence | Farmers              | Custom operators | Preemergence                | Postemergence    |                                     |                                 |                     |
|                    | 1,000 acres   | 1,000 acres   | Dollars                            | Dollars       | Percent              | Percent          |                             |                  |                                     |                                 |                     |
| Connecticut-----   | 3             | --            | 15.00                              | --            | 75                   | 25               | Good                        | ---              | Up                                  | Some                            | Yes                 |
| Delaware-----      | 2             | 1             | 7.00                               | 3.00          | 90                   | 10               | Good                        | Good             | Sta.                                | Little                          | Yes                 |
| Maryland-----      | 27            | --            | 5.00                               | --            | 100                  | --               | Good                        | ---              | Sta.                                | Some                            | No                  |
| New Hampshire----- | 3             | 1             | 20.00                              | 20.00         | 60                   | 40               | Good                        | Good             | Up                                  | Some                            | Yes                 |
| New Jersey-----    | 2             | --            | 4.50                               | --            | 90                   | 10               | Good                        | ---              | Sta.                                | Some                            | Yes                 |
| New York-----      | 30            | --            | 7.50                               | --            | 90                   | 10               | Good                        | ---              | Sta.                                | Some                            | Yes                 |
| Pennsylvania-----  | 12            | 15            | 4.00                               | 7.80          | 90                   | 10               | Good                        | Good             | Up                                  | Some                            | Yes                 |
| Northeastern-----  | 79            | 17            | 6.59                               | 8.24          | 91                   | 9                | 7-Good                      | 3-Good           | 3-Up<br>4-Sta.                      | 6-Some<br>1-Little              | 6-Yes<br>1-No       |
| Indiana-----       | 1             | --            | 10.00                              | --            | 100                  | --               | ---                         | ---              | Up                                  | Urgent                          | No                  |
| Iowa-----          | 5             | 5             | 3.00                               | 1.00          | 95                   | 5                | Fair                        | Fair             | Sta.                                | Some                            | No                  |
| Michigan-----      | 10            | 2             | 10.00                              | 2.00          | 90                   | 10               | Good                        | Good             | Up                                  | Some                            | Yes                 |
| Minnesota-----     | 75            | 2             | 3.50                               | 2.00          | 100                  | --               | Good                        | Good             | Up                                  | Some                            | Yes                 |
| Wisconsin-----     | 27            | 36            | 6.75                               | 5.40          | 50                   | 50               | Good                        | Fair             | Up                                  | Some                            | Yes                 |
| North Central----- | 118           | 45            | 4.83                               | 4.61          | 80                   | 20               | 1-Fair<br>3-Good            | 2-Good<br>3-Fair | 4-Up<br>1-Sta.                      | 1-Urgent<br>4-Some              | 3-Yes<br>2-No       |
| Florida-----       | 12            | 5             | 8.00                               | 10.00         | 75                   | 25               | Good                        | Good             | Up                                  | Some                            | Yes                 |
| Oklahoma-----      | --            | .5            | --                                 | 1.50          | 100                  | --               | ---                         | ---              | Up                                  | Some                            | Yes                 |
| Tennessee-----     | .3            | --            | 7.00                               | --            | 90                   | 10               | Good                        | ---              | Up                                  | Little                          | Yes                 |
| Virginia-----      | 1             | .3            | 4.25                               | 2.25          | 90                   | 10               | Fair                        | Fair             | Sta.                                | Some                            | Yes                 |
| Southern-----      | 13.3          | 5.8           | 7.70                               | 8.87          | 77                   | 23               | 2-Good<br>1-Fair            | 2-Good<br>1-Fair | 3-Up<br>1-Sta.                      | 3-Some<br>1-Little              | 4-Yes               |
| California-----    | --            | 2             | --                                 | 3.50          | 100                  | --               | Poor                        | Fair             | Sta.                                | Urgent                          | No                  |
| Idaho-----         | 6             | 5             | 6.00                               | 3.00          | 50                   | 50               | Good                        | ---              | Up                                  | Some                            | Yes                 |
| Oregon-----        | 8             | 4             | 5.00                               | 10.00         | 60                   | 40               | Fair                        | Fair             | Sta.                                | Little                          | No                  |
| Utah-----          | --            | 5             | --                                 | 5.00          | 75                   | 25               | ---                         | Fair             | Sta.                                | Urgent                          | Yes                 |
| Hawaii-----        | .2            | (3)           | 30.00                              | 35.00         | 100                  | --               | Good                        | Good             | Sta.                                | Little                          | No                  |
| Western-----       | 14.2          | 16            | 5.77                               | 5.19          | 62                   | 38               | 2-Good<br>1-Fair<br>1-Poor  | 1-Good<br>3-Fair | 1-Up<br>4-Sta.                      | 2-Urgent<br>1-Some<br>2-Little  | 2-Yes<br>3-No       |
| United States----- | 224.5         | 83.8          | 5.65                               | 5.75          | 81                   | 19               | 14-Good<br>3-Fair<br>1-Poor | 8-Good<br>7-Fair | 11-Up<br>10-Sta.                    | 3-Urgent<br>14-Some<br>4-Little | 15-Yes<br>6-No      |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.

<sup>2</sup> Sta., stationary.

<sup>3</sup> Less than 100 acres.

Table 26.--Sweet corn: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State | Weed             |           | Infestation |                  | Weed  |           | Infestation               |           | Weed  |                 | Infestation |           | Weed                      |           | Infestation |           |
|------------------|------------------|-----------|-------------|------------------|-------|-----------|---------------------------|-----------|-------|-----------------|-------------|-----------|---------------------------|-----------|-------------|-----------|
|                  | Acres            | Trend (1) | Acres       | Trend (1)        | Acres | Trend (1) | Acres                     | Trend (1) | Acres | Trend (1)       | Acres       | Trend (1) | Acres                     | Trend (1) | Acres       | Trend (1) |
| Northeastern:    |                  |           |             |                  |       |           |                           |           |       |                 |             |           |                           |           |             |           |
| Delaware-----    | Crabgrass-----   | 60        | Up          | Foxtail-----     | 30    | Up        | Lambsquarters--           | 50        | Sta.  | Nutsedge-----   | 50          | Up        | Pigweed-----              | 50        | Sta.        |           |
| Maryland-----    | Foxtail-----     | --        | Sta.        | Horsenettle---   | --    | Up        | Jimsonweed---             | --        | Up    | Johnsongrass--  | --          | Up        | Quackgrass---             | --        | Up          |           |
| New Hampshire--  | Barnyardgrass--  | 10        | Down        | Crabgrass-----   | 60    | Sta.      | Hairy galinsoga--         | 10        | Down  | Pigweed-----    | 10          | Down      | Quackgrass---             | 10        | Down        |           |
| New Jersey-----  | Crabgrass-----   | --        | Up          | Giant foxtail--- | --    | Up        | Lambsquarters--           | --        | Sta.  | Velvetleaf---   | --          | Sta.      | Quackgrass---             | --        | Up          |           |
| New York-----    | Bindweed-----    | 5         | Up          | Crabgrass-----   | 5     | Sta.      | Horsenettle---            | 10        | Up    | Quackgrass---   | 10          | Up        | Quackgrass---             | 10        | Up          |           |
| Pennsylvania---  | Foxtail-----     | 80        | Down        | Nutsedge-----    | 15    | Up        | Pigweed-----              | 20        | Down  | Quackgrass---   | 50          | Up        | Ragweed-----              | 80        | Down        |           |
| Rhode Island---  | Crabgrass-----   | 60        | Sta.        | Foxtail-----     | 60    | Sta.      | Nutsedge-----             | 20        | Sta.  | Purslane-----   | 60          | Sta.      | Quackgrass---             | 60        | Sta.        |           |
| Vermont-----     | Crabgrass-----   | 15        | Up          | Lambsquarters--  | 25    | Down      | Nutsedge-----             | 15        | Up    | Pigweed-----    | 25          | Down      | Quackgrass---             | 50        | Sta.        |           |
| North Central:   |                  |           |             |                  |       |           |                           |           |       |                 |             |           |                           |           |             |           |
| Illinois-----    | Giant foxtail--- | 25        | Down        | Jimsonweed-----  | 25    | Down      | Pigweed-----              | 25        | Down  | Smartweed-----  | 25          | Down      | Velvetleaf---             | 25        | Down        |           |
| Indiana-----     | Canada thistle   | 1         | Down        | Johnsongrass--   | 4     | Up        | Quackgrass---             | 2         | Sta.  | Wild cane-----  | 1           | Sta.      | Wild cucumber--           | 1         | Sta.        |           |
| Iowa-----        | Barnyardgrass--  | 75        | Sta.        | Buttonweed---    | 50    | Sta.      | Giant foxtail---          | 50        | Sta.  | Green foxtail-- | 75          | Sta.      | Yellow foxtail--          | 75        | Sta.        |           |
| Michigan-----    | Crabgrass-----   | --        | Sta.        | Lambsquarters--  | --    | Sta.      | Nutsedge-----             | --        | Up    | Quackgrass---   | --          | Up        | Ragweed-----              | --        | Up          |           |
| Ohio-----        | Barnyardgrass--  | 40        | Up          | Fall panicum---  | 30    | Up        | Foxtail-----              | 60        | Up    | Lambsquarters-- | 30          | Sta.      | Pigweed-----              | 30        | Sta.        |           |
| Wisconsin-----   | Foxtail-----     | 100       | Up          | Lambsquarters--  | 100   | Sta.      | Pigweed-----              | 100       | Sta.  | Quackgrass---   | 60          | Down      | Velvetleaf---             | 70        | Up          |           |
| Southern:        |                  |           |             |                  |       |           |                           |           |       |                 |             |           |                           |           |             |           |
| Arkansas-----    | Bermudagrass--   | --        | Sta.        | Crabgrass-----   | --    | Sta.      | Johnsongrass--            | --        | Sta.  | Nutsedge-----   | --          | Sta.      | Pigweed-----              | --        | Sta.        |           |
| Florida-----     | Bermudagrass--   | 60        | Up          | Crabgrass-----   | 100   | Sta.      | Goosegrass-----           | 100       | Sta.  | Nutsedge-----   | 50          | Up        | Spiny amaranth--          | 60        | Up          |           |
| Kentucky-----    | Crabgrass-----   | 40        | Sta.        | Foxtail-----     | 25    | Sta.      | Lambsquarters--           | 30        | Sta.  | Pigweed-----    | 40          | Sta.      | Purslane-----             | 20        | Sta.        |           |
| North Carolina-- | Cocklebur-----   | 70        | Sta.        | Crabgrass-----   | 90    | Down      | Morningglory---           | 80        | Sta.  | Nutsedge-----   | 15          | Up        | Pigweed-----              | 85        | Down        |           |
| Oklahoma-----    | Foxtail-----     | 30        | Up          | Johnsongrass--   | 80    | Up        | Lambsquarters--           | 60        | Up    | Pigweed-----    | 80          | Up        | Sunflower-----            | 30        | Up          |           |
| Tennessee-----   | Bindweed-----    | 20        | Sta.        | Cocklebur-----   | 25    | Sta.      | Crabgrass-----            | 30        | Sta.  | Johnsongrass--  | 5           | Sta.      | Morningglory---           | 40        | Sta.        |           |
| Virginia-----    | Crabgrass-----   | 30        | Sta.        | Fall panicum---  | 10    | Up        | Johnsongrass--            | 5         | Up    | Nutsedge-----   | 10          | Sta.      |                           |           |             |           |
| Western:         |                  |           |             |                  |       |           |                           |           |       |                 |             |           |                           |           |             |           |
| California-----  | Barnyardgrass--  | 65        | Sta.        | Crabgrass-----   | 50    | Sta.      | Nutsedge-----             | 25        | Up    | Pigweed-----    | 75          | Sta.      | Velvetleaf---             | 5         | Up          |           |
| Montana-----     | Canada thistle   | 25        | Up          | Kochia-----      | 50    | Sta.      | Lambsquarters--           | 50        | Sta.  | Pigweed-----    | 50          | Sta.      | Quackgrass---             | 10        | Sta.        |           |
| Oregon-----      | Barnyardgrass--  | 50        | Sta.        | Lambsquarters--  | 50    | Sta.      | Pigweed-----              | 15        | Down  | Quackgrass---   | 50          | Sta.      | Rye grasses-----          | 50        | Sta.        |           |
| Utah-----        | Barnyardgrass--  | 75        | Down        | Green foxtail--- | 75    | Sta.      | Morningglory---           | 25        | Down  | Quackgrass---   | 20          | Down      | Redroot pigweed--         | 100       | Down        |           |
| Washington-----  | Barnyardgrass--  | 60        | Sta.        | Lambsquarters--  | 60    | Sta.      | Pigweed-----              | 60        | Sta.  | Quackgrass---   | 5           | Sta.      | Smartweed-----            | 20        | Sta.        |           |
| Hawaii-----      | Bermudagrass--   | 15        | Up          | Bristly foxtail  | 25    | Up        | Feather finger-<br>grass. | 15        | Up    | Nutsedge-----   | 25          | Up        | Swollen finger-<br>grass. | 15        | Up          |           |

1 Sta., stationary.



johnsongrass, nutsedge, bindweed, and quackgrass; Southern States--bermudagrass, bindweed, johnsongrass, and nutsedge; and Western States--Canada thistle, nutsedge, and quackgrass.

### Other Vegetables

Approximately 6.2 million acres of vegetable crops other than sweet corn were grown in 36 States in 1965. Acreage treated with herbicides was 779,000 or about 12.5 percent. Farmers treated 72 percent of the acreage and custom operators treated the remainder. Sixty-five percent of the treated acreage was treated before emergence of crops and weeds. Total cost of herbicides including all treatments was \$7,969,000. This amounts to an average of \$10.23 per acre for all treated acreage. Average costs of preemergence and postemergence treatments were \$12.66 and \$5.76 per acre, respectively. Effectiveness of both preemergence and postemergence treatments was fair to good. Problems in herbicide persistence were reported by 18 States. Herbicide-usage trend for vegetable crops as a whole is up in 29 States. An urgent need for better herbicides is reported by 24 States. (Tables 1 to 5.)

### Root Crops

Preemergence and postemergence herbicide treatments of root crop plantings totaled 121,300 acres in 1965. Sixty percent of this acreage was treated before emergence of crops and weeds. Of the acreage treated preemergence, distribution by regions was: Northeastern States 41 percent; Southern States 28 percent; North Central States 24 percent; and Western States 7 percent. Average cost per acre of preemergence and postemergence treatments for all States was \$15.21 and \$12.60, respectively. Average cost per acre for preemergence treatments ranked by regions was: North Central States \$17.90; Northeastern States \$17.05; Western States \$12.39; and Southern States \$10.90. Average cost per acre for postemergence treatments ranked by regions was: Northeastern States \$17.20; Western States \$11.78; Southern States \$11.67; and North Central States \$11.33. Percent of acreage treated by farmers ranked by regions was: Southern States 87 percent; Northeastern States 83 percent; North Central States 81

percent; and Western States 31 percent. The remainder was treated by custom operators. Effectiveness of herbicide treatments was, in general, fair to good in all regions for both preemergence and postemergence treatments. Herbicide-usage trend on these crops was ascending for all regions except the Western States where six States reported usage as stationary. All regions report some need for better herbicides. Five States have an urgent need for better herbicides. All regions except the North Central States have some persistence problems. (Tables 27 and 28.)

Annual weeds mentioned two or more times in reports from the various regions are: Northeastern States--annual grasses, crabgrass, barnyardgrass, hairygalinsoga, foxtail, lambsquarters, ragweed, pigweed, and redroot pigweed; North Central States--crabgrass, giant foxtail, lambsquarters, foxtail, purslane, pigweed, and smartweed; Southern States--crabgrass, morningglory, and pigweed; and Western States--knotweed, barnyardgrass, lambsquarters, mallow, foxtail, pigweed, purslane, nightshade, and wild mustard.

Important perennial weeds mentioned in reports from the various regions are: Northeastern States--nutsedge and quackgrass; North Central States--nutsedge and quackgrass; Southern States--bermudagrass, nutsedge, johnsongrass, and quackgrass; and Western States--Canada thistle and nutsedge.

### Cucurbits

Preemergence and postemergence herbicide treatments of cucurbit plantings totaled 64,300 acres in 1965. Of the total acreage treated, 89 percent was treated preemergence. Of the acreage treated preemergence, distribution by regions was: Northeastern States 41.8 percent; North Central States 29.5 percent; Western States 15.2 percent; and Southern States 13.5 percent. States using postemergence treatments were Washington, Oregon, and Kentucky. Average cost per acre of preemergence and postemergence treatments for all States was \$10.09 and \$13.59, respectively. Average cost per acre for preemergence treatments ranked by regions was: Western States \$13.68; Northeastern States \$11.43; Southern States \$8.34; and North Central States \$7.15. Average cost per acre for postemergence treatments ranked by regions was: Southern States \$15.00 and

Table 27.---Root crops: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region    | Acres treated |                  | Acres cost per acre <sup>1</sup> |               | Acres treated by--- |                  | Effectiveness of herbicides  |                   | Herbicides usage trend <sup>2</sup> | Need for better herbicides      | Persistence problem |
|---------------------|---------------|------------------|----------------------------------|---------------|---------------------|------------------|------------------------------|-------------------|-------------------------------------|---------------------------------|---------------------|
|                     | Preemergence  | Postemergence    | Preemergence                     | Postemergence | Farmers             | Custom operators | Preemergence                 | Postemergence     |                                     |                                 |                     |
|                     | 1,000 acres   | 1,000 acres      | Dollars                          | Dollars       | Percent             | Percent          |                              |                   |                                     |                                 |                     |
| Connecticut-----    | --            | .7               | --                               | 35.00         | 100                 | --               | ---                          | Good              | Up                                  | Some                            | Yes                 |
| Delaware-----       | 2             | 6                | 5.00                             | 15.00         | 50                  | 50               | Good                         | Good              | Up                                  | Some                            | No                  |
| New Hampshire-----  | 1             | .5               | 20.00                            | 25.00         | 80                  | 20               | Fair                         | Fair              | Up                                  | Some                            | Yes                 |
| New Jersey-----     | 12            | --               | 12.00                            | --            | 90                  | 10               | Good                         | ---               | Up                                  | Some                            | No                  |
| New York-----       | 15            | --               | 22.50                            | --            | 95                  | 5                | Fair                         | ---               | Sta.                                | Some                            | No                  |
| Pennsylvania-----   | --            | 1                | --                               | 14.00         | 90                  | 10               | ---                          | Good              | Up                                  | Some                            | No                  |
| Northeastern-----   | 30            | 8.2              | 17.05                            | 17.20         | 83                  | 17               | 2-Good<br>2-Fair             | 3-Good<br>1-Fair  | 5-Up<br>1-Sta.                      | 6-Some                          | 2-Yes<br>4-No       |
| Indiana-----        | .7            | .9               | 16.00                            | 22.50         | 100                 | --               | Fair                         | Fair              | Up                                  | Some                            | No                  |
| Iowa-----           | 1             | --               | 3.00                             | --            | 95                  | 5                | Fair                         | ---               | No                                  | Urgent                          | No                  |
| Michigan-----       | 10            | 5                | 25.00                            | 10.00         | 70                  | 30               | Good                         | Fair              | Up                                  | Some                            | No                  |
| Minnesota-----      | .2            | .5               | 9.50                             | 9.50          | 100                 | --               | Good                         | Good              | Up                                  | Some                            | No                  |
| Ohio-----           | .3            | .2               | 6.00                             | 12.00         | 100                 | --               | Good                         | Good              | Up                                  | Some                            | No                  |
| Wisconsin-----      | 5             | 2                | 8.00                             | 10.00         | 95                  | 5                | Fair                         | Good              | Sta.                                | Some                            | No                  |
| North Central-----  | 17.2          | 8.6              | 17.90                            | 11.33         | 81                  | 19               | 3-Good<br>3-Fair             | 3-Good<br>2-Fair  | 4-Up<br>2-Sta.                      | 1-Urgent<br>5-Some              | 6-No                |
| Arkansas-----       | .3            | --               | 12.00                            | --            | 95                  | 5                | Fair                         | ---               | Up                                  | Some                            | No                  |
| Florida-----        | 5             | 4                | 8.00                             | 10.00         | 80                  | 20               | Good                         | Good              | Up                                  | Some                            | Yes                 |
| Georgia-----        | .5            | --               | 10.00                            | --            | 90                  | 10               | Fair                         | ---               | Up                                  | Urgent                          | No                  |
| Kentucky-----       | .2            | --               | 10.00                            | --            | 100                 | --               | Good                         | ---               | Up                                  | Some                            | Yes                 |
| Oklahoma-----       | .5            | --               | 4.50                             | --            | 100                 | --               | Good                         | ---               | Up                                  | Some                            | Yes                 |
| South Carolina----- | 1             | --               | 10.00                            | --            | 100                 | --               | Fair                         | ---               | Up                                  | Some                            | Yes                 |
| Tennessee-----      | .8            | --               | 18.00                            | --            | 90                  | 10               | Good                         | ---               | Sta.                                | Little                          | Yes                 |
| Virginia-----       | 12            | 2                | 12.00                            | 15.00         | 90                  | 10               | Fair                         | Fair              | Up                                  | Urgent                          | No                  |
| Southern-----       | 20.3          | 6                | 10.90                            | 11.67         | 87                  | 13               | 4-Good<br>4-Fair             | 1-Good<br>1-Fair  | 7-Up<br>1-Sta.                      | 2-Urgent<br>5-Some<br>1-Little  | 5-Yes<br>3-No       |
| Arizona-----        | --            | 2                | --                               | 12.00         | 20                  | 80               | ---                          | Good              | Sta.                                | Little                          | No                  |
| California-----     | 2             | 20               | 12.00                            | 12.00         | 20                  | 80               | ---                          | Good              | Up                                  | Urgent                          | No                  |
| New Mexico-----     | .8            | --               | 4.00                             | --            | 100                 | --               | Good                         | ---               | Up                                  | Some                            | No                  |
| Oregon-----         | --            | 2                | --                               | 6.00          | 90                  | 10               | ---                          | Good              | Sta.                                | Little                          | No                  |
| Utah-----           | --            | .1               | --                               | 15.00         | 100                 | --               | ---                          | Good              | Sta.                                | Little                          | No                  |
| Washington-----     | 2             | 2                | 15.00                            | 15.00         | 50                  | 50               | Good                         | Good              | Sta.                                | Some                            | Yes                 |
| Alaska-----         | --            | ( <sup>3</sup> ) | --                               | 80.00         | 100                 | --               | Poor                         | ---               | Sta.                                | Urgent                          | No                  |
| Hawaii-----         | .1            | --               | 35.00                            | --            | 100                 | --               | Fair                         | ---               | Up                                  | Some                            | Yes                 |
| Western-----        | 4.9           | 26.1             | 12.39                            | 11.78         | 31                  | 69               | 2-Good<br>1-Fair<br>1-Poor   | 5-Good            | 2-Up<br>6-Sta.                      | 2-Urgent<br>3-Some<br>3-Little  | 2-Yes<br>6-No       |
| United States-----  | 72.4          | 48.9             | 15.21                            | 12.60         | 70                  | 30               | 11-Good<br>10-Fair<br>1-Poor | 12-Good<br>4-Fair | 18-Up<br>10-Sta.                    | 5-Urgent<br>19-Some<br>4-Little | 9-Yes<br>19-No      |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.  
<sup>2</sup> Sta., stationary.  
<sup>3</sup> Less than 50 acres.

Table 28.--Root crops: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965.

| Region and State      | Weed              |           | Infestation         |           | Weed                 |           | Infestation       |           | Weed              |           | Infestation         |           | Weed                |           | Infestation      |           |
|-----------------------|-------------------|-----------|---------------------|-----------|----------------------|-----------|-------------------|-----------|-------------------|-----------|---------------------|-----------|---------------------|-----------|------------------|-----------|
|                       | Acres             | Trend (↑) | Acres               | Trend (↑) | Acres                | Trend (↑) | Acres             | Trend (↑) | Acres             | Trend (↑) | Acres               | Trend (↑) | Acres               | Trend (↑) | Acres            | Trend (↑) |
|                       | Pct.              |           | Pct.                |           | Pct.                 |           | Pct.              |           | Pct.              |           | Pct.                |           | Pct.                |           | Pct.             |           |
| <b>Northeastern:</b>  | Annual grasses--  | 25 Sta.   | Chickweed-----      | 25 Sta.   | Pepperweed-----      | 10 Sta.   | Ragweed-----      | 75 Up     | Ragweed-----      | 75 Up     | Shepherdspurse----  | 50 Sta.   | Shepherdspurse----  | 50 Sta.   | Wild radish----- | 50 Sta.   |
| Connecticut---        | Crabgrass-----    | 90 Up     | Lambsquarters----   | 90 Sta.   | Nutsedge-----        | 60 Up     | Pigweed-----      | 80 Up     | Pigweed-----      | 80 Up     | Wild mustard-----   | 10 Down   | Wild mustard-----   | 10 Down   | Quackgrass-----  | 5 Sta.    |
| Delaware-----         | Annual grasses--  | 20 Sta.   | Lambsquarters----   | 80 Sta.   | Quackgrass-----      | 30 Sta.   | Pigweed-----      | 15 Down   | Pigweed-----      | 15 Down   | Quackgrass-----     | 5 Sta.    | Quackgrass-----     | 5 Sta.    |                  |           |
| Maine-----            | Crabgrass-----    | 40 Sta.   | Hairy Galinsoga---- | 10 Up     | Lambsquarters----    | 15 Down   | Ragweed-----      | -- Sta.   | Ragweed-----      | -- Sta.   |                     | -- Sta.   |                     |           |                  |           |
| New Hampshire--       | Crabgrass-----    | 40 Sta.   | Hairy Galinsoga---- | 10 Up     | Lambsquarters----    | 15 Down   | Ragweed-----      | -- Sta.   | Ragweed-----      | -- Sta.   |                     | -- Sta.   |                     |           |                  |           |
| New Jersey-----       | Barnyardgrass--   | -- Sta.   | Fall Panicum-----   | -- Sta.   | Nutsedge-----        | -- Sta.   | Ragweed-----      | -- Sta.   | Ragweed-----      | -- Sta.   |                     | -- Sta.   |                     |           |                  |           |
| New York-----         | Hairy galinsoga-- | 50 Sta.   | Henbit-----         | 10 Sta.   | Lambsquarters----    | 95 Sta.   | Ragweed-----      | 50 Sta.   | Ragweed-----      | 50 Sta.   | Redroot pigweed---- | 95 Sta.   | Redroot pigweed---- | 95 Sta.   |                  |           |
| Pennsylvania---       | Foxtail-----      | 5 Down    | Lambsquarters----   | 12 Up     | Nutsedge-----        | 45 Down   | Pigweed-----      | 60 Sta.   | Pigweed-----      | 60 Sta.   | Ragweed-----        | 40 Down   | Ragweed-----        | 40 Down   |                  |           |
| Vermont-----          | Barnyardgrass--   | 25 Sta.   | Crabgrass-----      | 25 Sta.   | Foxtail-----         | 25 Sta.   | Lambsquarters--   | 25 Sta.   | Lambsquarters--   | 25 Sta.   | Pigweed-----        | 25 Sta.   | Pigweed-----        | 25 Sta.   |                  |           |
| <b>North Central:</b> | Crabgrass-----    | 20 Down   | Giant foxtail-----  | 20 Down   | Lambsquarters----    | 20 Down   | Pigweed-----      | 20 Down   | Pigweed-----      | 20 Down   | Smartweed-----      | 20 Down   | Smartweed-----      | 20 Down   |                  |           |
| Illinois-----         | Annual grasses--  | 100 Sta.  | Hairy galinsoga---- | 20 Up     | Pigweed-----         | 50 Sta.   | Purslane-----     | 50 Sta.   | Purslane-----     | 50 Sta.   |                     | --        |                     | --        |                  |           |
| Indiana-----          | Giant foxtail---  | 75 Sta.   | Lambsquarters----   | 50 Sta.   | Pigweed-----         | 50 Sta.   | Purslane-----     | -- Up     | Purslane-----     | -- Up     |                     | -- Sta.   |                     | -- Sta.   |                  |           |
| Iowa-----             | Common chickweed  | -- Up     | Crabgrass-----      | -- Up     | Nutsedge-----        | 100 Sta.  | Smartweed-----    | 100 Sta.  | Smartweed-----    | 100 Sta.  |                     | --        |                     | --        |                  |           |
| Michigan-----         | Lambsquarters--   | 50 Sta.   | Purslane-----       | 100 Sta.  | Smartweed-----       | 100 Sta.  | Smartweed-----    | 100 Sta.  | Smartweed-----    | 100 Sta.  |                     | --        |                     | --        |                  |           |
| Minnesota-----        | Foxtail-----      | 75 Sta.   | Lambsquarters----   | 60 Sta.   | Quackgrass-----      | 4 Sta.    | Quackgrass-----   | 60 Sta.   | Quackgrass-----   | 60 Sta.   | Wild oats-----      | 30 Sta.   | Wild oats-----      | 30 Sta.   |                  |           |
| North Dakota---       | Foxtail-----      | 40        | Foxtail-----        | 60        | Pigweed-----         | 60        | Purslane-----     | 60        | Purslane-----     | 60        | Wild oats-----      | 30 Sta.   | Wild oats-----      | 30 Sta.   |                  |           |
| Ohio-----             | Barnyardgrass--   | 40        | Foxtail-----        | 60        | Pigweed-----         | 60        | Purslane-----     | 60        | Purslane-----     | 60        | Ragweed-----        | 50 Up     | Ragweed-----        | 50 Up     |                  |           |
| Wisconsin-----        | Foxtail-----      | 100 Sta.  | Lambsquarters----   | 100 Sta.  | Pigweed-----         | 100 Sta.  | Purslane-----     | 100 Sta.  | Purslane-----     | 100 Sta.  | Sandbur-----        | 100 Sta.  | Sandbur-----        | 100 Sta.  |                  |           |
| <b>Southern:</b>      | Bermudagrass---   | -- Sta.   | Crabgrass-----      | -- Up     | Johnsongrass-----    | -- Up     | Nutsedge-----     | -- Sta.   | Nutsedge-----     | -- Sta.   | Redroot pigweed---- | -- Sta.   | Redroot pigweed---- | -- Sta.   |                  |           |
| Arkansas-----         | Bermudagrass---   | 60 Up     | Crabgrass-----      | 100 Sta.  | Goosegrass-----      | 100 Sta.  | Nutsedge-----     | 50 Up     | Nutsedge-----     | 50 Up     | Spiny amaranth----  | 50 Up     | Spiny amaranth----  | 50 Up     |                  |           |
| Florida-----          | Dock-----         | 10 Sta.   | Grasses-----        | 50 Up     | Foxtail-----         | 50 Sta.   | Pigweed-----      | 75 Sta.   | Pigweed-----      | 75 Sta.   |                     | 50 Sta.   |                     | 50 Sta.   |                  |           |
| Georgia-----          | Chickweed-----    | 30 Sta.   | Crabgrass-----      | 75 Sta.   | Foxtail-----         | 50 Sta.   | Pigweed-----      | 75 Sta.   | Pigweed-----      | 75 Sta.   |                     | 50 Sta.   |                     | 50 Sta.   |                  |           |
| Kentucky-----         | Cocklebur-----    | 70 Sta.   | Crabgrass-----      | 95 Down   | Morningglory-----    | 80 Sta.   | Nutsedge-----     | 20 Up     | Nutsedge-----     | 20 Up     |                     | 90 Down   |                     | 90 Down   |                  |           |
| North Carolina--      | Crabgrass-----    | 90 Up     | Lambsquarters----   | 60 Up     | Morningglory-----    | 35 Up     | Nutsedge-----     | 80 Up     | Nutsedge-----     | 80 Up     |                     | 30 Down   |                     | 30 Down   |                  |           |
| Oklahoma-----         | Crabgrass-----    | 90 Sta.   | Lambsquarters----   | 30 Up     | Morningglory-----    | 30 Up     | Pigweed-----      | 40 Sta.   | Pigweed-----      | 40 Sta.   |                     | 30 Sta.   |                     | 30 Sta.   |                  |           |
| South Carolina--      | Crabgrass-----    | 90 Sta.   | Morningglory----    | 30 Sta.   | Nutsedge-----        | 20 Up     | Pigweed-----      | 40 Sta.   | Pigweed-----      | 40 Sta.   |                     | 30 Sta.   |                     | 30 Sta.   |                  |           |
| Tennessee-----        | Bindweed-----     | 30 Sta.   | Morningglory----    | 30 Sta.   | Nutsedge-----        | 5 Up      | Quackgrass-----   | 5 Up      | Quackgrass-----   | 5 Up      |                     | 15 Up     |                     | 15 Up     |                  |           |
| Virginia-----         | Crabgrass-----    | 30 Sta.   | Nutsedge-----       | 5 Up      |                      | --        |                   | --        |                   |           |                     | --        |                     | --        |                  |           |
| <b>Western:</b>       | Knotweed-----     | 20        | Mallow-----         | 20        | Nettleleaf goosefoot | 50        | Sowthistle-----   | 50        | Sowthistle-----   | 50        | Wild mustard-----   | 80        | Wild mustard-----   | 80        |                  |           |
| Arizona-----          | Knotweed-----     | 80 Up     | Lambsquarters----   | 80 Sta.   | Nettle-----          | 50 Sta.   | Nutsedge-----     | 20 Up     | Nutsedge-----     | 20 Up     | Purslane-----       | 80 Up     | Purslane-----       | 80 Up     |                  |           |
| California-----       | Canada thistle--  | 10 Up     | Foxtail-----        | 50 Sta.   | Lambsquarters----    | 50 Sta.   | Nightshade-----   | 10 Sta.   | Nightshade-----   | 10 Sta.   | Wild oats-----      | 20 Sta.   | Wild oats-----      | 20 Sta.   |                  |           |
| Colorado-----         | Barnyardgrass--   | 50 Down   | Foxtail-----        | 80 Down   | Lambsquarters----    | 70 Down   | Nutsedge-----     | 60 Sta.   | Nutsedge-----     | 60 Sta.   | Pigweed-----        | 60 Down   | Pigweed-----        | 60 Down   |                  |           |
| New Mexico-----       | Barnyardgrass--   | 7 Sta.    | Pigweed-----        | 3 Sta.    | Purslane-----        | 3 Sta.    | Ryegrasses-----   | 7 Sta.    | Ryegrasses-----   | 7 Sta.    |                     | --        |                     | --        |                  |           |
| Oregon-----           | Barnyardgrass--   | 90 Sta.   | Lambsquarters----   | 100 Sta.  | Mallow-----          | 75 Sta.   | Ragweed-----      | 50 Sta.   | Ragweed-----      | 50 Sta.   | Redroot pigweed---- | 100 Sta.  | Redroot pigweed---- | 100 Sta.  |                  |           |
| Utah-----             | Barnyardgrass--   | 75 Sta.   | Canada thistle---   | 10 Up     | Lambsquarters----    | 75 Sta.   | Nightshade-----   | 75 Sta.   | Nightshade-----   | 75 Sta.   | Pigweed-----        | 75 Sta.   | Pigweed-----        | 75 Sta.   |                  |           |
| Washington-----       | Barnyardgrass--   | 25 Up     | Chickweed-----      | 100 Sta.  | Field pepperweed---  | 100 Sta.  | Lambsquarters---- | 100 Sta.  | Lambsquarters---- | 100 Sta.  | Wild mustard-----   | 100 Sta.  | Wild mustard-----   | 100 Sta.  |                  |           |
| Alaska-----           | Annual bluegrass  | 30 Up     | Little mallow---    | 30 Up     | Nutsedge-----        | 40 Up     | Red tassel-       | 25 Up     | Red tassel-       | 25 Up     | Smallflower         | 30 Up     | Smallflower         | 30 Up     |                  |           |
| Hawaii-----           | Lambsquarters---- | 30 Up     | Little mallow---    | 30 Up     | Nutsedge-----        | 40 Up     | flower.           |           | flower.           |           | galinsoga.          |           | galinsoga.          |           |                  |           |

1. Sta., stationary.

Western States \$13.57. Percent of acreage treated by farmers with their own equipment ranked by regions was: North Central States 82 percent; Northeastern States 70 percent; Southern States 65 percent; and Western States 54 percent. The remainder was treated by custom operators. The effectiveness of pre-emergence herbicide treatments was fair to poor in the Northeastern, North Central, and Western States, and fair to good in the Southern States. Effectiveness of postemergence treatments was good in the Southern States and fair to good in the Western States. Herbicide-usage trend in cucurbits was ascending in more than half of the States reporting. There is an urgent need for better herbicides in cucurbits in the majority of States. About one-third of the States reported persistence problems. (Tables 29 and 30.)

Annual weeds mentioned two or more times in reports from the various regions are: Northeastern States--annual grasses, crabgrass, barnyardgrass, lambsquarters, goosegrass, foxtail, pigweed, purslane, redroot pigweed, and ragweed; North Central States--crabgrass, foxtail, giant foxtail, lambsquarters, purslane, and pigweed; Southern States--cocklebur, crabgrass, lambsquarters, morningglory, pigweed, and ragweed; and Western States--barnyardgrass, pigweed, lambsquarters, and purslane.

Important perennial weeds mentioned in reports from the various regions are: Northeastern States--quackgrass; North Central States--bindweed, quackgrass; Southern States--bermudagrass, bindweed, johnsongrass, nutsedge, and horsenettle; and Western States--nutsedge, Canada thistle, horsetail, and rough bentgrass.

### *Vegetable Legumes*

Acreage treated preemergence and post-emergence with herbicides in 1965 was 168,100 acres and 182,600 acres, respectively, or a total of 350,700 acres. Acreage treated preemergence amounted to about 47.9 percent of the total acreage treated. Of the acreage treated preemergence, distribution by regions was: Western States 48.9 percent; Northeastern States 27.5 percent; North Central States 18.7 percent; and Southern States 4.9 percent. Of the acreage treated postemer-

gence, distribution by regions was: Western States 60.9 percent; North Central States 29.8 percent; Southern States 5.4 percent; and Northeastern States 3.9 percent. Average cost per acre of preemergence and postemergence treatments for all States was \$9.92 and \$3.30, respectively. Average cost per acre for pre-emergence treatments ranked by regions was: Western States \$11.48; Southern States \$11.12; North Central States \$8.84; and Northeastern States \$7.69. Average cost per acre for post-emergence treatments ranked by regions was: Northeastern States \$7.08; Southern States \$4.00; Western States \$3.10; and North Central States \$3.07. Percent of acreage treated by farmers ranked by regions was: North Central States 93 percent; Northeastern States 80 percent; Southern States 74 percent; and Western States 66 percent. The remainder was treated by custom operators. Effectiveness of preemergence herbicide treatments was good in the Northeastern States, and fair to good in the other regions. Effectiveness of post-emergence treatments was fair in the Southern States, and fair to good in the other regions. Herbicide-usage trend in vegetable legumes was ascending in more than 70 percent of the States reporting. There is an urgent need for better herbicides in five States; some need for better herbicides in 17 States; and six States report little need for better herbicides. About 20 percent of the States reported persistence problems. (Tables 31 and 32.)

Annual weeds mentioned two or more times in reports from the various regions are: Northeastern States--barnyardgrass, crabgrass, lambsquarters, and pigweed; North Central States--ragweed, foxtail, lambsquarters, pigweed, velvetleaf, smartweed, and wild mustard; Southern States--cocklebur, chickweed, crabgrass, pigweed, and ragweed; and Western States--barnyardgrass, foxtail, lambsquarters, nightshade, pigweed, redroot pigweed, and wild oats.

Important perennial weeds mentioned in reports from the various regions are: Northeastern States--Canada thistle, quackgrass, nutsedge, and red sorrel; North Central States--Canada thistle, field bindweed, nutsedge, quackgrass, and johnsongrass; Southern States--bermudagrass, johnsongrass, and nutsedge; and Western States--field bindweed, Canada thistle, fiddleneck, and nutsedge.

Table 29.---Cucurbits: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region   | Acres treated |                | Average cost per acre <sup>1</sup> |                | Acreage treated by-- |                  | Effectiveness of herbicides |                  | Herbicides usage trend <sup>2</sup> | Need for better herbicides      | Persistence problem |
|--------------------|---------------|----------------|------------------------------------|----------------|----------------------|------------------|-----------------------------|------------------|-------------------------------------|---------------------------------|---------------------|
|                    | Pre-emergence | Post-emergence | Pre-emergence                      | Post-emergence | Farmers              | Custom operators | Pre-emergence               | Post-emergence   |                                     |                                 |                     |
|                    | 1,000 acres   | 1,000 acres    | Dollars                            | Dollars        | Percent              | Percent          |                             |                  |                                     |                                 |                     |
| Connecticut-----   | .2            | ---            | 10.00                              | ---            | 100                  | ---              | Fair                        | ---              | Up                                  | Urgent                          | Yes                 |
| Delaware-----      | .1            | ---            | 5.00                               | ---            | 100                  | ---              | Poor                        | ---              | Sta.                                | Urgent                          | No                  |
| Maryland-----      | .9            | ---            | 2.50                               | ---            | 100                  | ---              | Fair                        | ---              | Sta.                                | Urgent                          | No                  |
| New Hampshire----- | .5            | ---            | 20.00                              | ---            | 100                  | ---              | Fair                        | ---              | Sta.                                | Urgent                          | Yes                 |
| New Jersey-----    | .2            | ---            | 2.50                               | ---            | 100                  | ---              | Fair                        | ---              | Up                                  | Urgent                          | No                  |
| New York-----      | 10            | ---            | 15.00                              | ---            | 40                   | 60               | Poor                        | ---              | Sta.                                | Some                            | No                  |
| Pennsylvania-----  | 12            | ---            | 9.00                               | ---            | 90                   | 10               | Fair                        | ---              | Up                                  | Urgent                          | No                  |
| Northeastern-----  | 23.9          | ---            | 11.43                              | ---            | 70                   | 30               | 5-Fair<br>2-Poor            | ---              | 3-Up<br>4-Sta.                      | 6-Urgent<br>1-Some              | 2-Yes<br>5-No       |
| Indiana-----       | .1            | ---            | 5.00                               | ---            | 100                  | ---              | Poor                        | ---              | Sta.                                | Urgent                          | No                  |
| Iowa-----          | 10            | ---            | 3.00                               | ---            | 95                   | 5                | Fair                        | ---              | Sta.                                | Urgent                          | No                  |
| Michigan-----      | 5             | ---            | 15.00                              | ---            | 50                   | 50               | Poor                        | ---              | Up                                  | Urgent                          | Yes                 |
| Minnesota-----     | 1             | ---            | 8.00                               | ---            | 100                  | ---              | Good                        | ---              | Up                                  | Little                          | No                  |
| Ohio-----          | .5            | ---            | 10.00                              | ---            | 100                  | ---              | Fair                        | ---              | Up                                  | Urgent                          | No                  |
| Wisconsin-----     | .3            | ---            | 8.00                               | ---            | 95                   | 5                | Poor                        | ---              | Sta.                                | Urgent                          | No                  |
| North Central----- | 16.9          | ---            | 7.15                               | ---            | 82                   | 18               | 1-Good<br>2-Fair<br>3-Poor  | ---              | 3-Up<br>3-Sta.                      | 5-Urgent<br>1-Little            | 1-Yes<br>5-No       |
| Arkansas-----      | .1            | ---            | 7.00                               | ---            | 100                  | ---              | Poor                        | ---              | Sta.                                | Urgent                          | No                  |
| Florida-----       | 2             | ---            | 12.00                              | ---            | 80                   | 20               | Good                        | ---              | Up                                  | Urgent                          | Yes                 |
| Georgia-----       | .5            | ---            | 10.00                              | ---            | 90                   | 10               | Fair                        | ---              | Up                                  | Urgent                          | No                  |
| Kentucky-----      | 2             | 1              | 7.00                               | 15.00          | 10                   | 90               | Good                        | Good             | Up                                  | Some                            | Yes                 |
| Oklahoma-----      | 2             | ---            | 4.80                               | ---            | 85                   | 15               | Fair                        | ---              | Up                                  | Urgent                          | Yes                 |
| Tennessee-----     | .1            | ---            | 14.00                              | ---            | 95                   | 5                | Fair                        | ---              | Sta.                                | Urgent                          | No                  |
| Virginia-----      | 1             | ---            | 9.50                               | ---            | 95                   | 5                | Fair                        | ---              | Up                                  | Urgent                          | No                  |
| Southern-----      | 7.7           | .1             | 8.34                               | 15.00          | 65                   | 35               | 2-Good<br>4-Fair<br>1-Poor  | 1-Good           | 5-Up<br>2-Sta.                      | 6-Urgent<br>1-Some              | 3-Yes<br>4-No       |
| Arizona-----       | 1             | ---            | 5.00                               | ---            | 20                   | 80               | Fair                        | ---              | Sta.                                | Some                            | No                  |
| California-----    | 1             | ---            | 12.00                              | ---            | 100                  | ---              | Poor                        | ---              | Sta.                                | Urgent                          | No                  |
| Oregon-----        | ---           | 1              | ---                                | 5.00           | 50                   | 50               | ---                         | Good             | Sta.                                | Little                          | No                  |
| Utah-----          | .5            | ---            | 10.00                              | ---            | 100                  | ---              | Fair                        | ---              | Up                                  | Urgent                          | No                  |
| Washington-----    | 6             | 6              | 15.00                              | 15.00          | 90                   | 50               | Fair                        | Fair             | Up                                  | Urgent                          | Yes                 |
| Hawaii-----        | .2            | ---            | 35.00                              | ---            | 100                  | ---              | Fair                        | ---              | Up                                  | Some                            | Yes                 |
| Western-----       | 8.7           | 7              | 13.68                              | 13.57          | 54                   | 46               | 4-Fair<br>1-Poor            | 1-Good<br>1-Fair | 3-Up<br>3-Sta.                      | 3-Urgent<br>2-Some<br>1-Little  | 2-Yes<br>4-No       |
| United States----- | 57.2          | 7.1            | 10.09                              | 13.59          | 69                   | 31               | 3-Good<br>15-Fair<br>7-Poor | 2-Good<br>1-Fair | 14-Up<br>12-Sta.                    | 20-Urgent<br>4-Some<br>2-Little | 8-Yes<br>18-No      |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom application and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which cost were reported.

<sup>2</sup> Sta., stationary.



Table 31.--Vegetable legumes: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region    | Acres treated |               | Average cost per acre <sup>1</sup> |               | Acreage treated by-- |                  | Herbicides usage trend <sup>2</sup> |                            | Need for better herbicides      | Persistence problem |
|---------------------|---------------|---------------|------------------------------------|---------------|----------------------|------------------|-------------------------------------|----------------------------|---------------------------------|---------------------|
|                     | Preemergence  | Postemergence | Preemergence                       | Postemergence | Farmers              | Custom operators | Preemergence                        | Postemergence              |                                 |                     |
|                     | 1,000 acres   | 1,000 acres   | Dollars                            | Dollars       | Percent              | Percent          |                                     |                            |                                 |                     |
| Connecticut-----    | .3            | --            | 10.00                              | --            | 100                  | --               | Good                                | ----                       | Little                          | No                  |
| Delaware-----       | 15            | 3             | 6.00                               | 5.00          | 80                   | 20               | Good                                | Good                       | Some                            | No                  |
| Maryland-----       | 5             | --            | 10.00                              | --            | 80                   | 20               | Good                                | ----                       | Some                            | No                  |
| New Hampshire-----  | 1             | .2            | 20.00                              | 20.00         | 100                  | --               | Good                                | Good                       | Some                            | Yes                 |
| New Jersey-----     | 3             | --            | 7.00                               | --            | 85                   | 15               | Good                                | ----                       | Some                            | No                  |
| New York-----       | 20            | --            | 7.50                               | --            | 75                   | 25               | Good                                | ----                       | Little                          | No                  |
| Pennsylvania-----   | 2             | 4             | 11.00                              | 8.00          | 90                   | 10               | Good                                | Fair                       | Urgent                          | No                  |
| Northeastern-----   | 46.3          | 7.2           | 7.69                               | 7.08          | 80                   | 20               | 7-Good                              | 2-Good<br>1-Fair           | 1-Urgent<br>4-Some<br>2-Little  | 1-Yes<br>6-No       |
| Indiana-----        | .1            | --            | 6.00                               | --            | 100                  | --               | Fair                                | ----                       | Some                            | Yes                 |
| Iowa-----           | .4            | .4            | 2.00                               | 1.00          | 95                   | 5                | Fair                                | Fair                       | Urgent                          | No                  |
| Michigan-----       | 5             | --            | 15.00                              | --            | 70                   | 30               | Fair                                | Poor                       | Some                            | No                  |
| Minnesota-----      | 8             | 20            | 9.50                               | 2.60          | 90                   | 10               | Good                                | Good                       | Some                            | No                  |
| Missouri-----       | --            | 10            | --                                 | 2.00          | 100                  | --               | ----                                | Fair                       | Some                            | No                  |
| Wisconsin-----      | 18            | 24            | 7.00                               | 3.95          | 95                   | 5                | Good                                | Fair                       | Some                            | No                  |
| North Central-----  | 31.5          | 54.4          | 8.84                               | 3.07          | 93                   | 7                | 2-Good<br>3-Fair                    | 1-Good<br>3-Fair<br>1-Poor | 1-Urgent<br>5-Some              | 1-Yes<br>5-No       |
| Arkansas-----       | .2            | --            | 6.00                               | --            | 90                   | 10               | Fair                                | ----                       | Little                          | No                  |
| Georgia-----        | 1             | 5             | 8.00                               | 6.00          | 90                   | 10               | Good                                | Fair                       | Some                            | No                  |
| North Carolina----- | 1             | --            | --                                 | --            | 100                  | --               | ----                                | Fair                       | Some                            | No                  |
| South Carolina----- | 1             | --            | 10.00                              | --            | 100                  | --               | Good                                | ----                       | Some                            | No                  |
| Tennessee-----      | 5             | --            | 12.00                              | --            | 60                   | 40               | Good                                | ----                       | Little                          | No                  |
| Texas-----          | --            | 5             | --                                 | 2.00          | 50                   | 50               | Good                                | Fair                       | Urgent                          | No                  |
| Virginia-----       | 1             | --            | 12.00                              | --            | 95                   | 5                | Poor                                | ----                       | Urgent                          | No                  |
| Southern-----       | 8.2           | 10            | 11.12                              | 4.00          | 74                   | 26               | 3-Good<br>1-Fair<br>1-Poor          | 2-Fair                     | 2-Urgent<br>3-Some<br>2-Little  | 7-No                |
| California-----     | 5             | 5             | 12.00                              | 5.00          | 90                   | 10               | Fair                                | Fair                       | Some                            | Yes                 |
| Idaho-----          | 50            | --            | 15.00                              | --            | 50                   | 50               | Good                                | ----                       | Some                            | Yes                 |
| Montana-----        | 4             | 1             | 4.00                               | 4.00          | 95                   | 5                | Good                                | Good                       | Little                          | No                  |
| Oregon-----         | 10            | 30            | 6.00                               | 5.00          | 70                   | 30               | Fair                                | Good                       | Urgent                          | No                  |
| Utah-----           | 1             | 5             | 12.00                              | 5.00          | 25                   | 75               | Fair                                | Good                       | Some                            | No                  |
| Washington-----     | 2             | 70            | 6.00                               | 2.00          | 70                   | 30               | Fair                                | Fair                       | Some                            | No                  |
| Wyoming-----        | 10            | --            | 3.00                               | --            | 80                   | 20               | Good                                | ----                       | Some                            | No                  |
| Hawaii-----         | .1            | --            | 30.00                              | --            | 100                  | --               | Good                                | ----                       | Little                          | No                  |
| Western-----        | 82.1          | 111           | 11.48                              | 3.10          | 66                   | 34               | 4-Good<br>4-Fair                    | 3-Good<br>2-Fair           | 1-Urgent<br>5-Some<br>2-Little  | 2-Yes<br>6-No       |
| United States-----  | 168.1         | 182.6         | 9.92                               | 3.30          | 75                   | 25               | 16-Good<br>8-Fair<br>1-Poor         | 6-Good<br>8-Fair<br>1-Poor | 5-Urgent<br>17-Some<br>6-Little | 4-Yes<br>24-No      |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.

<sup>2</sup> Sta., stationary.

Table 32.--Vegetable legumes: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State      | Weed  |           | Infestation      |           | Weed  |                  | Infestation |           | Weed             |           | Infestation |                  | Weed  |           | Infestation      |           |      |
|-----------------------|-------|-----------|------------------|-----------|-------|------------------|-------------|-----------|------------------|-----------|-------------|------------------|-------|-----------|------------------|-----------|------|
|                       | Acres | Trend (1) | Acres            | Trend (1) | Acres | Trend (1)        | Acres       | Trend (1) | Acres            | Trend (1) | Acres       | Trend (1)        | Acres | Trend (1) | Acres            | Trend (1) |      |
| <b>Northeastern:</b>  |       |           |                  |           |       |                  |             |           |                  |           |             |                  |       |           |                  |           |      |
| Connecticut           | 40    | Up        | Crabgrass        | 20        | Up    | Nutsedge         | 20          | Up        | Pigweed          | 60        | Sta.        | Quackgrass       | 10    | Sta.      | Quackgrass       | 10        | Sta. |
| Delaware              | 25    | Up        | Crabgrass        | 50        | Up    | Lambsquarters    | 60          | Sta.      | Pigweed          | 60        | Sta.        | Wild radish      | 30    | Sta.      | Wild radish      | 30        | Sta. |
| Maine                 | 30    | Up        | Quackgrass       | 10        | Up    | Quackgrass       | 10          | Up        | Quackgrass       | 10        | Up          | Quackgrass       | 10    | Up        | Quackgrass       | 10        | Up   |
| Maryland              | 80    | Up        | Lambsquarters    | 50        | Sta.  | Smartweed        | 50          | Sta.      | Smartweed        | 50        | Sta.        | Smartweed        | 50    | Sta.      | Smartweed        | 50        | Sta. |
| Massachusetts         | 30    | Up        | Foxtail          | 50        | Down  | Lambsquarters    | 90          | Down      | Pigweed          | 90        | Down        | Pigweed          | 90    | Down      | White cockle     | 30        | Up   |
| New Hampshire         | 30    | Sta.      | Lambsquarters    | 50        | Down  | Pigweed          | 40          | Down      | Quackgrass       | 10        | Sta.        | Red sorrel       | 20    | Sta.      | Red sorrel       | 20        | Sta. |
| New Jersey            | 10    | Up        | Crabgrass        | 8         | Up    | Ragweed          | 8           | Up        | Ragweed          | 8         | Up          | Ragweed          | 8     | Up        | Ragweed          | 8         | Up   |
| Pennsylvania          | 10    | Sta.      | Field pepperweed | 10        | Sta.  | Field pepperweed | 10          | Sta.      | Field pepperweed | 10        | Sta.        | Field pepperweed | 10    | Sta.      | Field pepperweed | 10        | Sta. |
| <b>North Central:</b> |       |           |                  |           |       |                  |             |           |                  |           |             |                  |       |           |                  |           |      |
| Illinois              | 20    | Down      | Field bindweed   | 20        | Down  | Pigweed          | 20          | Down      | Smartweed        | 20        | Down        | Smartweed        | 20    | Down      | Wild mustard     | 20        | Down |
| Indiana               | 10    | Sta.      | Ragweed          | 40        | Sta.  | Velvetleaf       | 40          | Sta.      | Velvetleaf       | 40        | Sta.        | Velvetleaf       | 40    | Sta.      | Velvetleaf       | 40        | Sta. |
| Iowa                  | 75    | Sta.      | Green foxtail    | 50        | Sta.  | Ragweed          | 50          | Sta.      | Yellow foxtail   | 50        | Sta.        | Yellow foxtail   | 50    | Sta.      | Yellow foxtail   | 50        | Sta. |
| Michigan              | 10    | Sta.      | Lambsquarters    | 100       | Sta.  | Nutsedge         | 100         | Sta.      | Nutsedge         | 100       | Sta.        | Nutsedge         | 100   | Sta.      | Nutsedge         | 100       | Sta. |
| Minnesota             | 10    | Sta.      | Foxtail          | 100       | Sta.  | Smartweed        | 100         | Sta.      | Smartweed        | 100       | Sta.        | Smartweed        | 100   | Sta.      | Smartweed        | 100       | Sta. |
| Missouri              | 10    | Up        | Crabgrass        | 40        | Up    | Foxtail          | 40          | Up        | Foxtail          | 40        | Up          | Foxtail          | 40    | Up        | Johnsongrass     | 10        | Up   |
| Nebraska              | 10    | Up        | Cocklebur        | 30        | Up    | Velvetleaf       | 30          | Up        | Velvetleaf       | 30        | Up          | Velvetleaf       | 30    | Up        | Wild mustard     | 25        | Up   |
| Wisconsin             | 25    | Sta.      | Foxtail          | 100       | Sta.  | Lambsquarters    | 100         | Sta.      | Lambsquarters    | 100       | Sta.        | Lambsquarters    | 100   | Sta.      | Pigweed          | 50        | Sta. |
| <b>Southern:</b>      |       |           |                  |           |       |                  |             |           |                  |           |             |                  |       |           |                  |           |      |
| Arkansas              | 10    | Up        | Crabgrass        | 70        | Up    | Johnsongrass     | 70          | Up        | Johnsongrass     | 70        | Up          | Johnsongrass     | 70    | Up        | Nutsedge         | 70        | Up   |
| Georgia               | 10    | Up        | Crabgrass        | 10        | Up    | Crabgrass        | 10          | Up        | Crabgrass        | 10        | Up          | Crabgrass        | 10    | Up        | Crabgrass        | 10        | Up   |
| Kentucky              | 10    | Up        | Crabgrass        | 10        | Up    | Crabgrass        | 10          | Up        | Crabgrass        | 10        | Up          | Crabgrass        | 10    | Up        | Crabgrass        | 10        | Up   |
| North Carolina        | 90    | Up        | Crabgrass        | 90        | Up    | Crabgrass        | 90          | Up        | Crabgrass        | 90        | Up          | Crabgrass        | 90    | Up        | Crabgrass        | 90        | Up   |
| Oklahoma              | 40    | Up        | Crabgrass        | 40        | Up    | Crabgrass        | 40          | Up        | Crabgrass        | 40        | Up          | Crabgrass        | 40    | Up        | Crabgrass        | 40        | Up   |
| South Carolina        | 10    | Sta.      | Cocklebur        | 10        | Sta.  | Cocklebur        | 10          | Sta.      | Cocklebur        | 10        | Sta.        | Cocklebur        | 10    | Sta.      | Cocklebur        | 10        | Sta. |
| Tennessee             | 40    | Sta.      | Pigweed          | 40        | Sta.  | Pigweed          | 40          | Sta.      | Pigweed          | 40        | Sta.        | Pigweed          | 40    | Sta.      | Pigweed          | 40        | Sta. |
| Virginia              | 10    | Up        | Crabgrass        | 10        | Up    | Crabgrass        | 10          | Up        | Crabgrass        | 10        | Up          | Crabgrass        | 10    | Up        | Crabgrass        | 10        | Up   |
| <b>Western:</b>       |       |           |                  |           |       |                  |             |           |                  |           |             |                  |       |           |                  |           |      |
| California            | 50    | Sta.      | Nightshade       | 20        | Sta.  | Pigweed          | 20          | Sta.      | Pigweed          | 20        | Sta.        | Pigweed          | 20    | Sta.      | Wild oats        | 30        | Sta. |
| Idaho                 | 100   | Down      | Nightshade       | 80        | Up    | Pigweed          | 80          | Up        | Pigweed          | 80        | Up          | Pigweed          | 80    | Up        | Pigweed          | 80        | Up   |
| Montana               | 10    | Up        | Lambsquarters    | 50        | Sta.  | Nightshade       | 50          | Sta.      | Nightshade       | 50        | Sta.        | Nightshade       | 50    | Sta.      | Nightshade       | 50        | Sta. |
| New Mexico            | 40    | Down      | Foxtail          | 30        | Down  | Lambsquarters    | 30          | Down      | Lambsquarters    | 30        | Down        | Lambsquarters    | 30    | Down      | Lambsquarters    | 30        | Down |
| Oregon                | 100   | Sta.      | Lambsquarters    | 100       | Sta.  | Nightshade       | 100         | Sta.      | Nightshade       | 100       | Sta.        | Nightshade       | 100   | Sta.      | Nightshade       | 100       | Sta. |
| Utah                  | 20    | Down      | Lambsquarters    | 20        | Down  | Morningglory     | 20          | Down      | Morningglory     | 20        | Down        | Morningglory     | 20    | Down      | Morningglory     | 20        | Down |
| Washington            | 60    | Sta.      | Field bindweed   | 10        | Sta.  | Lambsquarters    | 10          | Sta.      | Lambsquarters    | 10        | Sta.        | Lambsquarters    | 10    | Sta.      | Lambsquarters    | 10        | Sta. |
| Wyoming               | 50    | Sta.      | Barnyardgrass    | 50        | Sta.  | Green foxtail    | 50          | Sta.      | Green foxtail    | 50        | Sta.        | Green foxtail    | 50    | Sta.      | Green foxtail    | 50        | Sta. |
| Hawaii                | 30    | Up        | Nutsedge         | 30        | Up    | Nutsedge         | 30          | Up        | Nutsedge         | 30        | Up          | Nutsedge         | 30    | Up        | Nutsedge         | 30        | Up   |

1 Sta., stationary.



## *Solanaceous Crops*

Acreage treated preemergence and postemergence with herbicides in 1965 was 207,200 acres and 35,100 acres, respectively, or a total of 242,300 acres. Acreage treated preemergence amounted to about 85.5 percent of the total acreage treated. Of the acreage treated preemergence, distribution by regions was: Western States 48.2 percent; North Central States 24.3 percent; Northeastern States 15.2 percent; and Southern States 12.3 percent. Of the acreage treated postemergence, distribution by regions was: North Central States 57.5 percent; Southern States 31.3 percent; Western States 5.8 percent; and Northeastern States 5.4 percent. Average cost per acre of preemergence and postemergence treatments for all States was \$14.71 and \$7.45, respectively. Average cost per acre for preemergence treatments ranked by regions was: Western States \$18.60; North Central States \$11.96; Northeastern States \$10.39; and Southern States \$10.24. Average cost per acre for postemergence treatments ranked by regions was: Northeastern States \$15.47; Southern States \$11.73; North Central States \$4.76; and Western States \$3.50. Percent of acreage treated by farmers ranked by regions was: North Central States 97 percent; Southern States 82 percent; Northeastern States 75 percent; and Western States 43 percent. The remainder was treated by custom operators. Effectiveness of preemergence herbicide treatments was good in the Northeastern States, and fair to good in the other regions. Effectiveness of postemergence treatments was poor in the Western States, fair to good in the North Central and Northeastern States, and good in the Southern States. Herbicide-usage trend in solanaceous crops was ascending in about 75 percent of the States reporting. There was some need for better herbicides in all of the regions. About one-half of the States, including some in each region, reported persistence problems. (Tables 33 and 34.)

Annual weeds mentioned two or more times in reports of the various regions are: Northeastern States--annual grasses, crabgrass, barnyardgrass, lambsquarters, pigweed, and ragweed; North Central States--giant foxtail, lambsquarters, foxtail, pigweed, ragweed, and smartweed; Southern States--cocklebur, crab-

grass, goosegrass, lambsquarters, morning-glory, pigweed, and ragweed; and Western States--barnyardgrass, foxtail, lambsquarters, mallow, pigweed, nightshade, and wild oats.

Important perennial weeds mentioned in reports from the various regions are: Northeastern States--nutsedge and quackgrass; North Central States--quackgrass and nutsedge; Southern States--bermudagrass, nutsedge, and johnsongrass; and Western States--Canada thistle, nutsedge, and quackgrass.

## Fruits and Nuts

Approximately 2.9 million acres of fruit and nut crops were grown in 21 States in 1965. Acreage treated preemergence and postemergence<sup>9</sup> with herbicides in 1965 was 259,500 acres and 280,900 acres, respectively, or a total of 540,400 acres. Thus, about 19 percent of the total harvested acreage was treated. Acreage treated preemergence amounted to about 48 percent of the total acreage treated. Of the acreage treated preemergence, distribution by regions was: Western States 96.8 percent; Southern States 2.3 percent; North Central States 0.8 percent; and Northeastern States 0.1 percent. Of the acreage treated postemergence, distribution by regions was: Western States 43.8 percent; North Central States 34.1 percent; Southern States 18.4 percent; and Northeastern States 3.7 percent. Average per acre cost of preemergence and postemergence treatments for all States was \$11.87 and \$14.06, respectively. Average cost per acre for preemergence treatments ranked by regions was: Northeastern States \$25.00; Western States \$11.98; Southern States \$9.62; and North Central States \$4.05. Average cost per acre for postemergence treatments ranked by regions was: Southern States \$28.61; North Central States \$26.31; Northeastern States \$11.79; and Western States \$6.38. Percent of acreage treated by farmers' own equipment ranked by regions was: North Central States 95 percent; Northeastern States 92 percent; Western States 90 percent; and Southern States 43 percent. The remainder was treated by custom operators. Effectiveness of both preemergence and postemergence herbicide

<sup>9</sup>Preemergence and postemergence refer to emergence of weeds in perennial plantings.

Table 33.--Solanaceous crops: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region    | Acres treated    |                | Average cost per acre <sup>1</sup> |                | Acres treated by-- |                  | Effectiveness of herbicides |                            | Herbicides usage <sup>2</sup> trend | Need for better herbicides      | Persistence problem |
|---------------------|------------------|----------------|------------------------------------|----------------|--------------------|------------------|-----------------------------|----------------------------|-------------------------------------|---------------------------------|---------------------|
|                     | Pre-emergence    | Post-emergence | Pre-emergence                      | Post-emergence | Farmers            | Custom operators | Pre-emergence               | Post-emergence             |                                     |                                 |                     |
|                     | 1,000 acres      | 1,000 acres    | Dollars                            | Dollars        | Percent            | Percent          |                             |                            |                                     |                                 |                     |
| Connecticut-----    | --               | .1             | --                                 | 20.00          | 100                | --               | ---                         | Fair                       | Up                                  | Urgent                          | Yes                 |
| Delaware-----       | .5               | .3             | 8.00                               | 8.00           | 80                 | 20               | ---                         | Good                       | Up                                  | Some                            | No                  |
| Maryland-----       | 5                | --             | 12.00                              | --             | 100                | --               | ---                         | Good                       | Up                                  | Some                            | No                  |
| New Hampshire-----  | .9               | .5             | 14.00                              | 20.00          | 100                | --               | ---                         | Good                       | Up                                  | Some                            | Yes                 |
| New Jersey-----     | 8                | --             | 7.00                               | --             | 90                 | 10               | ---                         | Good                       | Up                                  | Some                            | No                  |
| New York-----       | 5                | --             | 7.50                               | --             | 30                 | 70               | ---                         | Good                       | Up                                  | Some                            | No                  |
| Pennsylvania-----   | 8                | --             | 12.00                              | --             | 50                 | 50               | ---                         | Good                       | Up                                  | Some                            | No                  |
| Rhode Island-----   | 4                | 1              | 15.00                              | 15.00          | 100                | --               | ---                         | Fair                       | Sta.                                | Urgent                          | Yes                 |
| Northeastern-----   | 31.4             | 1.9            | 10.39                              | 15.47          | 75                 | 25               | 6-Good<br>1-Fair            | 2-Good<br>2-Fair           | 7-Up<br>1-Sta.                      | 2-Urgent<br>6-Some              | 4-Yes<br>4-No       |
| Indiana-----        | ( <sup>3</sup> ) | --             | 10.00                              | --             | 100                | --               | ---                         | Fair                       | Sta.                                | Some                            | No                  |
| Iowa-----           | .2               | .2             | 2.00                               | 1.00           | 95                 | 5                | ---                         | Fair                       | Sta.                                | Some                            | No                  |
| Michigan-----       | 10               | --             | 20.00                              | --             | 80                 | 20               | ---                         | Good                       | Up                                  | Some                            | No                  |
| Ohio-----           | .2               | 2              | 12.00                              | 12.00          | 80                 | 20               | ---                         | Fair                       | Up                                  | Some                            | Yes                 |
| Wisconsin-----      | 40               | 18             | 10.00                              | 4.00           | 100                | --               | ---                         | Good                       | Up                                  | Some                            | Yes                 |
| North Central-----  | 50.4             | 20.2           | 11.96                              | 4.76           | 97                 | 3                | 2-Good<br>3-Fair            | 2-Good<br>1-Fair           | 3-Up<br>2-Sta.                      | 5-Some                          | 2-Yes<br>3-No       |
| Arkansas-----       | 2                | --             | 14.00                              | --             | 85                 | 15               | ---                         | Fair                       | Up                                  | Little                          | Yes                 |
| Florida-----        | 20               | 10             | 10.00                              | 12.00          | 80                 | 20               | ---                         | Good                       | Up                                  | Some                            | Yes                 |
| Georgia-----        | .5               | --             | 10.00                              | --             | 100                | --               | ---                         | Fair                       | Up                                  | Urgent                          | No                  |
| South Carolina----- | 2                | --             | 10.00                              | --             | 100                | --               | ---                         | Good                       | Up                                  | Some                            | Yes                 |
| Tennessee-----      | 1                | --             | 8.00                               | --             | 90                 | 10               | ---                         | Good                       | Up                                  | Little                          | Yes                 |
| Virginia-----       | --               | 1              | --                                 | 9.00           | 100                | --               | ---                         | Good                       | Up                                  | Some                            | No                  |
| Southern-----       | 25.5             | 11             | 10.24                              | 11.73          | 82                 | 18               | 3-Good<br>2-Fair            | 2-Good                     | 6-Up                                | 1-Urgent<br>3-Some<br>2-Little  | 4-Yes<br>2-No       |
| Arizona-----        | 2                | --             | 5.00                               | --             | 75                 | 25               | ---                         | Fair                       | Sta.                                | Some                            | No                  |
| California-----     | 80               | 2              | 20.00                              | 3.50           | 40                 | 60               | ---                         | Fair                       | Up                                  | Urgent                          | Yes                 |
| Idaho-----          | 10               | --             | 15.00                              | --             | 40                 | 60               | ---                         | Fair                       | Up                                  | Some                            | No                  |
| Montana-----        | 2                | --             | 3.00                               | --             | 95                 | 5                | ---                         | Fair                       | Sta.                                | Some                            | Yes                 |
| Utah-----           | 1                | --             | 15.00                              | --             | 75                 | 25               | ---                         | Good                       | Up                                  | Little                          | No                  |
| Washington-----     | 4                | --             | 15.00                              | --             | 50                 | 50               | ---                         | Fair                       | Up                                  | Some                            | Yes                 |
| Alaska-----         | .7               | --             | 15.00                              | --             | 100                | --               | ---                         | Good                       | Sta.                                | Some                            | No                  |
| Hawaii-----         | .2               | --             | 35.00                              | --             | 100                | --               | ---                         | Fair                       | Up                                  | Some                            | Yes                 |
| Western-----        | 99.9             | 2              | 18.60                              | 3.50           | 43                 | 57               | 2-Good<br>6-Fair            | 1-Poor                     | 5-Up<br>3-Sta.                      | 1-Urgent<br>6-Some<br>1-Little  | 4-Yes<br>4-No       |
| United States-----  | 207.2            | 35.1           | 14.71                              | 7.45           | 69                 | 31               | 13-Good<br>12-Fair          | 6-Good<br>3-Fair<br>1-Poor | 21-Up<br>6-Sta.                     | 4-Urgent<br>20-Some<br>3-Little | 14-Yes<br>13-No     |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.

<sup>2</sup> Sta., stationary.  
<sup>3</sup> Less than 50 acres.

Table 34. --Solanaaceous crops: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965.

| Region and State      | Weed           | Infestation |           | Weed             | Infestation |           | Weed            | Infestation |           | Weed            | Infestation |           | Pct.             |     |      |
|-----------------------|----------------|-------------|-----------|------------------|-------------|-----------|-----------------|-------------|-----------|-----------------|-------------|-----------|------------------|-----|------|
|                       |                | Acres       | Trend (1) |                  | Acres       | Trend (1) |                 | Acres       | Trend (1) |                 | Acres       | Trend (1) |                  |     |      |
| <b>Northeastern:</b>  |                |             |           |                  |             |           |                 |             |           |                 |             |           |                  |     |      |
| Connecticut           | Annual grasses | 25          | Sta.      | Barnyardgrass    | 10          | Up        | Crabgrass       | 50          | Up        | Hairy galinsoga | 40          | Sta.      | Lambquarters     | 25  | Down |
| Delaware              | Crabgrass      | 80          | Up        | Goosegrass       | 40          | Up        | Lambquarters    | 50          | Sta.      | Pigweed         | 60          | Sta.      | Ragweed          | 60  | Sta. |
| Maine                 | Annual grasses | 20          | Sta.      | Lambquarters     | 80          | Sta.      | Quackgrass      | 30          | Sta.      | Redroot pigweed | 80          | Up        | Wild mustard     | 10  | Down |
| Maryland              | Crabgrass      | --          | Sta.      | Lambquarters     | --          | Sta.      | Morningglory    | --          | Sta.      | Pigweed         | --          | Sta.      | --               | --  | --   |
| New Hampshire         | Barnyardgrass  | 15          | Sta.      | Chickweed        | 10          | Down      | Crabgrass       | 40          | Sta.      | Nutsedge        | 5           | Down      | Quackgrass       | 10  | Sta. |
| New Jersey            | Crabgrass      | --          | Sta.      | Fall panicum     | --          | Up        | Lambquarters    | --          | Sta.      | --              | --          | --        | --               | --  | --   |
| Pennsylvania          | Lambquarters   | 30          | Down      | Lambquarters     | 25          | Down      | Pigweed         | 70          | Down      | Quackgrass      | 40          | Down      | Ragweed          | 25  | Down |
| Rhode Island          | Crabgrass      | 80          | Sta.      | Ladythumb        | 80          | Sta.      | Nutsedge        | 25          | Up        | Ragweed         | 80          | Sta.      | Wild radish      | 80  | Sta. |
| <b>North Central:</b> |                |             |           |                  |             |           |                 |             |           |                 |             |           |                  |     |      |
| Illinois              | Giant foxtail  | 20          | Down      | Lambquarters     | 20          | Down      | Pigweed         | 20          | Down      | Ragweed         | 20          | Down      | Smartweed        | 20  | Down |
| Indiana               | Annual grasses | 100         | Sta.      | Jimsonweed       | 30          | Sta.      | Nutsedge        | 15          | Up        | Ragweed         | 30          | Sta.      | Velvetleaf       | 50  | Sta. |
| Iowa                  | Buttonweed     | 25          | Sta.      | Giant foxtail    | 50          | Sta.      | Green foxtail   | 25          | Sta.      | Lambquarters    | 25          | Sta.      | Yellow foxtail   | 25  | Sta. |
| Michigan              | Lambquarters   | --          | Sta.      | Purslane         | --          | Up        | Quackgrass      | --          | Sta.      | Redroot pigweed | --          | Up        | --               | --  | --   |
| Minnesota             | Quackgrass     | 10          | Sta.      | Sowthistle       | 20          | Sta.      | Wild oats       | 10          | Sta.      | --              | --          | --        | --               | --  | --   |
| Ohio                  | Foxtail        | 60          | Sta.      | Lambquarters     | 40          | Up        | Pigweed         | 60          | Up        | Smartweed       | 40          | Up        | --               | --  | --   |
| Wisconsin             | Barnyardgrass  | 100         | Sta.      | Foxtail          | 100         | Sta.      | Lambquarters    | 100         | Sta.      | Pigweed         | 100         | Sta.      | Quackgrass       | 50  | Sta. |
| <b>Southern:</b>      |                |             |           |                  |             |           |                 |             |           |                 |             |           |                  |     |      |
| Arkansas              | Bermudagrass   | --          | Sta.      | Crabgrass        | --          | Sta.      | Henbit          | --          | Up        | Johnsongrass    | --          | Sta.      | Morningglory     | --  | Sta. |
| Florida               | Bermudagrass   | 40          | Up        | Crabgrass        | 100         | Sta.      | Goosegrass      | 100         | Sta.      | Nightshade      | 75          | Up        | Nutsedge         | 40  | Up   |
| Georgia               | Cocklebur      | 20          | Up        | Sicklepod        | 10          | Up        | --              | --          | --        | --              | --          | --        | --               | --  | --   |
| Kentucky              | Cocklebur      | 25          | Up        | Crabgrass        | 90          | Up        | Foxtail         | 85          | Up        | Pigweed         | 45          | Up        | Purslane         | 80  | Up   |
| Oklahoma              | Cocklebur      | 30          | Sta.      | Crabgrass        | 90          | Sta.      | Johnsongrass    | 20          | Up        | Lambquarters    | 40          | Up        | Pigweed          | 30  | Sta. |
| South Carolina        | Crabgrass      | 40          | Down      | Goosegrass       | 30          | Sta.      | Nutsedge        | 10          | Up        | Pigweed         | 30          | Sta.      | Ragweed          | 30  | Sta. |
| Tennessee             | Crabgrass      | 25          | Sta.      | Lambquarters     | 30          | Sta.      | Morningglory    | 25          | Sta.      | Ragweed         | 30          | Sta.      | --               | --  | --   |
| Virginia              | Crabgrass      | --          | Sta.      | --               | --          | Sta.      | --              | --          | --        | --              | --          | --        | --               | --  | --   |
| <b>Western:</b>       |                |             |           |                  |             |           |                 |             |           |                 |             |           |                  |     |      |
| California            | Barnyardgrass  | 60          | Sta.      | Mallow           | 60          | Sta.      | Nightshade      | 35          | Up        | Nutsedge        | 25          | Up        | Pigweed          | 75  | Sta. |
| Colorado              | Canada thistle | 10          | Up        | Foxtail          | 50          | Sta.      | Lambquarters    | 50          | Down      | Nightshade      | 10          | Sta.      | Wild oats        | 20  | Sta. |
| Idaho                 | Foxtail        | 100         | Down      | Pigweed          | 100         | Down      | Russian thistle | 50          | Up        | --              | --          | --        | --               | --  | --   |
| Montana               | Lambquarters   | 50          | Sta.      | Mustard          | 45          | Sta.      | Pigweed         | 50          | Sta.      | Quackgrass      | 10          | Down      | Wild oats        | 15  | Down |
| Oregon                | Kochia         | 15          | Sta.      | Lambquarters     | 100         | Sta.      | Nightshade      | 100         | Sta.      | Pigweed         | 100         | Sta.      | Quackgrass       | 25  | Down |
| Utah                  | Barnyardgrass  | 90          | Down      | Lambquarters     | 100         | Down      | Mallow          | 50          | Sta.      | Nightshade      | 50          | Sta.      | Redroot pigweed  | 100 | Down |
| Washington            | Barnyardgrass  | 75          | Up        | Canada thistle   | 2           | Up        | Lambquarters    | 75          | Sta.      | Nightshade      | 75          | Sta.      | Pigweed          | 75  | Sta. |
| Alaska                | Chickweed      | 100         | Sta.      | Field pepperweed | 100         | Sta.      | Lambquarters    | 100         | Sta.      | Quackgrass      | 25          | Sta.      | Wild mustard     | 100 | Sta. |
| Hawaii                | Apple-of-Peru  | 20          | Up        | Black nightshade | 30          | Up        | Little mallow   | 15          | Up        | Nutsedge        | 30          | Up        | Red tasselflower | 30  | Up   |

1 Sta., stationary.

treatments was fair to good in all regions. Herbicide-usage trend in fruit and nut crops was ascending in more than 80 percent of the States reporting. Some States in all regions reported an urgent need for better herbicides, amounting to about 40 percent of the States reporting. The remainder of the States from various regions indicated some need for improved herbicides. The North Central and Southern States reported, in general, no persistence problems. Two of the four Northeastern States reporting indicated persistence problems and the five Western States reporting indicated persistence problems. (Tables 1 to 5, 35 and 36.)

Annual weeds mentioned two or more times in reports of the various regions are: Northeastern States--crabgrass, foxtail, curly dock, lambsquarters, dandelion, and pigweed; North Central States--none; Southern States--crabgrass, chickweed, and pigweed; and Western States--barnyardgrass.

Important perennial weeds mentioned in reports from the various regions are: Northeastern States--poison ivy, orchardgrass, and quackgrass; North Central States--Canada thistle, bindweed, poison ivy, horsenettle, and quackgrass; Southern States--bermudagrass, johnsongrass, paragrass, quackgrass, honeysuckle, horsenettle, poison ivy, trumpet-creeper, Virginia creeper, and torpedograss; and Western States--bermudagrass, bindweed, Canada thistle, johnsongrass, quackgrass, nut-sedge, paspalum, and wild garlic.

## Ornamentals

Accurate estimates of the total acreage of ornamentals are not available at the present time. Acreage treated preemergence and post-emergence<sup>10</sup> with herbicides in 1965 was 14,600 acres and 68,700 acres, respectively, or a total of 83,300 acres. Acreage treated preemergence amounted to about 17.5 percent of the total acreage treated. Of the acreage treated preemergence, distribution by regions was: Western States 35 percent; Southern States 27.3 percent; Northeastern States 19.2 percent; and North Central States 18.5 percent. Of the acreage treated postemergence, distribution by regions was: Western States 59.6

<sup>10</sup>Preemergence and postemergence refer to emergence of weeds in perennial ornamentals and to crop emergence in annual ornamentals.

percent; Southern States 22.3 percent; Northeastern States 17.9 percent; and North Central States 0.2 percent. Average per acre cost of preemergence and postemergence treatments for all States was \$24.19 and \$20.24, respectively. Average cost per acre for preemergence treatments ranked by regions was: Southern States \$40.88; Northeastern States \$22.71; North Central States \$18.81; and Western States \$14.75. Average cost per acre for postemergence treatments ranked by regions was: Southern States \$26.70; Northeastern States \$20.62; Western States \$17.76; and North Central States \$1.00. Percent of acreage treated by farmers ranked by regions was: Northeastern States 84 percent; Southern States 82 percent; North Central States 78 percent; and Western States 10 percent. The remainder was treated by custom operators. Effectiveness of preemergence herbicide treatments was fair to good in the Northeastern, North Central, and Southern States, and poor to good in the Western States. Effectiveness of post-emergence treatments was fair to good in the Northeastern and Southern States, fair in the North Central States, and poor to good in the Western States. Herbicide-usage trend in ornamentals was ascending in 14 of the 15 States reporting. There was some need for better herbicides in all of the regions, with 4 States reporting an urgent need. There were persistence problems in some of the States in each of the regions. (Tables 1 to 5, 37, and 38.)

Annual weeds mentioned two or more times in reports of the various regions are: Northeastern States--annual grasses, chickweed, crabgrass, and pigweed; North Central States--crabgrass, and other annual grasses; Southern States--betony, chickweed, crabgrass, pigweed, and ragweed; and Western States--crabgrass and purslane.

Important perennial weeds mentioned in reports from the various regions are: Northeastern States--bindweed, Canada thistle, mugwort, nutsedge, and quackgrass; North Central States--field bindweed, bluegrass, Canada thistle, quackgrass, nutsedge, and red sorrel; Southern States--bermudagrass, alligatorweed, field bindweed, mugwort, purple nutsedge, johnsongrass, quackgrass, yellow nutsedge, and wild garlic; and Western States--bermudagrass, bentgrass, bluegrass, quackgrass, nutsedge, and red sorrel.

Table 35.--Fruits and nuts: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region   | Acres treated    |                  | Average cost per acre <sup>1</sup> |                | Acres treated by-- |                  | Effectiveness of herbicides |                   | Herbicides usage trend <sup>2</sup> | Need for better herbicides | Persistence problem |
|--------------------|------------------|------------------|------------------------------------|----------------|--------------------|------------------|-----------------------------|-------------------|-------------------------------------|----------------------------|---------------------|
|                    | Pre-emergence    | Post-emergence   | Pre-emergence                      | Post-emergence | Farmers            | Custom operators | Pre-emergence               | Post-emergence    |                                     |                            |                     |
|                    | 1,000 acres      | 1,000 acres      | Dollars                            | Dollars        | Percent            | Percent          |                             |                   |                                     |                            |                     |
| Connecticut-----   | .2               | 1                | 25.00                              | 10.00          | 95                 | 5                | Good                        | Good              | Up                                  | Some                       | No                  |
| Delaware-----      | --               | .3               | --                                 | 13.00          | 75                 | 25               | ----                        | Good              | Up                                  | Urgent                     | Yes                 |
| New Hampshire----- | --               | 2                | --                                 | 10.00          | 100                | --               | ----                        | Good              | Up                                  | Some                       | Yes                 |
| Pennsylvania-----  | --               | 7                | --                                 | 12.50          | 90                 | 10               | ----                        | Good              | Up                                  | Some                       | No                  |
| Northeastern-----  | .2               | 10.3             | 25.00                              | 11.79          | 92                 | 8                | 1-Good                      | 4-Good            | 4-Up                                | 1-Urgent<br>3-Some         | 2-Yes<br>2-No       |
| Indiana-----       | 1                | --               | 4.00                               | --             | 100                | --               | Good                        | ----              | Up                                  | Urgent                     | No                  |
| Iowa-----          | 1                | 1                | 2.00                               | 1.00           | 95                 | 5                | Fair                        | Fair              | Sta.                                | Some                       | No                  |
| Michigan-----      | --               | 50               | --                                 | 10.00          | 90                 | 10               | ----                        | Good              | Up                                  | Urgent                     | No                  |
| Minnesota-----     | .1               | ( <sup>3</sup> ) | 25.00                              | 5.00           | 100                | --               | Fair                        | Fair              | Up                                  | Urgent                     | No                  |
| Wisconsin-----     | --               | 45               | --                                 | 45.00          | 100                | --               | ----                        | Fair              | Up                                  | Some                       | No                  |
| North Central----- | 2.1              | 96               | 4.05                               | 26.31          | 95                 | 5                | 1-Good<br>2-Fair            | 1-Good<br>3-Fair  | 4-Up<br>1-Sta.                      | 3-Urgent<br>2-Some         | 5-No                |
| Arkansas-----      | 2                | 3                | 5.00                               | 10.00          | 20                 | 80               | Fair                        | Fair              | Up                                  | Some                       | No                  |
| Florida-----       | ( <sup>3</sup> ) | 40               | --                                 | 35.00          | 30                 | 70               | ----                        | Fair              | Up                                  | Urgent                     | No                  |
| Georgia-----       | --               | ( <sup>3</sup> ) | 15.00                              | 5.00           | 100                | --               | Good                        | Good              | Up                                  | Some                       | No                  |
| Kentucky-----      | 2                | .8               | 15.00                              | 5.00           | 90                 | 10               | Good                        | Fair              | Up                                  | Some                       | No                  |
| Oklahoma-----      | 1                | 1                | 2.75                               | 1.50           | 100                | --               | Fair                        | Good              | Up                                  | Urgent                     | Yes                 |
| Tennessee-----     | 1                | .8               | 15.00                              | 2.50           | 95                 | 5                | Good                        | Good              | Up                                  | Some                       | No                  |
| Virginia-----      | --               | 6                | --                                 | 6.50           | 90                 | 10               | ----                        | Good              | Up                                  | Some                       | No                  |
| Southern-----      | 6                | 51.6             | 9.62                               | 28.61          | 43                 | 57               | 3-Good<br>2-Fair            | 4-Good<br>3-Fair  | 7-Up                                | 2-Urgent<br>5-Some         | 1-Yes<br>6-No       |
| Arizona-----       | --               | 7                | --                                 | 10.00          | 80                 | 20               | ----                        | Good              | Sta.                                | Some                       | Yes                 |
| California-----    | 250              | 100              | 12.00                              | 5.00           | 90                 | 10               | Good                        | Fair              | Up                                  | Some                       | Yes                 |
| Utah-----          | 1                | --               | 5.00                               | --             | 100                | --               | Good                        | ----              | Up                                  | Some                       | Yes                 |
| Washington-----    | --               | 15               | --                                 | 12.00          | 99                 | 1                | ----                        | Fair              | Up                                  | Urgent                     | Yes                 |
| Hawaii-----        | .2               | 1                | 25.00                              | 35.00          | 100                | --               | Fair                        | Fair              | Up                                  | Urgent                     | Yes                 |
| Western-----       | 251.2            | 123              | 11.98                              | 6.38           | 90                 | 10               | 2-Good<br>1-Fair            | 1-Good<br>3-Fair  | 4-Up<br>1-Sta.                      | 2-Urgent<br>3-Some         | 5-Yes               |
| United States----- | 259.5            | 280.9            | 11.87                              | 14.06          | 86                 | 14               | 7-Good<br>5-Fair            | 10-Good<br>9-Fair | 19-Up<br>2-Sta.                     | 8-Urgent<br>13-Some        | 8-Yes<br>13-No      |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.

<sup>2</sup> Sta., stationary.

<sup>3</sup> Less than 50 acres.

Table 36.--Fruits and nuts: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State      | Weed              |                    | Infestation |                     | Weed                |      | Infestation        |                    | Weed |                    | Infestation          |           | Weed                |                       | Infestation |           |       |
|-----------------------|-------------------|--------------------|-------------|---------------------|---------------------|------|--------------------|--------------------|------|--------------------|----------------------|-----------|---------------------|-----------------------|-------------|-----------|-------|
|                       | Weed              | Pct.               | Acres       | Trend (1)           | Weed                | Pct. | Acres              | Trend (1)          | Weed | Pct.               | Acres                | Trend (1) | Weed                | Pct.                  | Acres       | Trend (1) |       |
|                       |                   |                    |             |                     |                     |      |                    |                    |      |                    |                      |           |                     |                       |             |           | Acres |
| Northeastern:         | Bedstraw-----     | 5                  | Up          | Chickweed-----      | 10                  | Sta. | Dandelion-----     | 40                 | Sta. | Poison ivy-----    | 10                   | Sta.      | Quackgrass-----     | 75                    | Sta.        |           |       |
|                       | Crabgrass-----    | 10                 | Sta.        | Curly dock-----     | 2                   | Up   | Pigweed-----       | 10                 | Sta. | Poison ivy-----    | 2                    | Down      |                     |                       |             |           |       |
|                       | Goldenrod-----    | 20                 | Down        | Milkweed-----       | 8                   | Down | Morningglory-----  | 10                 | Down | Poison ivy-----    | 50                   | Down      | Quackgrass-----     | 85                    | Down        |           |       |
|                       | Crabgrass-----    | 30                 | Sta.        | Curly dock-----     | 30                  | Sta. | Dandelion-----     | 40                 | Down | Poison ivy-----    | 10                   | Down      | Quackgrass-----     | 35                    | Up          |           |       |
|                       | Foxtail-----      | 20                 | Sta.        | Lambsquarters-----  | 30                  | Sta. | Pigweed-----       | 20                 | Sta. | Pigweed-----       | 20                   | Sta.      | Quackgrass-----     | 75                    | Up          |           |       |
|                       | Crabgrass-----    | 20                 | Sta.        | Foxtail-----        | 30                  | Sta. | Lambsquarters----- | 20                 | Sta. |                    |                      |           |                     |                       |             |           |       |
|                       | North Central:    | Bindweed-----      | 10          | Down                | Crabgrass-----      | 10   | Down               | Poison ivy-----    | 10   | Down               | Quackgrass-----      | 10        | Down                | Weed bromegrasses     | 10          | Down      |       |
|                       |                   | Bindweed-----      | --          | Up                  | Canada thistle----- | --   | Up                 | Fescue-----        | --   | Sta.               | Horsenettle-----     | --        | Up                  | Poison ivy-----       | --          | Sta.      |       |
|                       |                   | Barnyardgrass----- | 50          | Sta.                | Giant foxtail-----  | 25   | Sta.               | Green foxtail----- | 50   | Sta.               | Ragweed-----         | 25        | Sta.                | Sandbur-----          | 25          | Sta.      |       |
|                       |                   | Bindweed-----      | --          | Up                  | Cinquefoil-----     | --   | Up                 | Horsenettle-----   | --   | Up                 | Milkweed-----        | --        | Up                  | Quackgrass-----       | --          | Down      |       |
| Canada thistle-----   |                   | 5                  | Up          | Foxtail-----        | 100                 | Sta. | Parslane-----      | 100                | Sta. | Quackgrass-----    | 20                   | Sta.      | Shepherdspuree----- | 50                    | Sta.        |           |       |
| Black nightshade----- |                   | 75                 | Sta.        | Canada thistle----- | 40                  | Sta. | Dandelion-----     | 100                | Sta. | Poison ivy-----    | 30                   | Down      | Quackgrass-----     | 100                   | Sta.        |           |       |
| Southern:             |                   | Barnyardgrass----- | --          | Sta.                | Crabgrass-----      | --   | Sta.               | Dock-----          | --   | Up                 | Johnsongrass-----    | --        | Up                  | Morningglory-----     | --          | Sta.      |       |
|                       |                   | Bermudagrass-----  | 80          | Sta.                | Milkweed-----       | 70   | Up                 | Paragrass-----     | 20   | Sta.               | Torpedograss-----    | 20        | Up                  | Virginia creeper----- | 5           | Sta.      |       |
|                       |                   | Cheat-----         | 30          | Sta.                | Chickweed-----      | 40   | Sta.               | Crabgrass-----     | 45   | Sta.               | Foxtail-----         | 30        | Sta.                | Pigweed-----          | 45          | Sta.      |       |
|                       |                   | Bermudagrass-----  | 30          | Sta.                | Horsenettle-----    | 40   | Up                 | Johnsongrass-----  | 20   | Sta.               | Trumpet creeper----- | 35        | Up                  | Virginia creeper----- | 20          | Up        |       |
|                       | Bermudagrass----- | 60                 | Up          | Crabgrass-----      | 85                  | Up   | Johnsongrass-----  | 80                 | Up   | Lambsquarters----- | 40                   | Up        | Pigweed-----        | 50                    | Up          |           |       |
|                       | Bermudagrass----- | 10                 | Sta.        | Chickweed-----      | 95                  | Sta. | Crabgrass-----     | 95                 | Sta. | Henbit-----        | 95                   | Sta.      | Smartweed-----      | 60                    | Up          |           |       |
|                       | Honeysuckle-----  | 6                  | Sta.        | Poison ivy-----     | 8                   | Sta. | Quackgrass-----    | 2                  | Sta. |                    |                      |           |                     |                       |             |           |       |
|                       | Western:          | Barnyardgrass----- | 40          | ---                 | Bermudagrass-----   | 15   | ---                | Johnsongrass-----  | 10   | ---                | Sandbur-----         | 20        | ---                 | Wild mustard-----     | 70          | ---       |       |
|                       |                   | Bermudagrass-----  | 30          | Sta.                | Bindweed-----       | 40   | Sta.               | Curly dock-----    | 50   | Sta.               | Johnsongrass-----    | 30        | Up                  | Nutsedge-----         | 20          | Up        |       |
|                       |                   | Barnyardgrass----- | 10          | Sta.                | Foxtail-----        | 35   | Sta.               | Kochia-----        | 40   | Sta.               | Nutsedge-----        | 10        | Sta.                | Pigweed-----          | 45          | Sta.      |       |
| Annual bluegrass----- |                   | 50                 | Sta.        | Chickweed-----      | 50                  | Sta. | Henbit-----        | 50                 | Sta. | Ryegrasses-----    | 20                   | Sta.      | Wild garlic-----    | 10                    | Sta.        |           |       |
| Canada thistle-----   |                   | 30                 | Up          | Green foxtail-----  | 40                  | Up   | Morningglory-----  | 25                 | Up   | Puncturevine-----  | 15                   | Sta.      | Quackgrass-----     | 40                    | Up          |           |       |
| Bindweed-----         |                   | 20                 | Sta.        | Canada thistle----- | 50                  | Up   | Dandelion-----     | 40                 | Up   | Quackgrass-----    | 80                   | Sta.      | Ragweed-----        | 50                    | Sta.        |           |       |
| Bristly foxtail-----  |                   | 25                 | Up          | Buttonweed-----     | 15                  | Up   | Junglerice-----    | 20                 | Up   | Nutsedge-----      | 50                   | Up        | Paspalum-----       | 15                    | Sta.        |           |       |

1 Sta., stationary

Table 37.--Ornamentals: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region   | Acres treated    |                  | Average cost per acre <sup>1</sup> |               | Acres treated by--- |                  | Effectiveness of herbicides |                            | Herbicides usage trend <sup>2</sup> | Need for better herbicides      | Persistence problem |
|--------------------|------------------|------------------|------------------------------------|---------------|---------------------|------------------|-----------------------------|----------------------------|-------------------------------------|---------------------------------|---------------------|
|                    | Preemergence     | Postemergence    | Preemergence                       | Postemergence | Farmers             | Custom operators | Preemergence                | Postemergence              |                                     |                                 |                     |
|                    | 1,000 acres      | 1,000 acres      | Dollars                            | Dollars       | Percent             | Percent          |                             |                            |                                     |                                 |                     |
| Connecticut-----   | 3                |                  | 25.00                              | 40.00         | 90                  | 10               | Good                        | Good                       | Up                                  | Some                            | No                  |
| Delaware-----      | ( <sup>3</sup> ) | .3               | 30.00                              | 18.00         | 100                 | --               | Good                        | Good                       | Up                                  | Some                            | Yes                 |
| Pennsylvania-----  | .8               | 9                | 17.00                              | 14.25         | 80                  | 20               | Fair                        | Fair                       | Up                                  | Some                            | No                  |
| Northeastern-----  | 2.8              | 12.3             | 22.71                              | 20.62         | 84                  | 16               | 2-Good<br>1-Fair            | 2-Good<br>1-Fair           | 3-Up                                | 3-Some                          | 1-Yes<br>2-No       |
| Indiana-----       | .3               | --               | 25.00                              | --            | 100                 | --               | Good                        | ---                        | Up                                  | Some                            | Yes                 |
| Iowa-----          | .1               | .1               | 3.00                               | 1.00          | 95                  | 5                | Fair                        | Fair                       | Sta.                                | Some                            | No                  |
| Michigan-----      | 2                | --               | 20.00                              | --            | 70                  | 30               | Fair                        | ---                        | Up                                  | Some                            | No                  |
| Minnesota-----     | .3               | --               | 10.00                              | --            | 100                 | --               | Fair                        | ---                        | Up                                  | Urgent                          | Yes                 |
| North Central----- | 2.7              | .1               | 18.81                              | 1.00          | 78                  | 22               | 1-Good<br>3-Fair            | 1-Fair                     | 3-Up<br>1-Sta                       | 1-Urgent<br>3-Some              | 2-Yes<br>2-No       |
| Florida-----       | 2                | 12               | 20.00                              | 30.00         | 80                  | 20               | Fair                        | Fair                       | Up                                  | Urgent                          | No                  |
| Georgia-----       | ( <sup>3</sup> ) |                  | 15.00                              | 5.00          | 100                 | --               | Good                        | Good                       | Up                                  | Some                            | No                  |
| Kentucky-----      | .5               | .1               | 15.00                              | 15.00         | 100                 | --               | Fair                        | Fair                       | Up                                  | Some                            | Yes                 |
| Tennessee-----     | 1                | .2               | 16.00                              | 10.00         | 95                  | 5                | Good                        | Good                       | Up                                  | Some                            | Yes                 |
| Virginia-----      | .5               | 3                | 200.00                             | 15.00         | 80                  | 20               | Good                        | Fair                       | Up                                  | Some                            | Yes                 |
| Southern-----      | 4.0              | 15.3             | 40.88                              | 26.70         | 82                  | 18               | 3-Good<br>2-Fair            | 1-Good<br>4-Fair           | 5-Up                                | 1-Urgent<br>4-Some              | 3-Yes<br>2-No       |
| California-----    | 5                | 40               | 15.00                              | 18.00         | 10                  | 90               | Poor                        | Poor                       | Up                                  | Urgent                          | Yes                 |
| Oregon-----        | .1               | 1                | 2.00                               | 8.00          | 20                  | 80               | Good                        | Good                       | Up                                  | Little                          | Yes                 |
| Utah-----          | --               | ( <sup>3</sup> ) | --                                 | 25.00         | 100                 | --               | ---                         | Poor                       | Up                                  | Urgent                          | Yes                 |
| Western-----       | 5.1              | 41               | 14.75                              | 17.76         | 10                  | 90               | 1-Good<br>1-Poor            | 1-Good<br>2-Poor           | 3-Up                                | 2-Urgent<br>1-Little            | 3-Yes               |
| United States----- | 14.6             | 68.7             | 24.19                              | 20.24         | 42                  | 58               | 7-Good<br>6-Fair<br>1-Poor  | 4-Good<br>6-Fair<br>2-Poor | 14-Up<br>1-Sta.                     | 4-Urgent<br>10-Some<br>1-Little | 9-Yes<br>6-No       |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom application and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.

<sup>2</sup> Sta., stationary.

<sup>3</sup> Less than 50 acres.

Table 38.--Ornamentals: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State  | Weed  |           | Infestation       |           | Weed  |                   | Infestation |           | Weed              |           | Infestation |                     | Weed  |           | Infestation |           |
|-------------------|-------|-----------|-------------------|-----------|-------|-------------------|-------------|-----------|-------------------|-----------|-------------|---------------------|-------|-----------|-------------|-----------|
|                   | Acres | Trend (1) | Acres             | Trend (1) | Acres | Trend (1)         | Acres       | Trend (1) | Acres             | Trend (1) | Acres       | Trend (1)           | Acres | Trend (1) | Acres       | Trend (1) |
| Northeastern:     |       |           |                   |           |       |                   |             |           |                   |           |             |                     |       |           |             |           |
| Connecticut----   | 100   | Sta.      | Bindweed-----     | 10        | Sta.  | Chickweed-----    | 20          | Sta.      | Mugwort-----      | 15        | Sta.        | Quackgrass-----     | 40    | Sta.      |             |           |
| Delaware-----     | 90    | Sta.      | Crabgrass-----    | 90        | Up    | Mugwort-----      | 15          | Up        | Nutsedge-----     | 25        | Up          | Pigweed-----        | 60    | Sta.      |             |           |
| Maine-----        | 50    | Sta.      | Chickweed-----    | 80        | Up    | Pigweed-----      | 80          | Sta.      | Quackgrass-----   | 25        | Up          |                     |       |           |             |           |
| New Jersey-----   | --    | Up        | Fall panicum----- | --        | Up    | Morningglory----- | --          | Up        | Mugwort-----      | --        | Down        |                     |       |           |             |           |
| Pennsylvania----- | 12    | Up        | Nutsedge-----     | 18        | Up    | Pigweed-----      | 50          | Down      | Quackgrass-----   | 80        | Up          | Yellow foxtail----- | 35    | Down      |             |           |
| Vermont-----      | 25    | Sta.      | Crabgrass-----    | 50        | Up    | Quackgrass-----   | 50          | Sta.      |                   | --        |             |                     |       |           |             |           |
| North Central:    |       |           |                   |           |       |                   |             |           |                   |           |             |                     |       |           |             |           |
| Illinois-----     | 10    | Down      | Field bindweed--- | 10        | Down  | Giant foxtail---  | 10          | Down      | Goosegrass-----   | 10        | Down        | Panicum-----        | 10    | Down      |             |           |
| Indiana-----      | 30    | Sta.      | Canada thistle--- | 3         | Sta.  | Field bindweed--- | 5           | Up        | Nutsedge-----     | 1         | Up          | Quackgrass-----     | 15    | Sta.      |             |           |
| Iowa-----         | 50    | Sta.      | Lambsquarters---  | 25        | Sta.  | Pigweed-----      | 25          | Sta.      | Yellow foxtail--- | 50        | Sta.        |                     |       |           |             |           |
| Michigan-----     | --    | Up        | Canada thistle--- | --        | Up    | Crabgrass-----    | --          | Sta.      | Field bindweed--- | --        | Up          | Quackgrass-----     | --    | Sta.      |             |           |
| Minnesota-----    | 40    | Up        | Chickweed-----    | 30        | Up    | Quackgrass-----   | 30          | Up        | Woodsorrel-----   | 20        | Up          |                     |       |           |             |           |
| Southern:         |       |           |                   |           |       |                   |             |           |                   |           |             |                     |       |           |             |           |
| Arkansas-----     | --    | Sta.      | Crabgrass-----    | --        | Up    | Curly dock-----   | --          | Sta.      | Nutsedge-----     | --        | Up          | Wild garlic-----    | --    | Up        |             |           |
| Florida-----      | 40    | Sta.      | Crabgrass-----    | 100       | Sta.  | Purple nutsedge-- | 75          | Sta.      | Spurges-----      | 95        | Sta.        | Yellow nutsedge---  | 50    | Sta.      |             |           |
| Georgia-----      | 5     | Sta.      | Betony-----       | 40        | Up    | Dichondra-----    | 20          | Up        | Pennywort-----    | 20        | Up          | Soliva-----         | 50    | Up        |             |           |
| Kentucky-----     | 10    | Up        | Chickweed-----    | 60        | Sta.  | Crabgrass-----    | 60          | Sta.      | Field bindweed--- | 20        | Sta.        | Pigweed-----        | 40    | Sta.      |             |           |
| North Carolina--  | 50    | Up        | Chickweed-----    | 80        | Up    | Henbit-----       | 80          | Sta.      | Mugwort-----      | 60        | Up          | Nutsedge-----       | 20    | Up        |             |           |
| Oklahoma-----     | 60    | Up        | Crabgrass-----    | 85        | Up    | Johnsongrass----- | 75          | Up        | Pigweed-----      | 90        | Up          | Sandbur-----        | 30    | Up        |             |           |
| South Carolina--  | 40    | Sta.      | Crabgrass-----    | 98        | Sta.  | Johnsongrass----- | 10          | Sta.      | Nutsedge-----     | 25        | Sta.        | Ragweed-----        | 40    | Sta.      |             |           |
| Tennessee-----    | 40    | Down      | Mugwort-----      | 15        | Up    | Quackgrass-----   | 25          | Sta.      | Ragweed-----      | 40        | Sta.        | Wild garlic-----    | 15    | Sta.      |             |           |
| Virginia-----     | 75    | Sta.      | Foxtail-----      | 5         | Up    | Morningglory----- | 15          | Sta.      | Mugwort-----      | 3         | Up          | Quackgrass-----     | 2     | Up        |             |           |
| Western:          |       |           |                   |           |       |                   |             |           |                   |           |             |                     |       |           |             |           |
| Arizona-----      | 100   |           | Nutsedge-----     | 30        |       |                   |             |           |                   |           |             |                     |       |           |             |           |
| California-----   | 60    | Up        | Crabgrass-----    | 80        | Sta.  | Nutsedge-----     | 30          | Up        | Prostrate spurge- | 30        | Up          | Purslane-----       | 25    | Up        |             |           |
| New Mexico-----   | 40    | Sta.      | Foxtail-----      | 10        | Down  | Lambsquarters---  | 10          | Down      | Nutsedge-----     | 10        | Sta.        |                     |       |           |             |           |
| Oregon-----       | 100   | Sta.      | Bluegrass-----    | 100       | Sta.  | Chickweed-----    | 100         | Sta.      | Quackgrass-----   | 100       | Sta.        | Red sorrel-----     | 100   | Sta.      |             |           |
| Utah-----         | 100   | Up        | Purslane-----     | 40        | Up    | Quackgrass-----   | 50          | Up        | Redroot pigweed-- | 90        | Sta.        | Sheepspurge-----    | 60    | Up        |             |           |
| Alaska-----       | 50    | Up        |                   | --        |       |                   |             |           |                   |           |             |                     |       |           |             |           |
| Hawaii-----       | 15    | Sta.      | Florida purslane- | 25        | Up    | Nutsedge-----     | 40          | Up        | Red tassellower-  | 30        | Up          | Smallflower gallin- | 25    | Up        |             |           |
|                   |       |           |                   |           |       |                   |             |           |                   |           |             |                     |       |           |             |           |

1. Sta., stationary.



## LAWNS

Over 5 million acres of turfgrass are found in home lawns and 10 million acres of turf are devoted to school installations, industrial grounds, military reservations, cemeteries, parks, and golf courses.

Weeds rank as one of the major problems in turf as judged by consumer interest and demand for tools and chemicals for weed control (tables 1 to 5).

Twenty-nine States estimated that over a million acres of turf were treated with herbicides in 1965 at a total cost of almost \$27 million (tables 1 and 39). Of this acreage, almost one-fourth was treated preemergence (table 2). Forty-two percent was treated by custom operators. Seventeen of 21 States reported good effectiveness for preemergence herbicides and 23 of the 29 States reported good effectiveness of postemergence treatments (tables 4 and 39). Twenty-seven of the 29 States reported upward trend for use of herbicides (tables 5 and 39).

The most important lawn weeds, as indicated by their frequency of listing (table 40), include: dandelion (26 States), chickweed (22

States), crabgrass (21 States), plantains (15 States), annual bluegrass (13 States), knotweed (10 States), and nutsedge (9 States). Many of the species above, with the exception of annual bluegrass and nutsedge, are controlled by herbicides available. In addition, there were 10 species of perennial grasses that were listed 34 times among the five most important weeds of the various States. These included such species as quackgrass, nimblewill, tall fescue, bermudagrass, bentgrass, and velvetgrass. These latter cannot generally be controlled selectively in lawns. Worse, most are difficult to eradicate conveniently by any means.

It is notable that many of the species listed infest a high percentage of the lawns. This indicates a sizable acreage where control methods are needed. Also, even though there may now be a useful control method for many species, this does not preclude wide acceptance of a more effective method should it become available. More effective and efficient herbicides are needed to cope with lawn weed problems.

Table 39. --Lawns: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region   | Acres treated    |                  | Average cost per acre <sup>1</sup> |                | Acreage treated by-- |                  | Effectiveness of herbicides |                   | Herbicides usage trend <sup>2</sup> | Need for better herbicides      | Persistence problem |
|--------------------|------------------|------------------|------------------------------------|----------------|----------------------|------------------|-----------------------------|-------------------|-------------------------------------|---------------------------------|---------------------|
|                    | Pre-emergence    | Post-emergence   | Pre-emergence                      | Post-emergence | Farmers              | Custom operators | Pre-emergence               | Post-emergence    |                                     |                                 |                     |
|                    | 1,000 acres      | 1,000 acres      | Dollars                            | Dollars        | Percent              | Percent          |                             |                   |                                     |                                 |                     |
| Connecticut-----   | 10               | 12               | 50.00                              | 70.00          | 75                   | 25               | Good                        | Good              | Up                                  | Some                            | Yes                 |
| Delaware-----      | ( <sup>3</sup> ) | 5                | 50.00                              | 15.00          | 99                   | 1                | Good                        | Good              | Up                                  | Some                            | No                  |
| Maine-----         | --               | ( <sup>3</sup> ) | --                                 | 4.50           | 100                  | --               | ---                         | ---               | Up                                  | Little                          | No                  |
| Massachusetts----- | .1               | 3                | 8.00                               | 8.00           | 50                   | 50               | Good                        | Good              | Up                                  | Little                          | Yes                 |
| New Hampshire----- | 5                | 4.5              | 5.00                               | 5.00           | 95                   | 5                | Fair                        | Good              | Up                                  | Some                            | No                  |
| New Jersey-----    | 8                | 15               | 50.00                              | 16.00          | 90                   | 10               | Good                        | Good              | Up                                  | Some                            | No                  |
| Vermont-----       | --               | 1                | --                                 | 10.00          | 75                   | 25               | ---                         | ---               | Up                                  | Some                            | No                  |
| Northeastern-----  | 23.1             | 81               | 40.08                              | 17.46          | 88                   | 12               | 4-Good<br>1-Fair            | 7-Good            | 7-Up                                | 5-Some<br>2-Little              | 2-Yes<br>5-No       |
| Indiana-----       | 4                | 20               | 50.00                              | 10.00          | 95                   | 5                | Good                        | Good              | Up                                  | Some                            | No                  |
| Iowa-----          | 1                | 2                | 50.00                              | 1.70           | 95                   | 5                | Fair                        | Good              | Sta.                                | Little                          | No                  |
| Minnesota-----     | 15               | 100              | 2.50                               | 3.00           | 50                   | 50               | Good                        | Fair              | Up                                  | Urgent                          | Yes                 |
| Ohio-----          | --               | 5                | --                                 | 20.00          | 60                   | 40               | ---                         | ---               | Up                                  | Some                            | No                  |
| North Central----- | 20               | 127              | 14.38                              | 4.75           | 59                   | 41               | 2-Good<br>1-Fair            | 3-Good<br>1-Fair  | 3-Up<br>1-Sta.                      | 1-Urgent<br>2-Some<br>1-Little  | 1-Yes<br>3-No       |
| Arkansas-----      | --               | .9               | --                                 | 20.00          | 90                   | 10               | ---                         | ---               | Up                                  | Some                            | No                  |
| Florida-----       | 70               | 130              | 30.00                              | 20.00          | 30                   | 70               | Good                        | Good              | Up                                  | Urgent                          | No                  |
| Georgia-----       | 50               | 70               | 15.00                              | 5.00           | 70                   | 30               | Good                        | Good              | Up                                  | Some                            | No                  |
| Kentucky-----      | 5                | 10               | 50.00                              | 10.00          | 70                   | 30               | Good                        | Good              | Up                                  | Little                          | No                  |
| Oklahoma-----      | 10               | 15               | 24.50                              | 9.00           | 85                   | 15               | Good                        | Fair              | Up                                  | Little                          | No                  |
| Tennessee-----     | 5                | 15               | 20.00                              | 14.00          | 75                   | 25               | Good                        | Fair              | Up                                  | Some                            | Yes                 |
| Texas-----         | 10               | 50               | 60.00                              | 30.00          | 70                   | 30               | Fair                        | Fair              | Up                                  | Some                            | No                  |
| Virginia-----      | --               | 300              | --                                 | 30.00          | 70                   | 30               | ---                         | ---               | Up                                  | Some                            | No                  |
| Southern-----      | 150              | 570.9            | 26.97                              | 24.20          | 51                   | 49               | 5-Good<br>1-Fair            | 5-Good<br>3-Fair  | 8-Up                                | 1-Urgent<br>5-Some<br>2-Little  | 1-Yes<br>7-No       |
| Arizona-----       | .5               | .1               | 50.00                              | 10.00          | 90                   | 10               | Good                        | Good              | Up                                  | Little                          | No                  |
| California-----    | 60               | 70               | 50.00                              | 30.00          | 70                   | 30               | Good                        | Fair              | Up                                  | Urgent                          | Yes                 |
| Idaho-----         | --               | 1                | --                                 | 20.00          | 50                   | 50               | ---                         | ---               | Up                                  | Little                          | No                  |
| Montana-----       | .1               | 1                | 10.00                              | 3.00           | 85                   | 15               | Good                        | Good              | Up                                  | Some                            | No                  |
| Nevada-----        | --               | .7               | --                                 | 5.00           | 80                   | 20               | ---                         | ---               | Up                                  | Some                            | No                  |
| Oregon-----        | 1                | 1                | 5.00                               | 30.00          | 50                   | 50               | Good                        | Good              | Sta.                                | Urgent                          | No                  |
| Utah-----          | .5               | 2                | 45.00                              | 10.00          | 50                   | 50               | Fair                        | Fair              | Up                                  | Urgent                          | Yes                 |
| Washington-----    | --               | 20               | --                                 | 12.00          | 90                   | 10               | ---                         | ---               | Up                                  | Some                            | No                  |
| Wyoming-----       | ( <sup>2</sup> ) | 2                | 5.00                               | 5.00           | 80                   | 20               | Good                        | Good              | Up                                  | Some                            | No                  |
| Hawaii-----        | ( <sup>3</sup> ) | .5               | 20.00                              | 20.00          | 50                   | 50               | Good                        | Good              | Up                                  | Urgent                          | No                  |
| Western-----       | 64.1             | 98.3             | 47.79                              | 25.04          | 71                   | 29               | 6-Good<br>1-Fair            | 8-Good<br>2-Fair  | 9-Up<br>1-Sta.                      | 5-Urgent<br>3-Some<br>2-Little  | 2-Yes<br>8-No       |
| United States----- | 257.2            | 877.2            | 32.36                              | 20.77          | 58                   | 42               | 17-Good<br>4-Fair           | 23-Good<br>6-Fair | 27-Up<br>2-Sta.                     | 7-Urgent<br>15-Some<br>7-Little | 6-Yes<br>23-No      |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.  
<sup>2</sup> Sta., stationary.  
<sup>3</sup> Less than 50 acres.

Table 40.--Lawns: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State | Weed               | Infestation |           | Weed                | Infestation |           | Weed                | Infestation |           | Weed               | Infestation |           |
|------------------|--------------------|-------------|-----------|---------------------|-------------|-----------|---------------------|-------------|-----------|--------------------|-------------|-----------|
|                  |                    | Acres       | Trend (↑) |                     | Acres       | Trend (↑) |                     | Acres       | Trend (↑) |                    | Acres       | Trend (↑) |
| Northeastern:    |                    |             |           |                     |             |           |                     |             |           |                    |             |           |
| Connecticut      | Chickweed          | 40          | Sta.      | Crabgrass           | 80          | Down      | Dandelion           | 50          | Down      | Plantain           | 40          | Down      |
| Delaware         | Chickweed          | 15          | Sta.      | Crabgrass           | 40          | Down      | Dandelion           | 30          | Down      | Nutsedge           | 20          | Up        |
| Maine            | Chickweed          | 40          | Sta.      | Dandelion           | 90          | Sta.      | Fall hawkbit        | 70          | Sta.      | Plantain           | 70          | Sta.      |
| Maryland         | Annual bluegrass   | --          | Sta.      | Bermudagrass        | --          | Up        | Knotted             | --          | Up        | Paspalum           | --          | Up        |
| Massachusetts    | Chickweed          | 70          | Sta.      | Crabgrass           | 90          | Sta.      | Dandelion           | 90          | Sta.      | Plantain           | 90          | Sta.      |
| New Hampshire    | Chickweed          | --          | Sta.      | Crabgrass           | --          | Down      | Dandelion           | --          | Down      | Knotted            | --          | Down      |
| New Jersey       | Annual bluegrass   | --          | Up        | Fescue              | --          | Up        | Nutsedge            | --          | Up        | Spotted spurge     | --          | Sta.      |
| Rhode Island     | Little starwort    | 20          | Sta.      | Spotted spurge      | 15          | Sta.      | Velvetgrass         | 25          | Sta.      | Wood sorrel        | 20          | Sta.      |
| Vermont          | Crabgrass          | 25          | Sta.      | Dandelion           | 75          | Down      | Ground ivy          | 25          | Sta.      | Knotted            | 25          | Sta.      |
| West Virginia    | Chickweed          | --          | Up        | Crabgrass           | --          | Up        | Dandelion           | --          | Sta.      | Ground ivy         | --          | Sta.      |
| North Central:   |                    |             |           |                     |             |           |                     |             |           |                    |             |           |
| Illinois         | Chickweed          | 20          | Down      | Dandelion           | 20          | Sta.      | Fescue              | 20          | Sta.      | Nimblewill         | 20          | Sta.      |
| Indiana          | Annual bluegrass   | 20          | Up        | Bentgrass           | 1           | Up        | Fescue              | 1           | Sta.      | Nimblewill         | 2           | Up        |
| Iowa             | Chickweed          | 10          | Sta.      | Fescue              | 5           | Sta.      | Ground ivy          | 10          | Sta.      | Red sorrel         | 10          | Sta.      |
| Kansas           | Common chickweed   | --          | Up        | Crabgrass           | --          | Up        | Dandelion           | --          | Up        | Foxtail            | --          | Down      |
| Michigan         | Annual bluegrass   | --          | Up        | Bentgrass           | --          | Sta.      | Black medic         | --          | Up        | Crabgrass          | --          | Down      |
| Minnesota        | Annual bluegrass   | 90          | Sta.      | Bentgrass           | 70          | Up        | Chickweed           | 60          | Up        | Dandelion          | 90          | Sta.      |
| Missouri         | Chickweed          | --          | Up        | Crabgrass           | --          | Down      | Dandelion           | --          | Down      | Plantain           | --          | Up        |
| Nebraska         | Chickweed          | 30          | Sta.      | Crabgrass           | 80          | Down      | Foxtail             | 85          | Down      | Foxtail            | 15          | Up        |
| North Dakota     | Common chickweed   | 80          | Sta.      | Dandelion           | 95          | Sta.      | Ground ivy          | 15          | Sta.      | Prostrate knotweed | 50          | Sta.      |
| Ohio             | Fescue             | 40          | Up        | Knotted             | 40          | Sta.      | Nimblewill          | 30          | Up        | Red sorrel         | 10          | Sta.      |
| Wisconsin        | Broadleaf plantain | 100         | Sta.      | Chickweed           | 100         | Sta.      | Crabgrass           | 80          | Sta.      | Dandelion          | 100         | Sta.      |
| Southern:        |                    |             |           |                     |             |           |                     |             |           |                    |             |           |
| Arkansas         | Crabgrass          | --          | Up        | Dallisgrass         | --          | Up        | Dandelion           | --          | Sta.      | Nutsedge           | --          | Up        |
| Florida          | Crowfootgrass      | 30          | Sta.      | Purple nutsedge     | 75          | Sta.      | Sandbur             | 40          | Sta.      | Spurge             | 95          | Sta.      |
| Georgia          | Alligatorweed      | 10          | Sta.      | Dichondra           | 30          | Up        | Florida betony      | 30          | Sta.      | Pennywort          | 30          | Up        |
| Kentucky         | Bermudagrass       | 25          | Up        | Chickweed           | 75          | Sta.      | Crabgrass           | 75          | Sta.      | Henbit             | 65          | Sta.      |
| North Carolina   | Chickweed          | 60          | Sta.      | Crabgrass           | 80          | Down      | Ground ivy          | 40          | Up        | Henbit             | 60          | Sta.      |
| Oklahoma         | Annual grasses     | 85          | Up        | Chickweed           | 85          | Up        | Crabgrass           | 85          | Up        | Dandelion          | 90          | Up        |
| South Carolina   | Annual bluegrass   | 50          | Up        | Common chickweed    | 50          | Up        | Crabgrass           | 98          | Sta.      | Henbit             | 50          | Sta.      |
| Tennessee        | Crabgrass          | 50          | Up        | Dandelion           | 40          | Sta.      | Paspalum            | 30          | Sta.      | Plantain           | 40          | Sta.      |
| Texas            | Annual bluegrass   | 5           | Sta.      | Crabgrass           | 5           | Sta.      | Dallisgrass         | 8           | Sta.      | Nutsedge           | 10          | Sta.      |
| Virginia         | Annual bluegrass   | 10          | Sta.      | Bermudagrass        | 10          | Up        | Ground ivy          | 20          | Up        | Nimblewill         | 5           | Up        |
| Western:         |                    |             |           |                     |             |           |                     |             |           |                    |             |           |
| Arizona          | Crabgrass          | 50          | ---       | Nutsedge            | 20          | ---       | Spurge              | 70          | ---       | Wild mustard       | 50          | ---       |
| California       | Annual bluegrass   | 30          | Sta.      | Dallisgrass         | 15          | Up        | Nutsedge            | 10          | Up        | Prostrate spurge   | 20          | Up        |
| Colorado         | Chickweed          | 50          | Up        | Chickweed           | 50          | Down      | Dandelion           | 90          | Sta.      | Quackgrass         | 30          | Up        |
| Idaho            | Annual bluegrass   | --          | Up        | Chickweed           | --          | Down      | Mallow              | --          | Up        | Quackgrass         | --          | ---       |
| Montana          | Broadleaf plantain | 70          | Sta.      | Chickweed           | 70          | Sta.      | Creeping bellflower | 10          | Up        | Dandelion          | 90          | Sta.      |
| Nevada           | Chickweed          | --          | Up        | Dandelion           | --          | Up        | Knotted             | --          | Up        | Nimblewill         | --          | Up        |
| New Mexico       | Dandelion          | 20          | Sta.      | Knotted             | 5           | Sta.      | Nutsedge            | 10          | Sta.      | Puncturevine       | 15          | Down      |
| Oregon           | Annual bluegrass   | --          | Down      | Buckhorn plantain   | --          | Down      | Dandelion           | --          | Down      | Doek               | --          | Down      |
| Utah             | Chickweed          | 20          | Up        | Crabgrass           | 50          | Down      | Dandelion           | 90          | Sta.      | Plantain           | 50          | Sta.      |
| Washington       | Annual bluegrass   | 25          | Up        | Black medic         | 40          | Sta.      | Dandelion           | 80          | Sta.      | Plantain           | 75          | Sta.      |
| Wyoming          | Chickweed          | 40          | Up        | Creeping bellflower | 40          | Up        | Dandelion           | 90          | Sta.      | Knotted            | 75          | Up        |
| Alaska           | Annual bluegrass   | 50          | Up        | Chickweed           | 100         | Sta.      | Dandelion           | 90          | Sta.      | Knotted            | 30          | Up        |
| Hawaii           | Buttonweed         | 10          | Up        | Kyllinga            | 10          | Up        | Nutsedge            | 15          | Up        | Stargrass          | 20          | Up        |

1 Sta., stationary.

## HAY

Thirty-five States reported that 1,269,000 acres were sprayed for weed control in 1965 (tables 1 to 5 and 41). This is about three times the acreage reported for 1962. Of this total, 79 percent was sprayed by farmers and 21 percent by custom applicators. Twenty-four States reported effectiveness of postemergence herbicides to be fair or poor. Only 10 reported good effectiveness. Thirty-four States indicated need for better herbicides in hay crops.

A wide range of weeds are important in hay crops and they tend to be somewhat regional

in distribution although some are found widely (table 42). Some of the species having wide distribution are quackgrass (15 States), fox-tails (12 States), chickweed (12 States), dock (10 States), weed bromegrasses (10 States), ragweed (9 States), and dandelion (8 States). Some of these weeds infest 100 percent of the hay acreage in several States.

There is need for much more research on control of weeds in hay crops than is currently underway. Methods for control of many of the weeds listed are inadequate.

Table 41.--Hay: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region    | Acres treated |                | Average cost per acre <sup>1</sup> |                | Acreage treated by-- |                  | Effectiveness of herbicides |                              | Herbicides usage trend <sup>2</sup> | Need for better herbicides       | Persistence problem |
|---------------------|---------------|----------------|------------------------------------|----------------|----------------------|------------------|-----------------------------|------------------------------|-------------------------------------|----------------------------------|---------------------|
|                     | Pre-emergence | Post-emergence | Pre-emergence                      | Post-emergence | Farmers              | Custom operators | Pre-emergence               | Post-emergence               |                                     |                                  |                     |
|                     | 1,000 acres   | 1,000 acres    | Dollars                            | Dollars        | Percent              | Percent          |                             |                              |                                     |                                  |                     |
| Delaware-----       | .5            | 2              | 8.00                               | 3.00           | 95                   | 5                | Fair                        | Fair                         | Up                                  | Urgent                           | No                  |
| Maine-----          | --            | 3              | --                                 | 2.50           | 100                  | --               | ---                         | Good                         | Up                                  | Little                           | No                  |
| Maryland-----       | 3             | 35             | 11.00                              | 5.00           | 80                   | 20               | Good                        | Good                         | Up                                  | Some                             | No                  |
| Massachusetts-----  | 2             | 4              | 10.00                              | 3.00           | 90                   | 60               | Fair                        | Fair                         | Up                                  | Some                             | No                  |
| New Jersey-----     | --            | 19             | --                                 | 2.25           | 90                   | 10               | ---                         | Fair                         | Up                                  | Urgent                           | No                  |
| New York-----       | 50            | 280            | 10.00                              | 4.00           | 70                   | 30               | Fair                        | Fair                         | Up                                  | Urgent                           | Yes                 |
| Pennsylvania-----   | --            | 35             | --                                 | 4.50           | 75                   | 25               | ---                         | Fair                         | Up                                  | Urgent                           | No                  |
| Rhode Island-----   | .2            | .4             | 15.00                              | 10.00          | 100                  | --               | Fair                        | Fair                         | Sta.                                | Urgent                           | Yes                 |
| Vermont-----        | --            | 1              | --                                 | 3.00           | 75                   | 25               | ---                         | Fair                         | Sta.                                | Urgent                           | No                  |
| West Virginia-----  | --            | 1              | --                                 | 4.00           | 100                  | --               | ---                         | Poor                         | Sta.                                | Urgent                           | No                  |
| Northeastern-----   | 55.7          | 379.4          | 10.05                              | 4.03           | 72                   | 28               | 1-Good<br>4-Fair            | 2-Good<br>7-Fair<br>1-Poor   | 7-Up<br>3-Sta.                      | 7-Urgent<br>2-Some<br>1-Little   | 2-Yes<br>8-No       |
| Illinois-----       | --            | 2              | --                                 | 2.00           | 95                   | 5                | ---                         | Fair                         | Sta.                                | Some                             | No                  |
| Iowa-----           | --            | 350            | --                                 | 1.50           | 95                   | 5                | ---                         | Fair                         | Sta.                                | Little                           | No                  |
| Minnesota-----      | 5             | 10             | 10.00                              | 7.50           | 90                   | 10               | Fair                        | Good                         | Up                                  | Urgent                           | Yes                 |
| Ohio-----           | --            | 7              | --                                 | 6.50           | 90                   | 10               | ---                         | Fair                         | Sta.                                | Urgent                           | No                  |
| South Dakota-----   | --            | 85             | --                                 | 1.50           | 50                   | 50               | ---                         | Good                         | Sta.                                | Some                             | No                  |
| Wisconsin-----      | --            | 4              | --                                 | 1.45           | 80                   | 20               | ---                         | Poor                         | Sta.                                | Urgent                           | No                  |
| North Central-----  | 5             | 458            | 10.00                              | 1.71           | 86                   | 14               | 1-Fair                      | 2-Good<br>3-Fair<br>1-Poor   | 1-Up<br>5-Sta.                      | 3-Urgent<br>2-Some<br>1-Little   | 1-Yes<br>5-No       |
| Kentucky-----       | 20            | 55             | 10.00                              | 4.00           | 90                   | 10               | Good                        | Fair                         | Up                                  | Some                             | No                  |
| North Carolina----- | --            | 5              | --                                 | 2.00           | 100                  | --               | ---                         | Fair                         | Sta.                                | Some                             | No                  |
| Oklahoma-----       | --            | 10             | --                                 | 7.50           | 95                   | 5                | ---                         | Good                         | Up                                  | Urgent                           | Yes                 |
| South Carolina----- | --            | 5              | --                                 | 1.00           | 75                   | 25               | ---                         | Good                         | Up                                  | Some                             | No                  |
| Tennessee-----      | --            | 2              | --                                 | 3.00           | 50                   | 50               | ---                         | Fair                         | Sta.                                | Some                             | Yes                 |
| Texas-----          | --            | 30             | --                                 | 2.00           | 50                   | 50               | ---                         | Good                         | Up                                  | Some                             | Yes                 |
| Virginia-----       | .4            | 43             | 10.00                              | 4.30           | 75                   | 25               | Fair                        | Fair                         | Up                                  | Some                             | No                  |
| Southern-----       | 20.4          | 150.0          | 10.00                              | 3.74           | 79                   | 21               | 1-Good<br>1-Fair            | 3-Good<br>4-Fair             | 5-Up<br>2-Sta.                      | 1-Urgent<br>6-Some               | 2-Yes<br>5-No       |
| Arizona-----        | .2            | .2             | 4.00                               | 4.00           | 100                  | --               | Good                        | Good                         | Sta.                                | Little                           | No                  |
| California-----     | 25            | 40             | 8.50                               | 6.50           | 70                   | 30               | Fair                        | Fair                         | Up                                  | Urgent                           | No                  |
| Idaho-----          | --            | (3)            | --                                 | 6.00           | 50                   | 50               | ---                         | Fair                         | Up                                  | Some                             | Yes                 |
| Montana-----        | --            | .5             | --                                 | 3.00           | 90                   | 10               | ---                         | Fair                         | Up                                  | Little                           | No                  |
| Nevada-----         | --            | 5              | --                                 | 3.00           | 50                   | 50               | ---                         | Fair                         | Up                                  | Urgent                           | Yes                 |
| New Mexico-----     | 5             | 8              | 7.00                               | 7.00           | 80                   | 20               | Good                        | Good                         | Up                                  | Urgent                           | No                  |
| Oregon-----         | 1             | 30             | 8.00                               | 20.00          | 80                   | 20               | Fair                        | Good                         | Up                                  | Urgent                           | Yes                 |
| Utah-----           | --            | .5             | --                                 | 6.00           | 100                  | --               | ---                         | Fair                         | Up                                  | Urgent                           | No                  |
| Washington-----     | --            | 80             | --                                 | 4.00           | 90                   | 10               | ---                         | Fair                         | Up                                  | Some                             | Yes                 |
| Wyoming-----        | --            | 1              | --                                 | 3.00           | 100                  | --               | ---                         | Fair                         | Sta.                                | Some                             | No                  |
| Alaska-----         | --            | 4              | --                                 | 6.00           | 100                  | --               | ---                         | Fair                         | Up                                  | Urgent                           | No                  |
| Hawaii-----         | .1            | --             | 25.00                              | --             | 100                  | --               | Good                        | ---                          | Up                                  | Some                             | Yes                 |
| Western-----        | 31.3          | 169.2          | 8.27                               | 7.58           | 81                   | 19               | 3-Good<br>2-Fair            | 3-Good<br>8-Fair             | 10-Up<br>2-Sta.                     | 6-Urgent<br>4-Some<br>2-Little   | 5-Yes<br>7-No       |
| United States-----  | 112.4         | 1,156.6        | 9.54                               | 3.59           | 79                   | 21               | 5-Good<br>8-Fair            | 10-Good<br>22-Fair<br>2-Poor | 23-Up<br>12-Sta.                    | 17-Urgent<br>14-Some<br>4-Little | 10-Yes<br>25-No     |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.  
<sup>2</sup> Sta., stationary.  
<sup>3</sup> Less than 50 acres.

Table 42.--Hay: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State | Weed                |           | Infestation         |           | Weed                 |           | Infestation         |           | Weed                |           | Infestation         |           | Weed                |           | Infestation         |           | Weed                |           | Infestation         |           |                     |
|------------------|---------------------|-----------|---------------------|-----------|----------------------|-----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|---------------------|
|                  | Acres               | Trend (1) | Acres               | Trend (1) | Acres                | Trend (1) | Acres               | Trend (1) | Acres               | Trend (1) | Acres               | Trend (1) | Acres               | Trend (1) | Acres               | Trend (1) | Acres               | Trend (1) | Acres               | Trend (1) |                     |
| Northeastern:    |                     |           |                     |           |                      |           |                     |           |                     |           |                     |           |                     |           |                     |           |                     |           |                     |           |                     |
| Connecticut----  | Chickweed-----      | 50 Sta.   | Pepperweed-----     | 50 Sta.   | Quackgrass-----      | 75 Sta.   | Shepherdspurse----  | 50 Sta.   | Wintercress-----    | 50 Sta.   | Wild mustard-----   | 50 Sta.   | Wild mustard-----   | 50 Sta.   | Wild mustard-----   | 50 Sta.   | Wild mustard-----   | 50 Sta.   | Wild mustard-----   | 50 Sta.   | Wild mustard-----   |
| Delaware-----    | Chickweed-----      | 25 Up     | Pigweed-----        | 50 Up     | Ragweed-----         | 50 Up     | Wild garlic-----    | 10 Down   | Wild mustard-----   | 10 Down   | Wild mustard-----   | 10 Down   | Wild mustard-----   | 10 Down   | Wild mustard-----   | 10 Down   | Wild mustard-----   | 10 Down   | Wild mustard-----   | 10 Down   | Wild mustard-----   |
| Maine-----       | Dandelion-----      | 50 Sta.   | Quackgrass-----     | 10 Sta.   | Plantain-----        | 15 Sta.   | White cockle-----   | 15 Up     | White cockle-----   | 15 Up     | White cockle-----   | 15 Up     | White cockle-----   | 15 Up     | White cockle-----   | 15 Up     | White cockle-----   | 15 Up     | White cockle-----   | 15 Up     | White cockle-----   |
| Massachusetts--  | Chickweed-----      | 50 Sta.   | Dandelion-----      | 35 Sta.   | White cockle-----    | 15 Sta.   | Shepherdspurse----  | 100 Sta.  | Yellow rocket-----  | 30 Sta.   | Yellow rocket-----  | 30 Sta.   | Yellow rocket-----  | 30 Sta.   | Yellow rocket-----  | 30 Sta.   | Yellow rocket-----  | 30 Sta.   | Yellow rocket-----  | 30 Sta.   | Yellow rocket-----  |
| New Hampshire--  | Dock-----           | 15 Sta.   | Corn chamomile----  | 35 Sta.   | Mustard-----         | 15 Up     | Shepherdspurse----  | 100 Sta.  | Wild carrot-----    | 50 Up     | Wild carrot-----    | 50 Up     | Wild carrot-----    | 50 Up     | Wild carrot-----    | 50 Up     | Wild carrot-----    | 50 Up     | Wild carrot-----    | 50 Up     | Wild carrot-----    |
| New Jersey-----  | Barnyardgrass----   | 40 Sta.   | Dandelion-----      | 100 Sta.  | Quackgrass-----      | 100 Sta.  | Quackgrass-----     | 100 Sta.  | Wild carrot-----    | 50 Up     | Wild carrot-----    | 50 Up     | Wild carrot-----    | 50 Up     | Wild carrot-----    | 50 Up     | Wild carrot-----    | 50 Up     | Wild carrot-----    | 50 Up     | Wild carrot-----    |
| New York-----    | Chickweed-----      | 12 Down   | Dandelion-----      | 15 Up     | Dandelion-----       | 15 Up     | Plantain-----       | 8 Sta.    | Plantain-----       | 5 Sta.    | Plantain-----       | 5 Sta.    | Plantain-----       | 5 Sta.    | Plantain-----       | 5 Sta.    | Plantain-----       | 5 Sta.    | Plantain-----       | 5 Sta.    | Plantain-----       |
| Pennsylvania---  | Chickweed-----      | 20 Sta.   | Daisy-----          | 10 Sta.   | Horse-nettle-----    | 10 Sta.   | Horse-nettle-----   | 10 Sta.   | Quackgrass-----     | 40 Sta.   | Quackgrass-----     | 40 Sta.   | Quackgrass-----     | 40 Sta.   | Quackgrass-----     | 40 Sta.   | Quackgrass-----     | 40 Sta.   | Quackgrass-----     | 40 Sta.   | Quackgrass-----     |
| Rhode Island---  | Chickweed-----      | 30 Sta.   | Chicory-----        | 40 Sta.   | Quackgrass-----      | 90 Sta.   | Quackgrass-----     | 90 Sta.   | Quackgrass-----     | 90 Sta.   | Quackgrass-----     | 90 Sta.   | Quackgrass-----     | 90 Sta.   | Quackgrass-----     | 90 Sta.   | Quackgrass-----     | 90 Sta.   | Quackgrass-----     | 90 Sta.   | Quackgrass-----     |
| Vermont-----     | Canada thistle---   | 30 Sta.   | Foxtail-----        | 30 Up     | Quackgrass-----      | 30 Up     | Quackgrass-----     | 30 Up     | Ragweed-----        | 20 Up     | Ragweed-----        | 20 Up     | Ragweed-----        | 20 Up     | Ragweed-----        | 20 Up     | Ragweed-----        | 20 Up     | Ragweed-----        | 20 Up     | Ragweed-----        |
| West Virginia--  | Chickweed-----      | 25 Sta.   | Foxtail-----        | 30 Up     | Quackgrass-----      | 30 Up     | Quackgrass-----     | 30 Up     | Ragweed-----        | 20 Up     | Ragweed-----        | 20 Up     | Ragweed-----        | 20 Up     | Ragweed-----        | 20 Up     | Ragweed-----        | 20 Up     | Ragweed-----        | 20 Up     | Ragweed-----        |
| North Central:   |                     |           |                     |           |                      |           |                     |           |                     |           |                     |           |                     |           |                     |           |                     |           |                     |           |                     |
| Illinois-----    | Canada thistle---   | 10 --     | Curly dock-----     | 10 --     | Giant foxtail-----   | 20 --     | Giant foxtail-----  | 20 --     | Wild carrot-----    | 10 --     | Wild carrot-----    | 10 --     | Wild carrot-----    | 10 --     | Wild carrot-----    | 10 --     | Wild carrot-----    | 10 --     | Wild carrot-----    | 10 --     | Wild carrot-----    |
| Indiana-----     | Canada thistle---   | -- Sta.   | Dock-----           | -- Sta.   | Downy brome-----     | -- Sta.   | Downy brome-----    | -- Sta.   | Giant foxtail-----  | -- Sta.   | Giant foxtail-----  | -- Sta.   | Giant foxtail-----  | -- Sta.   | Giant foxtail-----  | -- Sta.   | Giant foxtail-----  | -- Sta.   | Giant foxtail-----  | -- Sta.   | Giant foxtail-----  |
| Iowa-----        | Giant foxtail---    | 50 --     | Green foxtail---    | 50 --     | Ragweed-----         | 25 --     | Ragweed-----        | 25 --     | Smartweed-----      | 10 --     | Smartweed-----      | 10 --     | Smartweed-----      | 10 --     | Smartweed-----      | 10 --     | Smartweed-----      | 10 --     | Smartweed-----      | 10 --     | Smartweed-----      |
| Michigan-----    | Downy brome-----    | 15 Up     | Quackgrass-----     | 80 Up     | Shepherdspurse----   | 60 Up     | White cockle-----   | 60 Up     | White cockle-----   | 60 Up     | White cockle-----   | 60 Up     | White cockle-----   | 60 Up     | White cockle-----   | 60 Up     | White cockle-----   | 60 Up     | White cockle-----   | 60 Up     | White cockle-----   |
| Minnesota-----   | Canada thistle---   | 50 Up     | Foxtail-----        | 90 Up     | Quackgrass-----      | 75 Up     | White cockle-----   | 75 Up     | White cockle-----   | 75 Up     | White cockle-----   | 75 Up     | White cockle-----   | 75 Up     | White cockle-----   | 75 Up     | White cockle-----   | 75 Up     | White cockle-----   | 75 Up     | White cockle-----   |
| Missouri-----    | Broomsedge-----     | 25 Sta.   | Johnsongrass-----   | 3 Up      | Red sorrel-----      | 2 Up      | Thistles-----       | 2 Up      | Thistles-----       | 2 Up      | Thistles-----       | 2 Up      | Thistles-----       | 2 Up      | Thistles-----       | 2 Up      | Thistles-----       | 2 Up      | Thistles-----       | 2 Up      | Thistles-----       |
| North Dakota---  | Dandelion-----      | 25 Sta.   | Kochia-----         | 45 Up     | Lambquarters-----    | 35 Sta.   | Pigweed-----        | 35 Sta.   | Pigweed-----        | 35 Sta.   | Pigweed-----        | 35 Sta.   | Pigweed-----        | 35 Sta.   | Pigweed-----        | 35 Sta.   | Pigweed-----        | 35 Sta.   | Pigweed-----        | 35 Sta.   | Pigweed-----        |
| Ohio-----        | Canada thistle---   | 25 Up     | Craggrass-----      | 40 Sta.   | Quackgrass-----      | 40 Sta.   | Quackgrass-----     | 40 Sta.   | Ragweed-----        | 60 Sta.   | Ragweed-----        | 60 Sta.   | Ragweed-----        | 60 Sta.   | Ragweed-----        | 60 Sta.   | Ragweed-----        | 60 Sta.   | Ragweed-----        | 60 Sta.   | Ragweed-----        |
| South Dakota---  | Canada thistle---   | 1 --      | Downy brome-----    | 10 --     | Field bindweed-----  | 2 --      | Field bindweed----- | 2 --      | Japanese brome----- | -- Sta.   | Japanese brome----- | -- Sta.   | Japanese brome----- | -- Sta.   | Japanese brome----- | -- Sta.   | Japanese brome----- | -- Sta.   | Japanese brome----- | -- Sta.   | Japanese brome----- |
| Wisconsin-----   | Hoary alyssum----   | 75 Up     | Penny-cress-----    | 20 Sta.   | Quackgrass-----      | 100 Sta.  | White cockle-----   | 100 Sta.  | White cockle-----   | 90 Up     | White cockle-----   | 90 Up     | White cockle-----   | 90 Up     | White cockle-----   | 90 Up     | White cockle-----   | 90 Up     | White cockle-----   | 90 Up     | White cockle-----   |
| Southern:        |                     |           |                     |           |                      |           |                     |           |                     |           |                     |           |                     |           |                     |           |                     |           |                     |           |                     |
| Arkansas-----    | Bitter sneezeweed-- | 25 Up     | Chickweed-----      | 60 Up     | Croton-----          | 10 Up     | Dock-----           | 10 Up     | Dock-----           | 5 Up      | Dock-----           | 5 Up      | Dock-----           | 5 Up      | Dock-----           | 5 Up      | Dock-----           | 5 Up      | Dock-----           | 5 Up      | Dock-----           |
| Florida-----     | Bull thistle-----   | 5 Up      | Crotalaria-----     | 2 Down    | Dogfennel-----       | 5 Sta.    | Ragweed-----        | 10 Sta.   | Ragweed-----        | 10 Sta.   | Ragweed-----        | 10 Sta.   | Ragweed-----        | 10 Sta.   | Ragweed-----        | 10 Sta.   | Ragweed-----        | 10 Sta.   | Ragweed-----        | 10 Sta.   | Ragweed-----        |
| Georgia-----     | Annual grasses----  | 50 Up     | Blackberry-----     | 20 Up     | Johnsongrass-----    | 30 Up     | Smartweed-----      | 30 Up     | Smartweed-----      | 30 Up     | Smartweed-----      | 30 Up     | Smartweed-----      | 30 Up     | Smartweed-----      | 30 Up     | Smartweed-----      | 30 Up     | Smartweed-----      | 30 Up     | Smartweed-----      |
| Kentucky-----    | Chickweed-----      | 50 Up     | Craggrass-----      | 45 Up     | Dock-----            | 25 Sta.   | Henbit-----         | 25 Sta.   | Henbit-----         | 25 Sta.   | Henbit-----         | 25 Sta.   | Henbit-----         | 25 Sta.   | Henbit-----         | 25 Sta.   | Henbit-----         | 25 Sta.   | Henbit-----         | 25 Sta.   | Henbit-----         |
| Louisiana-----   | Craggrass-----      | 65 Sta.   | Curly dock-----     | 50 Up     | Foxtail-----         | 25 Up     | Horse-nettle-----   | 15 Up     | Horse-nettle-----   | 15 Up     | Horse-nettle-----   | 15 Up     | Horse-nettle-----   | 15 Up     | Horse-nettle-----   | 15 Up     | Horse-nettle-----   | 15 Up     | Horse-nettle-----   | 15 Up     | Horse-nettle-----   |
| Mississippi---   | Bitter sneezeweed-- | 70 Sta.   | Cheat-----          | 65 Sta.   | Darnel-----          | 65 Sta.   | Darnel-----         | 65 Sta.   | Darnel-----         | 65 Sta.   | Darnel-----         | 65 Sta.   | Darnel-----         | 65 Sta.   | Darnel-----         | 65 Sta.   | Darnel-----         | 65 Sta.   | Darnel-----         | 65 Sta.   | Darnel-----         |
| North Carolina-- | Chickweed-----      | 40 Sta.   | Dock-----           | 15 Sta.   | Henbit-----          | 30 Sta.   | Henbit-----         | 30 Sta.   | Henbit-----         | 30 Sta.   | Henbit-----         | 30 Sta.   | Henbit-----         | 30 Sta.   | Henbit-----         | 30 Sta.   | Henbit-----         | 30 Sta.   | Henbit-----         | 30 Sta.   | Henbit-----         |
| Oklahoma-----    | Craggrass-----      | 80 Up     | Curly dock-----     | 50 Up     | Henbit-----          | 50 Up     | Johnsongrass-----   | 50 Up     | Johnsongrass-----   | 50 Up     | Johnsongrass-----   | 50 Up     | Johnsongrass-----   | 50 Up     | Johnsongrass-----   | 50 Up     | Johnsongrass-----   | 50 Up     | Johnsongrass-----   | 50 Up     | Johnsongrass-----   |
| South Carolina-- | Dodder-----         | 30 Sta.   | Fleabane-----       | 30 Sta.   | Plantain-----        | 30 Sta.   | Plantain-----       | 30 Sta.   | Plantain-----       | 30 Sta.   | Plantain-----       | 30 Sta.   | Plantain-----       | 30 Sta.   | Plantain-----       | 30 Sta.   | Plantain-----       | 30 Sta.   | Plantain-----       | 30 Sta.   | Plantain-----       |
| Tennessee-----   | Dodder-----         | 30 Sta.   | Fleabane-----       | 30 Sta.   | Plantain-----        | 30 Sta.   | Plantain-----       | 30 Sta.   | Plantain-----       | 30 Sta.   | Plantain-----       | 30 Sta.   | Plantain-----       | 30 Sta.   | Plantain-----       | 30 Sta.   | Plantain-----       | 30 Sta.   | Plantain-----       | 30 Sta.   | Plantain-----       |
| Texas-----       | Craggrass-----      | 10 --     | Henbit-----         | 3 --      | Johnsongrass-----    | 10 --     | Johnsongrass-----   | 10 --     | Johnsongrass-----   | 10 --     | Johnsongrass-----   | 10 --     | Johnsongrass-----   | 10 --     | Johnsongrass-----   | 10 --     | Johnsongrass-----   | 10 --     | Johnsongrass-----   | 10 --     | Johnsongrass-----   |
| Virginia-----    | Chickweed-----      | 25 Up     | Chicory-----        | 10 Sta.   | Dock-----            | 10 Sta.   | Dock-----           | 10 Sta.   | Dock-----           | 10 Sta.   | Dock-----           | 10 Sta.   | Dock-----           | 10 Sta.   | Dock-----           | 10 Sta.   | Dock-----           | 10 Sta.   | Dock-----           | 10 Sta.   | Dock-----           |
| Western:         |                     |           |                     |           |                      |           |                     |           |                     |           |                     |           |                     |           |                     |           |                     |           |                     |           |                     |
| Arizona-----     | Barnyardgrass----   | 60 --     | Johnsongrass-----   | 15 --     | London rocket-----   | 50 --     | Pigweed-----        | 50 --     | Pigweed-----        | 30 --     | Pigweed-----        | 30 --     | Pigweed-----        | 30 --     | Pigweed-----        | 30 --     | Pigweed-----        | 30 --     | Pigweed-----        | 30 --     | Pigweed-----        |
| California-----  | Chickweed-----      | 30 Sta.   | Douglas fiddleneck  | 30 Sta.   | Russian thistle---   | 20 Sta.   | Tansymustard-----   | 20 Sta.   | Tansymustard-----   | 20 Sta.   | Tansymustard-----   | 20 Sta.   | Tansymustard-----   | 20 Sta.   | Tansymustard-----   | 20 Sta.   | Tansymustard-----   | 20 Sta.   | Tansymustard-----   | 20 Sta.   | Tansymustard-----   |
| Idaho-----       | Downy brome-----    | 100 Sta.  | Shepherdspurse----  | 80 Sta.   | Common milkweed---   | 2 Sta.    | Downy brome-----    | 2 Sta.    | Downy brome-----    | 2 Sta.    | Downy brome-----    | 2 Sta.    | Downy brome-----    | 2 Sta.    | Downy brome-----    | 2 Sta.    | Downy brome-----    | 2 Sta.    | Downy brome-----    | 2 Sta.    | Downy brome-----    |
| Montana-----     | Canada thistle---   | 5 Sta.    | Caraway-----        | 10 Sta.   | Common milkweed---   | 2 Sta.    | Downy brome-----    | 2 Sta.    | Downy brome-----    | 2 Sta.    | Downy brome-----    | 2 Sta.    | Downy brome-----    | 2 Sta.    | Downy brome-----    | 2 Sta.    | Downy brome-----    | 2 Sta.    | Downy brome-----    | 2 Sta.    | Downy brome-----    |
| Nevada-----      | Dodder-----         | 10 Sta.   | Foxtail barley---   | 25 Sta.   | Hairy white-top----- | 10 Down   | Russian knapweed--- | 20 Down   | Russian knapweed--- | 20 Down   | Russian knapweed--- | 20 Down   | Russian knapweed--- | 20 Down   | Russian knapweed--- | 20 Down   | Russian knapweed--- | 20 Down   | Russian knapweed--- | 20 Down   | Russian knapweed--- |
| New Mexico-----  | Barnyardgrass----   | 45 Sta.   | Foxtail-----        | 45 Sta.   | Johnsongrass-----    | 20 Sta.   | Pigweed-----        | 20 Sta.   | Pigweed-----        | 20 Sta.   | Pigweed-----        | 20 Sta.   | Pigweed-----        | 20 Sta.   | Pigweed-----        | 20 Sta.   | Pigweed-----        | 20 Sta.   | Pigweed-----        | 20 Sta.   | Pigweed-----        |
| Oregon-----      | Barnyardgrass----   | 10 Sta.   | Dodder-----         | 2 Sta.    | Foxtail barley---    | 10 Sta.   | Red sorrel-----     | 4 Sta.    | Red sorrel-----     | 4 Sta.    | Red sorrel-----     | 4 Sta.    | Red sorrel-----     | 4 Sta.    | Red sorrel-----     | 4 Sta.    | Red sorrel-----     | 4 Sta.    | Red sorrel-----     | 4 Sta.    | Red sorrel-----     |
| Utah-----        | Dandelion-----      | 30 Sta.   | Downy brome-----    | 15 Sta.   | Foxtail-----         | 10 Down   | Mustard-----        | 20 Up     | Mustard-----        | 20 Up     | Mustard-----        | 20 Up     | Mustard-----        | 20 Up     | Mustard-----        | 20 Up     | Mustard-----        | 20 Up     | Mustard-----        | 20 Up     | Mustard-----        |
| Washington-----  | Dandelion-----      | 50 Up     | Downy brome-----    | 20 Up     | Shepherdspurse----   | 30 Sta.   | Tansymustard-----   | 30 Sta.   | Tansymustard-----   | 30 Sta.   | Tansymustard-----   | 30 Sta.   | Tansymustard-----   | 30 Sta.   | Tansymustard-----   | 30 Sta.   | Tansymustard-----   | 30 Sta.   | Tansymustard-----   | 30 Sta.   | Tansymustard-----   |
| Wyoming-----     | Arrowgrass-----     | 20 Sta.   | Dandelion-----      | 20 Sta.   | Foxtail-----         | 20 Sta.   | Plantain-----       | 20 Sta.   | Plantain-----       | 20 Sta.   | Plantain-----       | 20 Sta.   | Plantain-----       | 20 Sta.   | Plantain-----       | 20 Sta.   | Plantain-----       | 20 Sta.   | Plantain-----       | 20 Sta.   | Plantain-----       |
| Alaska-----      | Chickweed-----      | 100 Sta.  | Corn spurry-----    | 60 Sta.   | Hemp-nettle-----     | 20 Up     | Lambquarters-----   | 100 Up    | Lambquarters-----   | 100 Up    | Lambquarters-----   | 100 Up    | Lambquarters-----   | 100 Up    | Lambquarters-----   | 100 Up    | Lambquarters-----   | 100 Up    | Lambquarters-----   | 100 Up    | Lambquarters-----   |
| Hawaii-----      | Bermudagrass-----   | 5 Up      | Feather finge-grass | 40 Up     | Ki kuyugrass-----    | 5 Sta.    | Sandbur-----        | 30 Sta.   | Sandbur-----        | 30 Sta.   | Sandbur-----        | 30 Sta.   | Sandbur-----        | 30 Sta.   | Sandbur-----        | 30 Sta.   | Sandbur-----        | 30 Sta.   | Sandbur-----        | 30 Sta.   | Sandbur-----        |

1 Sta., stationary.

## PASTURE AND RANGELAND

Approximately 940 million acres of land are grazed in the United States--about 310 million acres of pasture and 630 million acres of rangeland. Weeds and brush are found in almost all this area but are a problem on only about one-half to three-fourths of it.

Almost 10 million acres of grazing land was sprayed by herbicides in 1965 at a cost of about \$32 million (tables 1 to 5 and odd-numbered tables 43 to 55). Farmers or ranchers sprayed only 13 percent of the treated acreage of rangelands with their own equipment but sprayed 84 percent of the treated pasture acreage. Custom applicators treated the balance of each. The cost for spraying rangeland is higher than that for pastures, largely because relatively more brush species on rangeland were sprayed with 2,4,5-T. Less expensive 2,4-D is more commonly used on pastures. Also, the rate of spraying required for control of brush is usually higher than for control of herbaceous weeds.

To provide more meaningful information on weed and brush species the grazing land area is classified as follows: Annual pastures (table 44), perennial improved pastures (table 46), perennial unimproved pastures (table 48), mountain rangeland (table 50), foothill or prairie rangeland (table 52), arid rangeland (table 54), and rainbelt rangeland (table 56).

### Annual Pastures

In annual pastures annual weed species were listed most often among the five most important weeds. Those listed most frequently were lambsquarters (12 States), pigweeds (14 States), and ragweed (6 States) (table 44). Only a few perennial and biennial species were listed for annual pastures.

### Perennial Improved Pastures

Perennial improved pastures are characterized as having a high proportion of perennial weed species listed as most important problems (table 46). Those species mentioned most frequently are docks (18 States), Canada

thistle (16 States), other thistles, mostly biennial (13 States), quackgrass (11 States), and horsenettle, dandelion and ragweed (9 States each).

### Perennial Unimproved Pastures

Perennial unimproved pastures are also characterized by having a preponderance of perennial weeds listed as most important (table 48). A number of annual weeds are notably important also. Species listed most often include Canada thistle (7 States), other thistles (11 States), ragweed (6 States), dock and ironweed (5 States each), and broomsedge, quackgrass and bitter sneezeweed (4 States each). The high percentages of pasture acreage infested by many of the species listed in table 48 indicates a high potential acreage for use of any improved method of control that may be developed.

### Mountain Rangeland

On mountain rangeland more serious weed problems mentioned by the most States included larkspurs, sagebrush species, and Canada thistle (table 50). Many other weed and brush species are listed as serious on extensive acreages.

### Foothills [Prairie]

On the foothill and prairie ranges species of weed brome grasses are most often mentioned among the five most important weeds within the States reporting (table 52). The next most frequently mentioned are the sagebrush species. Other species listed in several States include junipers, loco, goldenrods, leafy spurge, sagewort, wormwood, and medusahead. Because of the extensive acreages involved and the high percentage of infestation, many of the difficult-to-kill species warrant increased attention in research. On the other hand, species such as the sagebrushes which are found on extensive acreages probably should command low priority in research because efficient and effective methods for their control have been developed.

Table 4.3.--Annual pastures: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region    | Acres treated |                | Average cost per acre <sup>1</sup> |                | Average treated by-- |                  | Effectiveness of herbicides |                  | Herbicides usage trend <sup>2</sup> | Need for better herbicides     | Persistence problem |
|---------------------|---------------|----------------|------------------------------------|----------------|----------------------|------------------|-----------------------------|------------------|-------------------------------------|--------------------------------|---------------------|
|                     | Pre-emergence | Post-emergence | Pre-emergence                      | Post-emergence | Farmers              | Custom operators | Pre-emergence               | Post-emergence   |                                     |                                |                     |
|                     | 1,000 acres   | 1,000 acres    | Dollars                            | Dollars        | Percent              | Percent          | Percent                     | Percent          |                                     |                                |                     |
| Connecticut-----    | --            | .1             | --                                 | 7.50           | 100                  | --               | ---                         | Good             | Sta.                                | Some                           | Yes                 |
| New Hampshire-----  | .1            | .1             | 4.00                               | 4.00           | 50                   | 50               | Good                        | Good             | Sta.                                | Little                         | No                  |
| New York-----       | 20            | 30             | 8.00                               | 6.00           | 60                   | 40               | ---                         | Good             | Up                                  | Some                           | Yes                 |
| Rhode Island-----   | --            | .4             | --                                 | 8.00           | 100                  | --               | ---                         | Good             | Up                                  | Little                         | Yes                 |
| Northeastern-----   | 20.1          | 30.6           | 7.98                               | 6.02           | 60                   | 40               | 1-Good                      | 4-Good           | 2-Up<br>2-Sta.                      | 2-Some<br>2-Little             | 3-Yes<br>1-No       |
| Illinois-----       | 1             | 1              | 4.00                               | 1.25           | 95                   | 5                | Fair                        | Fair             | Up                                  | Some                           | No                  |
| Iowa-----           | --            | 100            | --                                 | 1.50           | 95                   | 5                | ---                         | Good             | Up                                  | Little                         | No                  |
| Minnesota-----      | --            | 5              | --                                 | 2.00           | 100                  | --               | ---                         | Good             | Up                                  | Little                         | No                  |
| South Dakota-----   | --            | 10             | --                                 | 1.35           | 50                   | 50               | ---                         | Good             | Up                                  | Urgent                         | No                  |
| North Central-----  | 1             | 116            | 4.00                               | 1.51           | 91                   | 9                | 1-Fair                      | 3-Good<br>1-Fair | 4-Up                                | 1-Urgent<br>1-Some<br>2-Little | 4-No                |
| Florida-----        | --            | 8              | --                                 | 1.50           | 50                   | 50               | ---                         | Fair             | Up                                  | Some                           | No                  |
| North Carolina----- | --            | 10             | --                                 | 2.00           | 100                  | --               | ---                         | Good             | Sta.                                | Some                           | No                  |
| South Carolina----- | --            | 1              | --                                 | 1.00           | 75                   | 25               | ---                         | Fair             | Up                                  | Urgent                         | No                  |
| Tennessee-----      | --            | 2              | --                                 | 1.50           | 95                   | 5                | ---                         | Fair             | Up                                  | Some                           | Yes                 |
| Texas-----          | --            | 10             | --                                 | 2.00           | 40                   | 60               | ---                         | Fair             | Up                                  | Some                           | No                  |
| Virginia-----       | --            | 1              | --                                 | 3.50           | 90                   | 10               | ---                         | Fair             | Sta.                                | Some                           | No                  |
| Southern-----       | --            | 32             | --                                 | 1.86           | 67                   | 33               | ---                         | 1-Good<br>5-Fair | 4-Up<br>2-Sta.                      | 1-Urgent<br>5-Some             | 1-Yes<br>5-No       |
| California-----     | --            | 10             | --                                 | 3.50           | 70                   | 30               | ---                         | Fair             | Sta.                                | Some                           | No                  |
| Western-----        | --            | 10             | --                                 | 3.50           | 70                   | 30               | ---                         | 1-Fair           | 1-Sta.                              | 1-Some                         | 1-No                |
| United States-----  | 21.1          | 188.6          | 7.79                               | 2.41           | 79                   | 21               | 1-Good<br>1-Fair            | 8-Good<br>7-Fair | 10-Up<br>5-Sta.                     | 2-Urgent<br>9-Some<br>4-Little | 4-Yes<br>11-No      |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides.

Regional and United States averages are for acreages on which costs were reported.

<sup>2</sup> Sta., stationary.



Table 44.--Annual pastures: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State  | Weed             | Infestation |           | Weed               | Infestation |           | Weed                | Infestation |           | Weed               | Infestation |           |                  |    |      |
|-------------------|------------------|-------------|-----------|--------------------|-------------|-----------|---------------------|-------------|-----------|--------------------|-------------|-----------|------------------|----|------|
|                   |                  | Acres       | Trend (↑) |                    | Acres       | Trend (↑) |                     | Acres       | Trend (↑) |                    | Acres       | Trend (↑) |                  |    |      |
|                   |                  | Pct.        |           |                    |             | Pct.      |                     |             |           | Pct.               |             | Pct.      |                  |    |      |
| Northeastern:     |                  |             |           |                    |             |           |                     |             |           |                    |             |           |                  |    |      |
| Connecticut---    | Barryardgrass--- | 40          | Sta.      | Lambsquarters---   | 50          | Sta.      | Regweed---          | 40          | Sta.      | Redroot pigweed--- | 80          | Sta.      | Smartweed---     | 25 | Sta. |
| Massachusetts---  | Crabgrass---     | --          | Sta.      | Foxtail---         | --          | Sta.      | Lambsquarters---    | --          | Sta.      | Redroot pigweed--- | --          | Sta.      | Smartweed---     | -- | Sta. |
| New Hampshire---  | Lambsquarters--- | 40          | Sta.      | Redroot pigweed--- | 40          | Sta.      | Smartweed---        | 20          | Sta.      | Quackgrass---      | 60          | Sta.      | Wild mustard---  | 80 | Sta. |
| New York---       | Lambsquarters--- | 50          | Sta.      | Nutsedge---        | 40          | Up        | Pigweed---          | 50          | Sta.      | Smartweed---       | 75          | Sta.      |                  | -- |      |
| Rhode Island---   | Lambsquarters--- | 40          | Sta.      | Pigweed---         | 60          | Sta.      | Regweed---          | 60          | Sta.      | Smartweed---       |             |           |                  |    |      |
| North Central:    |                  |             |           |                    |             |           |                     |             |           |                    |             |           |                  |    |      |
| Illinois---       | Johnsongrass---  | 10          | Sta.      | Lambsquarters---   | 10          | Down      | Pigweed---          | 10          | Down      | Smartweed---       | 10          | Down      | Wild garlic---   | 10 | Sta. |
| Iowa---           | Giant foxtail--- | 25          | Sta.      | Green foxtail---   | 25          | Sta.      | Regweed---          | 25          | Sta.      | Yellow foxtail---  | 25          | Sta.      | Regweed---       | 70 | Sta. |
| Minnesota---      | Barryardgrass--- | 75          | Sta.      | Lambsquarters---   | 95          | Sta.      | Pigweed---          | 95          | Sta.      | Quackgrass---      | 60          | Sta.      | Sunflower---     | 25 | Sta. |
| Nebraska---       | Crabgrass---     | 25          | Sta.      | Foxtail---         | 50          | Sta.      | Lambsquarters---    | 60          | Sta.      | Pigweed---         | 80          | Sta.      | Sunflower---     |    |      |
| South Dakota---   | Cocklebur---     | --          | ---       | Horseweed---       | --          | ---       | Lambsquarters---    | --          | ---       | Pigweed---         | --          | ---       | Sunflower---     | -- | ---  |
| Southern:         |                  |             |           |                    |             |           |                     |             |           |                    |             |           |                  |    |      |
| Arkansas---       | Pigweed---       | 30          | Up        | Regweed---         | 30          | Up        | Regweed---          | --          | ---       | Ragweed---         | --          | ---       | Sicklepod---     | 20 | Sta. |
| Florida---        | Crabgrass---     | 100         | Sta.      | Crotalaria---      | 5           | Down      | Florida purslane--- | 100         | Sta.      | Horseneville---    | 40          | Sta.      | Knawel---        | 20 | Up   |
| North Carolina--- | Chickweed---     | 40          | Sta.      | Dock---            | 25          | Sta.      | Henbit---           | 45          | Sta.      | Morningglory---    | 20          | Sta.      | Pigweed---       | 50 | Up   |
| Tennessee---      | Cocklebur---     | 15          | Up        | Crabgrass---       | 95          | Sta.      | Lambsquarters---    | 15          | Up        | Pigweed---         | 10          | Sta.      | Texas panicum--- | 12 | Sta. |
| Texas---          | Crabgrass---     | 10          | Sta.      | Dock---            | 1           | Sta.      | Johnsongrass---     | 15          | Sta.      | Pigweed---         | 10          | Sta.      |                  |    |      |
| Western:          |                  |             |           |                    |             |           |                     |             |           |                    |             |           |                  |    |      |
| Idaho---          | Musk thistle---  | 1           | Up        | Scotch thistle---  | 1           | Down      | Wild barley---      | 20          | Sta.      | Pigweed---         | --          | ---       | Sunflower---     | 10 | Sta. |
| New Mexico---     | Barryardgrass--- | 5           | Sta.      | Johnsongrass---    | 15          | Sta.      | Lambsquarters---    | 10          | Down      | Pigweed---         | 15          | Down      | Sunflower---     | -- | ---  |
| Oregon---         | Lambsquarters--- | --          | ---       | Pigweed---         | --          | ---       | Wild oats---        | --          | ---       |                    | --          | ---       |                  | -- | ---  |

<sup>1</sup> Sta., stationary.

Table 4.5.--Improved perennial pastures: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicide, and residue problems, by States and geographic divisions, 1965

| State and region    | Acres treated |                | Average cost per acre <sup>1</sup> |                | Acres treated by-- |                  | Effectiveness of herbicides |                              | Herbicides usage trend <sup>2</sup> | Need for better herbicides       | Persistence problem |
|---------------------|---------------|----------------|------------------------------------|----------------|--------------------|------------------|-----------------------------|------------------------------|-------------------------------------|----------------------------------|---------------------|
|                     | Pre-emergence | Post-emergence | Pre-emergence                      | Post-emergence | Farmers            | Custom operators | Pre-emergence               | Post-emergence               |                                     |                                  |                     |
|                     | 1,000 acres   | 1,000 acres    | Dollars                            | Dollars        | Percent            | Percent          |                             |                              |                                     |                                  |                     |
| Connecticut-----    | --            | 1              | --                                 | 7.00           | 75                 | 25               | Fair                        | Fair                         | Up                                  | Some                             | Yes                 |
| Delaware-----       | --            | 2              | --                                 | 2.00           | 100                | --               | Fair                        | Fair                         | Sta.                                | Some                             | No                  |
| Maine-----          | --            | 2              | --                                 | 2.50           | 100                | --               | Good                        | Good                         | Up                                  | Some                             | No                  |
| Maryland-----       | --            | 20             | --                                 | 1.50           | 80                 | 20               | Poor                        | Poor                         | Up                                  | Urgent                           | No                  |
| New Hampshire-----  | 10            | 90             | 12.00                              | 9.00           | 75                 | 25               | Fair                        | Fair                         | Sta.                                | Urgent                           | Yes                 |
| New Jersey-----     | --            | 14             | --                                 | 1.75           | 95                 | 5                | Good                        | Good                         | Sta.                                | Some                             | No                  |
| New York-----       | --            | 200            | --                                 | 5.00           | 60                 | 40               | Good                        | Good                         | Up                                  | Some                             | Yes                 |
| Pennsylvania-----   | --            | 15             | --                                 | 3.50           | 95                 | 5                | Good                        | Good                         | Sta.                                | Some                             | No                  |
| Rhode Island-----   | --            | 1              | --                                 | 8.00           | 100                | --               | Fair                        | Fair                         | Up                                  | Urgent                           | Yes                 |
| West Virginia-----  | --            | 2              | --                                 | 2.00           | 100                | --               | Fair                        | Fair                         | Up                                  | Some                             | No                  |
| Northeastern-----   | 10            | 347            | 12.00                              | 7.61           | 69                 | 31               | 1-Fair                      | 4-Good<br>5-Fair<br>1-Poor   | 6-Up<br>4-Sta.                      | 3-Urgent<br>7-Some               | 4-Yes<br>5-No       |
| Illinois-----       | --            | 10             | --                                 | 1.50           | 95                 | 5                | ---                         | Fair                         | Sta.                                | Some                             | No                  |
| Iowa-----           | --            | 250            | --                                 | 1.50           | 95                 | 5                | ---                         | Good                         | Up                                  | Little                           | No                  |
| Kansas-----         | --            | 1,000          | --                                 | 1.85           | 95                 | 5                | ---                         | Fair                         | Sta.                                | Some                             | Yes                 |
| Minnesota-----      | --            | 100            | --                                 | 2.50           | 90                 | 10               | ---                         | Fair                         | Up                                  | Little                           | No                  |
| Ohio-----           | --            | 40             | --                                 | 2.00           | 95                 | 5                | ---                         | Fair                         | Sta.                                | Some                             | No                  |
| South Dakota-----   | --            | 20             | --                                 | 1.50           | 50                 | 50               | ---                         | Good                         | Sta.                                | Some                             | No                  |
| North Central-----  | --            | 1,420          | --                                 | 1.42           | 94                 | 6                | ---                         | 2-Good<br>4-Fair             | 2-Up<br>4-Sta.                      | 4-Some<br>2-Little               | 1-Yes<br>5-No       |
| Alabama-----        | --            | 119            | --                                 | 2.00           | 95                 | 5                | ---                         | Fair                         | Up                                  | Urgent                           | Yes                 |
| Arkansas-----       | 10            | 60             | 1.50                               | 2.00           | 90                 | 10               | Fair                        | Good                         | Up                                  | Some                             | Yes                 |
| Florida-----        | --            | 10             | --                                 | 1.50           | 50                 | 50               | ---                         | Fair                         | Up                                  | Some                             | No                  |
| Georgia-----        | --            | 400            | --                                 | 2.00           | 80                 | 20               | ---                         | Good                         | Up                                  | Some                             | No                  |
| Kentucky-----       | --            | 150            | --                                 | 2.00           | 95                 | 5                | ---                         | Fair                         | Up                                  | Urgent                           | No                  |
| Louisiana-----      | 5             | 120            | 6.00                               | 1.25           | 70                 | 30               | Good                        | Good                         | Up                                  | Urgent                           | No                  |
| Mississippi-----    | --            | 300            | --                                 | 1.00           | 95                 | 5                | ---                         | Fair                         | Up                                  | Some                             | No                  |
| North Carolina----- | --            | 100            | --                                 | 2.00           | 100                | --               | ---                         | Good                         | Sta.                                | Some                             | No                  |
| Oklahoma-----       | --            | 30             | --                                 | 1.75           | 20                 | 80               | ---                         | Good                         | Up                                  | Urgent                           | Yes                 |
| South Carolina----- | --            | 10             | --                                 | 1.00           | 75                 | 25               | ---                         | Fair                         | Up                                  | Urgent                           | No                  |
| Tennessee-----      | --            | 5              | --                                 | 3.00           | 95                 | 5                | ---                         | Good                         | Up                                  | Some                             | Yes                 |
| Texas-----          | 3             | 50             | 6.00                               | 2.00           | 50                 | 50               | Fair                        | Good                         | Up                                  | Some                             | No                  |
| Virginia-----       | --            | 75             | --                                 | 3.50           | 70                 | 30               | ---                         | Fair                         | Up                                  | Some                             | No                  |
| Southern-----       | 18            | 1,429          | 3.50                               | 1.79           | 84                 | 16               | 1-Good<br>2-Fair            | 7-Good<br>6-Fair             | 12-Up<br>1-Sta.                     | 4-Urgent<br>8-Some<br>1-Little   | 4-Yes<br>9-No       |
| Arizona-----        | --            | 1              | --                                 | 2.00           | 80                 | 20               | ---                         | Good                         | Sta.                                | Little                           | No                  |
| California-----     | --            | 50             | --                                 | 3.50           | 70                 | 30               | ---                         | Fair                         | Up                                  | Urgent                           | No                  |
| Montana-----        | --            | 1              | --                                 | 1.75           | 100                | --               | ---                         | Good                         | Sta.                                | Little                           | No                  |
| Nevada-----         | --            | 3              | --                                 | 4.50           | 50                 | 50               | ---                         | Fair                         | Up                                  | Urgent                           | Yes                 |
| Oregon-----         | --            | 10             | --                                 | 4.00           | 90                 | 10               | ---                         | Fair                         | Sta.                                | Urgent                           | Yes                 |
| Utah-----           | --            | 1              | --                                 | 3.00           | 70                 | 30               | ---                         | Fair                         | Up                                  | Urgent                           | Yes                 |
| Washington-----     | --            | 20             | --                                 | 5.00           | 90                 | 10               | ---                         | Good                         | Up                                  | Some                             | No                  |
| Wyoming-----        | --            | 2              | --                                 | 2.00           | 50                 | 50               | ---                         | Fair                         | Up                                  | Some                             | No                  |
| Hawaii-----         | --            | 5              | --                                 | 10.00          | 50                 | 50               | ---                         | Fair                         | Up                                  | Urgent                           | Yes                 |
| Western-----        | --            | 93             | --                                 | 4.19           | 75                 | 25               | ---                         | 3-Good<br>6-Fair             | 6-Up<br>3-Sta.                      | 5-Urgent<br>2-Some<br>2-Little   | 4-Yes<br>5-No       |
| United States-----  | 28            | 3,289          | 6.54                               | 2.31           | 86                 | 14               | 1-Good<br>3-Fair            | 16-Good<br>21-Fair<br>1-Poor | 26-Up<br>12-Sta.                    | 12-Urgent<br>21-Some<br>5-Little | 13-Yes<br>25-No     |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.  
<sup>2</sup> Sta., stationary.

Table 46.---Improved perennial pastures: Five most important weeds listed alphabetically, within States, acreage infested, and infestation trend, 1965

| Region and State      | Weed  |           | Infestation         |           | Weed      |                      | Infestation |                   | Weed                 |           | Infestation  |                      |      |      |
|-----------------------|-------|-----------|---------------------|-----------|-----------|----------------------|-------------|-------------------|----------------------|-----------|--------------|----------------------|------|------|
|                       | Acres | Trend (1) | Acres               | Trend (1) | Acres     | Trend (1)            | Acres       | Trend (1)         | Acres                | Trend (1) | Acres        | Trend (1)            |      |      |
| <b>Northeastern:</b>  |       |           |                     |           |           |                      |             |                   |                      |           |              |                      |      |      |
| Connecticut----       |       |           |                     |           |           |                      |             |                   |                      |           |              |                      |      |      |
| Delaware-----         | 50    | Up        | Quackgrass-----     | 25        | Sta.      | White cockle-----    | 30          | Up                | Wild carrot-----     | 25        | Sta.         | Wintergrass-----     | 30   | Up   |
| Maine-----            | 5     | Down      | Chickweed-----      | 25        | Sta.      | Horseneville-----    | 5           | Up                | Wild garlic-----     | 25        | Sta.         | Wild mustard-----    | 15   | Sta. |
| Maryland-----         | 10    | Sta.      | Milkweed-----       | 5         | Up        | Thistles-----        | 5           | Up                | Sta.                 |           |              |                      |      |      |
| Massachusetts--       | 45    | Up        | Horseneville-----   | 40        | Up        | Milkweed-----        | 10          | Up                | Purpletop-----       | 15        | Up           | Star-of-Bethlehem--  | 5    | Up   |
| New Hampshire--       | --    | Sta.      | Dandelion-----      | --        | Sta.      | Plantain-----        | --          | Sta.              | Spherulaspurse-----  | --        | Sta.         | White cockle-----    | --   | Sta. |
| New Jersey-----       | 75    | Sta.      | Thistles-----       | 15        | Sta.      | White cockle-----    | 10          | Up                | Wild mustard-----    | 20        | Sta.         | Yellow rocket-----   | 30   | Sta. |
| New York-----         | --    | Up        | Horseneville-----   | --        | Sta.      | Milkweed-----        | --          | Up                | Quackgrass-----      | --        | Sta.         |                      |      |      |
| Pennsylvania---       | 20    | Sta.      | Dandelion-----      | 90        | Up        | Canada thistle-----  | 60          | Sta.              | Wild carrot-----     | 50        | Up           | Yellow rocket-----   | 90   | Up   |
| Rhode Island---       | 40    | Down      | Buttercup-----      | 15        | Sta.      | Canada thistle-----  | 30          | Up                | Dandelion-----       | 60        | Up           | Wintergrass-----     | 20   | Down |
| Vermont-----          | 40    | Sta.      | Chickweed-----      | 40        | Sta.      | Dandelion-----       | 80          | Sta.              | Quackgrass-----      | 40        | Sta.         | Yellow rocket-----   | 30   | Sta. |
| West Virginia---      | 25    | Sta.      | Canada thistle----- | 25        | Sta.      | Chicory-----         | 10          | Sta.              | Milkweed-----        | 10        | Sta.         | Yellow hawkweed----- | 10   | Sta. |
|                       | 15    | Sta.      | Ironweed-----       | 10        | Sta.      | Multiflora rose----- | 5           | Up                | Thistles-----        | 15        | Up           |                      | --   | --   |
| <b>North Central:</b> |       |           |                     |           |           |                      |             |                   |                      |           |              |                      |      |      |
| Illinois-----         |       |           |                     |           |           |                      |             |                   |                      |           |              |                      |      |      |
| Indiana-----          | 10    | Down      | Canada thistle----- | 10        | Down      | Curly dock-----      | 5           | Down              | Elm brush-----       | 5         | Down         | Johnsongrass-----    | 15   | Sta. |
| Iowa-----             | --    | Sta.      | Canada thistle----- | --        | Sta.      | Dogfennel-----       | --          | Sta.              | Horseneville-----    | --        | Sta.         | Ironweed-----        | --   | Sta. |
| Kansas-----           | 65    | Up        | Ragweed-----        | 80        | Sta.      | Weed bromegrasses--  | 50          | Sta.              |                      |           |              |                      |      |      |
| Minnesota-----        | 15    | Sta.      | Quackgrass-----     | 70        | Sta.      | Ragweed-----         | 70          | Sta.              | Vervain-----         | 50        | Sta.         | Weed bromegrasses--  | 75   | Sta. |
| Missouri-----         | --    | Up        | Ironweed-----       | --        | Up        | Ragweed-----         | --          | Up                | Thistles-----        | --        | Up           | Woody plants-----    | --   | Sta. |
| Nebraska-----         | 70    | Sta.      | Kochia-----         | 40        | Sta.      | Ragweed-----         | 85          | Sta.              | Weed bromegrasses--  | 70        | Sta.         | Wild mustard-----    | 40   | Sta. |
| Ohio-----             | 25    | Sta.      | Crabgrass-----      | 40        | Sta.      | Foxtail-----         | 60          | Sta.              | Quackgrass-----      | 15        | Sta.         | Ragweed-----         | 80   | Sta. |
| South Dakota---       | 1     | Sta.      | Cocklebur-----      | 8         | Sta.      | Goldenrod-----       | 100         | Sta.              | Leafy spurge-----    | 1         | Up           | Sunflower-----       | 10   | Sta. |
| Wisconsin-----        | 75    | Up        | Pennycress-----     | 20        | Sta.      | Quackgrass-----      | 100         | Sta.              | White cockle-----    | 90        | Up           | Yellow rocket-----   | 50   | Up   |
| <b>Southern:</b>      |       |           |                     |           |           |                      |             |                   |                      |           |              |                      |      |      |
| Alabama-----          |       |           |                     |           |           |                      |             |                   |                      |           |              |                      |      |      |
| Arkansas-----         | 75    | Sta.      | Dogfennel-----      | 40        | Up        | Dropseed-----        | 25          | Up                | Little barley-----   | 75        | Sta.         | Wolf-tail-----       | 30   | Up   |
| Florida-----          | 20    | Up        | Dock-----           | 10        | Up        | Ragweed-----         | --          | Sta.              | Sandbur-----         | 5         | Up           | Sumpweed-----        | 5    | Up   |
| Georgia-----          | 70    | Down      | Carolina geranium-- | 50        | Sta.      | Curly dock-----      | 30          | Sta.              | Matweed-----         | 10        | Sta.         | Smutgrass-----       | 20   | Up   |
| Kentucky-----         | 60    | Up        | Curly dock-----     | 10        | Sta.      | Pigweed-----         | 30          | Up                | Sandbur-----         | 30        | Up           | Smutgrass-----       | 20   | Up   |
| Louisiana-----        | 40    | Down      | Curly dock-----     | 60        | Up        | Giant foxtail-----   | 30          | Up                | Johnsongrass-----    | 20        | Sta.         | Ragweed-----         | 40   | Up   |
| Mississippi---        | 100   | Sta.      | Croton-----         | 70        | Sta.      | Horseneville-----    | 30          | Up                | Little barley-----   | 35        | Up           | Yankee weed-----     | 25   | Up   |
| North Carolina--      | 40    | Sta.      | Chickweed-----      | 45        | Sta.      | Dock-----            | 90          | Sta.              | Thistles-----        | 90        | Sta.         | Yankee weed-----     | 85   | Sta. |
| Oklahoma-----         | 75    | Sta.      | Broomsedge-----     | 60        | Up        | Dock-----            | 20          | Sta.              | Henbit-----          | 45        | Sta.         | Wild garlic-----     | 30   | Sta. |
| South Carolina--      | 40    | Up        | Dogfennel-----      | 15        | Up        | Ragweed-----         | 90          | Up                | Sandbur-----         | 60        | Up           | Threawn-----         | 50   | Sta. |
| Tennessee-----        | 25    | Up        | Broomsedge-----     | 20        | Up        | Horseneville-----    | 30          | Sta.              | Little barley-----   | 25        | Up           | Wild garlic-----     | 40   | Sta. |
| Texas-----            | 10    | Down      | Croton-----         | 15        | Down      | Buttercup-----       | 3           | Sta.              | Horseneville-----    | 30        | Up           | Ragweed-----         | 50   | Up   |
| Virginia-----         | 20    | Sta.      |                     | --        | Dock----- | --                   | --          | Horseneville----- | 5                    | Down      | Sandbur----- | 15                   | Down |      |
| <b>Western:</b>       |       |           |                     |           |           |                      |             |                   |                      |           |              |                      |      |      |
| California-----       |       |           |                     |           |           |                      |             |                   |                      |           |              |                      |      |      |
| Colorado-----         | 20    | Up        | Buttercup-----      | 20        | Up        | Curly dock-----      | 60          | Sta.              | Foxtail-----         | 15        | Up           | Sedges-----          | 20   | Up   |
| Idaho-----            | 30    | Up        | Curly dock-----     | 20        | Sta.      | Foxtail-----         | 35          | Sta.              | Milkweed-----        | 10        | Sta.         | Quackgrass-----      | 20   | Up   |
| Montana-----          | 1     | Down      | Leafy spurge-----   | 1         | Up        | Quackgrass-----      | 20          | Sta.              | Wormwood-----        | 5         | Up           |                      |      |      |
| Nebraska-----         | 10    | Down      | Canada thistle----- | 2         | Down      | Canada thistle-----  | 1           | Up                | Wild barley-----     | 1         | Sta.         | Yarrow-----          | 1    | Down |
| New Mexico-----       | 30    | Sta.      | Curly dock-----     | 30        | Sta.      | Foxtail barley-----  | 15          | Sta.              | Hairy white-top----- | 10        | Sta.         | Povertyweed-----     | 5    | Down |
| Oregon-----           | --    | Sta.      | Cocklebur-----      | 5         | Sta.      | Dock-----            | 5           | Sta.              | Lambquarters-----    | 20        | Sta.         | Wild mustard-----    | 20   | Sta. |
| Utah-----             | --    | Sta.      | Dandelion-----      | --        | Sta.      | Canada thistle-----  | --          | Sta.              | Dock-----            | --        | Sta.         | Velveleaf-----       | --   | Sta. |
| Washington-----       | 5     | Sta.      | Canada thistle----- | 15        | Up        | Mallow-----          | 25          | Sta.              | Morning glory-----   | --        | Sta.         | Plantain-----        | --   | Sta. |
| Wyoming-----          | 50    | Up        | Dandelion-----      | 70        | Sta.      | Kochia-----          | 80          | Sta.              | Quackgrass-----      | 20        | Up           | Plantain-----        | 30   | Up   |
| Hawaii-----           | 25    | Up        | Cocklebur-----      | 5         | Sta.      | Mallow-----          | 10          | Up                | Mustard-----         | 20        | Up           | Sourgrass-----       | 10   | Sta. |

<sup>1</sup> Sta., stationary.

Table 47.--Unimproved perennial pastures: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems by States and geographic divisions, 1965

| State and region    | Acres treated |                | Average cost per acre <sup>1</sup> |                | Acreage treated by-- |                  | Effectiveness of herbicides |                  | Herbicides usage trend <sup>2</sup> | Need for better herbicides      | Persistence problem |
|---------------------|---------------|----------------|------------------------------------|----------------|----------------------|------------------|-----------------------------|------------------|-------------------------------------|---------------------------------|---------------------|
|                     | Pre-emergence | Post-emergence | Post-emergence                     | Post-emergence | Farmers              | Custom operators | Pre-emergence               | Post-emergence   |                                     |                                 |                     |
|                     | 1,000 acres   | 1,000 acres    | Dollars                            | Dollars        | Percent              | Percent          | Percent                     | Percent          |                                     |                                 |                     |
| Connecticut-----    | --            | 300.1          | --                                 | 25.00          | 100                  | --               | ---                         | Good             | Sta. Up                             | Little                          | No                  |
| New York-----       | --            | 300.1          | --                                 | 5.00           | 60                   | 40               | ---                         | Good             |                                     | Some                            | Yes                 |
| Northeastern-----   | --            | 300.1          | --                                 | 5.01           | 60                   | 40               | ---                         | 2-Good           | 1-Up<br>1-Sta.                      | 1-Some<br>1-Little              | 1-Yes<br>1-No       |
| Illinois-----       | --            | 40             | --                                 | 1.50           | 95                   | 5                | ---                         | Fair             | Sta.                                | Some                            | No                  |
| Iowa-----           | --            | 500            | --                                 | 1.50           | 95                   | 5                | ---                         | Good             | Up                                  | Little                          | No                  |
| Kansas-----         | --            | 1,000          | --                                 | 1.85           | 95                   | 5                | ---                         | Fair             | Sta.                                | Some                            | Yes                 |
| Minnesota-----      | --            | 75             | --                                 | 2.50           | 95                   | 5                | ---                         | Fair             | Up                                  | Little                          | No                  |
| Missouri-----       | --            | 220            | --                                 | 2.00           | 30                   | 70               | ---                         | Fair             | Sta.                                | Little                          | No                  |
| Ohio-----           | --            | 220            | --                                 | 1.50           | 90                   | 10               | ---                         | Fair             | Sta.                                | Some                            | No                  |
| South Dakota-----   | --            | 50             | --                                 | 2.50           | 40                   | 60               | ---                         | Good             | Sta.                                | Some                            | No                  |
| Wisconsin-----      | --            | 50             | --                                 | 1.90           | 90                   | 10               | ---                         | Good             | Sta.                                | Some                            | No                  |
| North Central-----  | --            | 2,005          | --                                 | 1.76           | 91                   | 9                | ---                         | 3-Good<br>5-Fair | 2-Up<br>6-Sta.                      | 5-Some<br>3-Little              | 1-Yes<br>7-No       |
| Arkansas-----       | 20            | 100            | 1.50                               | 2.00           | 90                   | 10               | Fair                        | Good             | Up                                  | Some                            | No                  |
| North Carolina----- | --            | 50             | --                                 | 2.00           | 100                  | --               | ---                         | Good             | Sta.                                | Some                            | No                  |
| South Carolina----- | --            | 2              | --                                 | 1.00           | 75                   | 25               | ---                         | Fair             | Up                                  | Urgent                          | No                  |
| Texas-----          | --            | 100            | --                                 | 2.00           | 50                   | 50               | ---                         | Good             | Up                                  | Some                            | No                  |
| Virginia-----       | --            | 525            | --                                 | 4.50           | 70                   | 30               | ---                         | Fair             | Up                                  | Some                            | No                  |
| Southern-----       | 20            | 777            | 1.50                               | 3.69           | 72                   | 28               | 1-Fair                      | 3-Good<br>2-Fair | 4-Up<br>1-Sta.                      | 1-Urgent<br>4-Some              | 5-No                |
| California-----     | --            | 30             | --                                 | 3.50           | 70                   | 30               | ---                         | Fair             | Sta.                                | Some                            | No                  |
| Montana-----        | --            | 2              | --                                 | 1.75           | 100                  | --               | ---                         | Good             | Sta.                                | Little                          | No                  |
| Hawaii-----         | --            | 10             | --                                 | 10.00          | 50                   | 50               | ---                         | Fair             | Up                                  | Urgent                          | Yes                 |
| Western-----        | --            | 42             | --                                 | 4.96           | 67                   | 33               | ---                         | 1-Good<br>2-Fair | 1-Up<br>2-Sta.                      | 1-Urgent<br>1-Some<br>1-Little  | 1-Yes<br>2-No       |
| United States-----  | 20            | 3,124.1        | 1.50                               | 2.60           | 83                   | 17               | 1-Fair                      | 5-Good<br>9-Fair | 8-Up<br>10-Sta.                     | 2-Urgent<br>11-Some<br>5-Little | 3-Yes<br>15-No      |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.

<sup>2</sup> Sta., stationary.

Table 48.--Perennial unimproved pastures: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State  | Weed  |           | Infestation         |           | Weed  |                     | Infestation |           | Weed                |           | Infestation |                      |    |       |
|-------------------|-------|-----------|---------------------|-----------|-------|---------------------|-------------|-----------|---------------------|-----------|-------------|----------------------|----|-------|
|                   | Acres | Trend (1) | Acres               | Trend (1) | Acres | Trend (1)           | Acres       | Trend (1) | Acres               | Trend (1) | Acres       | Trend (1)            |    |       |
| Northeastern:     |       |           |                     |           |       |                     |             |           |                     |           |             |                      |    |       |
| Connecticut----   | 75    | Sta.      | Hawkeed-----        | 75        | Sta.  | Wild carrot-----    | 75          | Sta.      | Woodsorrel-----     | 75        | Sta.        | Yarrow-----          | 75 | Sta.  |
| Massachusetts---- | --    | Sta.      | Dandelion-----      | --        | Sta.  | Goldenrod-----      | --          | Sta.      | Plantain-----       | --        | Sta.        | Wild carrot-----     | -- | Sta.  |
| New York-----     | 95    | Sta.      | Brush-----          | 90        | Up    | Perennial grasses-- | 95          | Up        | Quackgrass-----     | 90        | Sta.        | Quackgrass-----      | 90 | Sta.  |
| Rhode Island----  | 10    | Sta.      | Dandelion-----      | 80        | Sta.  | Plantain-----       | 20          | Sta.      | Quackgrass-----     | 40        | Sta.        | Thistles-----        | 10 | Sta.  |
| West Virginia---- | 20    | Sta.      | Greenbrier-----     | 20        | Sta.  | Sassafras-----      | 20          | Sta.      | Yarrow-----         | 20        | Sta.        | -----                | -- | ----- |
| North Central:    |       |           |                     |           |       |                     |             |           |                     |           |             |                      |    |       |
| Illinois-----     | 15    | Sta.      | Bull thistle-----   | 10        | Down  | Canada thistle----- | 10          | Down      | Vervain-----        | 5         | Sta.        | White snakeroot----- | 5  | Down  |
| Iowa-----         | 50    | Sta.      | Hazel brush-----    | 50        | Sta.  | Red alder-----      | 5           | Sta.      | Tree seedlings----- | 5         | Sta.        | -----                | -- | ----- |
| Kansas-----       | 85    | Sta.      | Musk thistle-----   | 65        | Up    | Ragweed-----        | 80          | Sta.      | Vervain-----        | 90        | Sta.        | Weed bromegrasses--  | 40 | Sta.  |
| Minnesota-----    | 85    | Sta.      | Canada thistle----- | 65        | Sta.  | Ironweed-----       | 65          | Sta.      | Quackgrass-----     | 50        | Sta.        | Ragweed-----         | 85 | Sta.  |
| Missouri-----     | --    | Sta.      | Foxtail-----        | --        | Up    | Ragweed-----        | --          | Up        | Thistles-----       | --        | Up          | Weed bromegrasses--  | -- | Up    |
| Nebraska-----     | 90    | Sta.      | Ironweed-----       | 85        | Up    | Ragweed-----        | 60          | Up        | Threawn-----        | 50        | Up          | Wild mustard-----    | 50 | Sta.  |
| Ohio-----         | 30    | Sta.      | Ironweed-----       | 15        | Up    | Quackgrass-----     | 15          | Sta.      | Ragweed-----        | 80        | Sta.        | Wild carrot-----     | 15 | Sta.  |
| South Dakota----  | 1     | Sta.      | Goldenrod-----      | 50        | Sta.  | Ironweed-----       | 1           | Sta.      | Sagewort wormwood-- | 85        | Sta.        | Wormwood-----        | 2  | Up    |
| Wisconsin-----    | 50    | Sta.      | Canada thistle----- | 40        | Sta.  | Hoary alyssum-----  | 80          | Up        | Oxeye daisy-----    | 30        | Sta.        | Yarrow-----          | 30 | Sta.  |
| Southern:         |       |           |                     |           |       |                     |             |           |                     |           |             |                      |    |       |
| Arkansas-----     | 50    | Up        | Gumweed-----        | 20        | Up    | Pricklypear-----    | 5           | Up        | Starthistle-----    | 5         | Up          | Yankeeweed-----      | 5  | Up    |
| Georgia-----      | 70    | Sta.      | Brush-----          | 20        | Up    | Dock-----           | 60          | Up        | -----               | --        | -----       | -----                | -- | ----- |
| North Carolina--  | 40    | Up        | Hawkeed-----        | 10        | Up    | Henbit-----         | 45          | Up        | Horsenettle-----    | 30        | Up          | Wild garlic-----     | 40 | Up    |
| Oklahoma-----     | 40    | Up        | Cocklebur-----      | 40        | Up    | Dock-----           | 50          | Up        | Puncturevine-----   | 40        | Up          | Sunflower-----       | 30 | Up    |
| South Carolina--  | 60    | Up        | Broomsedge-----     | 40        | Sta.  | Common chickweed--  | 20          | Sta.      | Poorjoe-----        | 30        | Up          | Wild garlic-----     | 40 | Up    |
| Tennessee-----    | 30    | Up        | Broomsedge-----     | 85        | Up    | Buttercup-----      | 25          | Up        | Ragweed-----        | 35        | Up          | Thistles-----        | 35 | Up    |
| Texas-----        | 15    | Sta.      | Croton-----         | 23        | Sta.  | Horsenettle-----    | 15          | Sta.      | Sandbur-----        | 25        | Sta.        | Yankeeweed-----      | 5  | Sta.  |
| Virginia-----     | 15    | Up        | Buttercup-----      | 40        | Sta.  | Musk thistle-----   | 15          | Up        | Spotted knapweed--  | 10        | Up          | Weitted thistle----- | 35 | Up    |
| Western:          |       |           |                     |           |       |                     |             |           |                     |           |             |                      |    |       |
| California-----   | 40    | Up        | Bull thistle-----   | 75        | Sta.  | Foxtail-----        | 30          | Up        | Weed bromegrasses-- | 40        | Up          | Yellow starthistle-  | 20 | Up    |
| Colorado-----     | 30    | Sta.      | Pricklypear-----    | 25        | Up    | Rabbitbrush-----    | 25          | Up        | Sagebrush-----      | 40        | Up          | Snakeweed-----       | 25 | Up    |
| Montana-----      | 5     | Up        | Canada thistle----- | 5         | Up    | Hairy whitetop----- | 2           | Down      | Musk thistle-----   | 1         | Sta.        | Spotted knapweed--   | 2  | Up    |
| Nevada-----       | 20    | Sta.      | Foxtail barley----- | 25        | Sta.  | Iris-----           | 30          | Sta.      | Povertyweed-----    | 10        | Sta.        | Sedges-----          | 15 | Sta.  |
| Utah-----         | --    | -----     | Canada thistle----- | --        | ----- | Common milkweed---  | --          | -----     | Gumweed-----        | --        | -----       | -----                | -- | ----- |
| Hawaii-----       | 2     | Up        | Boneset-----        | 40        | Up    | Broomsedge-----     | 30          | Up        | Flatsedge-----      | 10        | Up          | Foxtail-----         | 10 | Up    |

1 Sta., stationary

Table 49.--Mountain rangeland: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides and residue problems, by States and geographic divisions, 1965

| State and region   | Acres treated |                | Average cost per acre <sup>1</sup> |         | Acreage treated by-- |                  | Effectiveness of herbicides |                  | Herbicides usage trend <sup>2</sup> | Need for better herbicides     | Persistence problem |
|--------------------|---------------|----------------|------------------------------------|---------|----------------------|------------------|-----------------------------|------------------|-------------------------------------|--------------------------------|---------------------|
|                    | Pre-emergence | Post-emergence | Dollars                            | Percent | Farmers              | Custom operators | Pre-emergence               | Post-emergence   |                                     |                                |                     |
| South Dakota-----  | --            | 20             | --                                 | 20.00   | 25                   | 75               | ----                        | Good             | Up                                  | Urgent                         | Yes                 |
| North Central----- | --            | 20             | --                                 | 20.00   | 25                   | 75               | ----                        | 1-Good           | 1-Up                                | 1-Urgent                       | 1-Yes               |
| Texas-----         | --            | 500            | --                                 | 5.00    | 10                   | 90               | ----                        | Good             | Up                                  | Some                           | No                  |
| Southern-----      | --            | 500            | --                                 | 5.00    | 10                   | 90               | ----                        | 1-Good           | 1-Up                                | 1-Some                         | 1-No                |
| Arizona-----       | --            | 2              | --                                 | 5.00    | 100                  | --               | ----                        | Fair             | Sta.                                | Little                         | No                  |
| California-----    | --            | 80             | --                                 | 6.50    | 10                   | 90               | ----                        | Good             | Up                                  | Some                           | No                  |
| Idaho-----         | --            | 5              | --                                 | 3.00    | 20                   | 80               | ----                        | Good             | Up                                  | Some                           | No                  |
| Montana-----       | --            | 4              | --                                 | 3.00    | 10                   | 90               | ----                        | Good             | Up                                  | Little                         | No                  |
| New Mexico-----    | --            | 2              | --                                 | 2.50    | 50                   | 50               | ----                        | Good             | Up                                  | Some                           | No                  |
| Oregon-----        | --            | 1              | --                                 | 10.00   | 90                   | 10               | ----                        | Pair             | Up                                  | Urgent                         | Yes                 |
| Utah-----          | --            | 45             | --                                 | 4.00    | 5                    | 95               | ----                        | Good             | Up                                  | Some                           | No                  |
| Washington-----    | --            | 1              | --                                 | 2.00    | 10                   | 90               | ----                        | Good             | Up                                  | Some                           | No                  |
| Hawaii-----        | --            | 10             | --                                 | 5.00    | 50                   | 50               | ----                        | Good             | Up                                  | Urgent                         | Yes                 |
| Western-----       | --            | 150            | --                                 | 5.36    | 14                   | 86               | ----                        | 7-Good<br>2-Fair | 8-Up<br>1-Sta.                      | 2-Urgent<br>5-Some<br>2-Little | 2-Yes<br>7-No       |
| United States----- | --            | 670            | --                                 | 5.53    | 11                   | 89               | ----                        | 9-Good<br>2-Fair | 10-Up<br>1-Sta.                     | 3-Urgent<br>6-Some<br>2-Little | 3-Yes<br>8-No       |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.

<sup>2</sup> Sta., stationary.

Table 50.--Mountain rangeland: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State | Weed              | Infestation |       | Weed               | Infestation |       | Weed               | Infestation |       | Weed               | Infestation |       |                    |    |      |
|------------------|-------------------|-------------|-------|--------------------|-------------|-------|--------------------|-------------|-------|--------------------|-------------|-------|--------------------|----|------|
|                  |                   | Trend (↑)   | Acres |                    | Trend (↑)   | Acres |                    | Trend (↑)   | Acres |                    | Trend (↑)   | Acres |                    |    |      |
| North Central:   |                   |             |       |                    |             |       |                    |             |       |                    |             |       |                    |    |      |
| South Dakota---  | Burdock-----      | 8           | Sta.  | Canada thistle---  | 12          | Up    | Leafy spurge-----  | 2           | Sta.  | Mullein-----       | 12          | Up    | Sagebrush-----     | 20 | Sta. |
| Urban:           |                   |             |       |                    |             |       |                    |             |       |                    |             |       |                    |    |      |
| Texas-----       | Cresotebush-----  | 4           | Up    | Juniper-----       | 40          | Up    | Mesquite-----      | 30          | Up    | Pricklypear-----   | 65          | Up    | Saltcedar-----     | 1  | Up   |
| Western:         |                   |             |       |                    |             |       |                    |             |       |                    |             |       |                    |    |      |
| Arizona-----     | Juniper-----      | 15          | Sta.  | Manzanita-----     | 10          | Sta.  | Oakbrush-----      | 20          | Sta.  | Sagebrush-----     | 20          | Sta.  | Tall larkspur----- | 10 | Up   |
| California-----  | Chamise-----      | 60          | Up    | Elm-----           | 60          | Up    | False hellebore--- | --          | Up    | Rush skeletonweed- | --          | Up    | Spotted knapweed-  | 1  | Up   |
| Idaho-----       | Canada thistle--- | 50          | Up    | Diffuse knapweed-- | 5           | Up    | Leaky spurge-----  | 1           | Up    | Sagebrush-----     | 5           | Sta.  | Tall larkspur---   | 1  | Up   |
| Montana-----     | Canada thistle--- | 10          | Up    | Downy bromes-----  | 5           | Sta.  | Tall larkspur---   | 5           | Sta.  | Pingue-----        | 5           | Sta.  | Sagebrush-----     | 10 | Down |
| Nevada-----      | Manzanita-----    | 5           | Sta.  | Larkspur-----      | 5           | Sta.  | Mulleins-----      | 6           | Up    | Tall larkspur---   | 3           | Sta.  | Tarweed-----       | 5  | Sta. |
| New Mexico-----  | Big sagebrush---  | 18          | Up    | Medicanean sage--- | 28          | Up    | False hellebore--- | 1           | Up    | Oxeye daisy-----   | 1           | Up    | Tall larkspur---   | 1  | Sta. |
| Utah-----        | Brush-----        | 20          | Up    | Canada thistle---  | 80          | Sta.  | Tall larkspur---   | 10          | Up    | Firebush-----      | 10          | Up    | Pukiawe-----       | 15 | Up   |
| Washington-----  | Mulleins-----     | 10          | Up    | Sagebrush-----     | 20          | Up    | Bonseset-----      | 10          | Up    |                    |             |       |                    |    |      |
| Wyoming-----     | A talli-----      | 10          | Sta.  |                    |             |       |                    |             |       |                    |             |       |                    |    |      |
| Hawaii-----      |                   |             |       |                    |             |       |                    |             |       |                    |             |       |                    |    |      |

<sup>1</sup> Sta., stationary.



Table 53.--Arid rangeland: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region   | Acres treated |                | Average cost per acre <sup>1</sup> |                | Acreage treated by-- |                  | Effectiveness of herbicides |                  | Herbicides usage trend <sup>2</sup> | Need for better herbicides     | Persistence problem |
|--------------------|---------------|----------------|------------------------------------|----------------|----------------------|------------------|-----------------------------|------------------|-------------------------------------|--------------------------------|---------------------|
|                    | Pre-emergence | Post-emergence | Pre-emergence                      | Post-emergence | Farmers              | Custom operators | Pre-emergence               | Post-emergence   |                                     |                                |                     |
|                    | 1,000 acres   | 1,000 acres    | Dollars                            | Dollars        | Percent              | Percent          |                             |                  |                                     |                                |                     |
| Texas-----         | --            | 250            | --                                 | 4.00           | 10                   | 90               | ----                        | Good             | Up                                  | Urgent                         | No                  |
| Southern-----      | --            | 250            | --                                 | 4.00           | 10                   | 90               | ----                        | 1-Good           | 1-Up                                | 1-Urgent                       | 1-No                |
| Arizona-----       | --            | 20             | --                                 | 3.00           | 100                  | --               | ----                        | Fair             | Up                                  | Little                         | No                  |
| California-----    | --            | 5              | --                                 | 5.00           | 25                   | 75               | ----                        | Fair             | Sta.                                | Urgent                         | No                  |
| Idaho-----         | --            | 5              | --                                 | 3.00           | 20                   | 80               | ----                        | Fair             | Down                                | Some                           | No                  |
| Montana-----       | --            | 2              | --                                 | 3.00           | 15                   | 85               | ----                        | Good             | Up                                  | Little                         | No                  |
| New Mexico-----    | --            | 12             | --                                 | 3.00           | 100                  | --               | ----                        | Good             | Up                                  | Some                           | No                  |
| Oregon-----        | --            | 100            | --                                 | 2.00           | 10                   | 90               | ----                        | Good             | Up                                  | Little                         | No                  |
| Utah-----          | --            | 10             | --                                 | 4.50           | 5                    | 95               | ----                        | Fair             | Up                                  | Some                           | No                  |
| Washington-----    | --            | 10             | --                                 | 2.00           | 10                   | 90               | ----                        | Good             | Up                                  | Some                           | No                  |
| Wyoming-----       | --            | 10             | --                                 | 3.00           | --                   | 100              | ----                        | Good             | Up                                  | Some                           | No                  |
| Hawaii-----        | --            | 15             | --                                 | 7.50           | 75                   | 25               | ----                        | Fair             | Up                                  | Some                           | Yes                 |
| Western-----       | --            | 189            | --                                 | 2.91           | 30                   | 70               | ----                        | 5-Good<br>5-Fair | 7-Up<br>2-Sta.<br>1-Down            | 1-Urgent<br>6-Some<br>3-Little | 1-Yes<br>9-No       |
| United States----- | --            | 439            | --                                 | 3.53           | 19                   | 81               | ----                        | 6-Good<br>5-Fair | 8-Up<br>2-Sta.<br>1-Down            | 2-Urgent<br>6-Some<br>3-Little | 1-Yes<br>10-No      |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.

<sup>2</sup> Sta., stationary.

Table 54.--Arid rangeland: Five important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State | Weed                | Infestation |      | Weed                    | Acres | Infestation |                    | Weed | Acres | Infestation            |      | Weed | Acres                   | Infestation |      |
|------------------|---------------------|-------------|------|-------------------------|-------|-------------|--------------------|------|-------|------------------------|------|------|-------------------------|-------------|------|
|                  |                     | Trend       | Pct. |                         |       | Trend       | Pct.               |      |       | Trend                  | Pct. |      |                         | Trend       | Pct. |
| North Central:   |                     |             |      |                         |       |             |                    |      |       |                        |      |      |                         |             |      |
| South Dakota---  | Prickly pear-----   | --          | Sta. |                         |       |             |                    |      |       |                        |      |      |                         |             |      |
| Southern:        |                     |             |      |                         |       |             |                    |      |       |                        |      |      |                         |             |      |
| Texas-----       | Blackbush-----      | 40          | Up   | Crosetobush-----        | 70    | Up          | Mesquite-----      | 75   | Up    | Saltcedar-----         | 2    | Up   | Tarbrush-----           | 60          | Sta. |
| Western:         |                     |             |      |                         |       |             |                    |      |       |                        |      |      |                         |             |      |
| Arizona-----     | Mesquite-----       | 31          | ---  | Pricklypear-----        | 40    | ---         | Tree tobacco-----  | 10   | Sta.  | Weed bromegrasses----- | 80   | Sta. | Yellow starthistle----- | 65          | Up   |
| California-----  | Salgrass-----       | 20          | Sta. | Tarweed-----            | 50    | Up          | Sagebrush-----     | 15   | Sta.  | Spotted knapweed-----  | 1    | Up   | Weed bromegrasses-----  | 5           | Up   |
| Idaho-----       | Halogeton-----      | 1           | Up   | Medushead-----          | 1     | Up          | Oak-----           | 15   | Up    | Russian thistle-----   | 15   | Sta. | Yucca-----              | 15          | Up   |
| Montana-----     | Leafy spurge-----   | 1           | Up   | Pricklypear-----        | 1     | Up          | Rabbitbrush-----   | 10   | Up    | Sagebrush-----         | 5    | Sta. | Loco-----               | 12          | Up   |
| Nevada-----      | Greasewood-----     | 10          | Sta. | Halogeton-----          | 15    | Up          | Horsetail-----     | 10   | Up    | Weed bromegrasses----- | 75   | Sta. | Sagebrush-----          | 50          | Sta. |
| New Mexico-----  | Cacti-----          | 15          | Sta. | Mesquite-----           | 60    | Up          | Pricklypear-----   | 20   | Sta.  | Russian thistle-----   | 30   | Up   | Sagebrush-----          | 5           | Up   |
| Oregon-----      | Low larkspar-----   | 30          | Sta. | Medushead-----          | 10    | Up          | Fountaingrass----- | 5    | Up    | Lantana-----           | 25   | Down | Partridgepea-----       |             |      |
| Utah-----        | Big sagebrush-----  | 25          | Up   | Downy brome-----        | 10    | Up          |                    |      |       |                        |      |      |                         |             |      |
| Washington-----  | Big sagebrush-----  | 25          | Up   | Greene rabbitbrush----- | 10    | Up          |                    |      |       |                        |      |      |                         |             |      |
| Wyoming-----     | Greasewood-----     | 10          | Sta. | Halogeton-----          | 10    | Sta.        |                    |      |       |                        |      |      |                         |             |      |
| Hawaii-----      | Apple-of-Sodom----- | 5           | Up   | Brazil peppertree-----  | 20    | Up          |                    |      |       |                        |      |      |                         |             |      |
|                  | nightsade.          |             |      |                         |       |             |                    |      |       |                        |      |      |                         |             |      |

<sup>1</sup> Sta., stationary.



Table 55.--Rainbelt rangeland: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region   | Acres treated |                | Average cost per acre <sup>1</sup> |                | Acres treated by-- |                  | Effectiveness of herbicides |                  | Herbicides usage trend <sup>2</sup> | Need for better herbicides | Persistence problem |
|--------------------|---------------|----------------|------------------------------------|----------------|--------------------|------------------|-----------------------------|------------------|-------------------------------------|----------------------------|---------------------|
|                    | Pre-emergence | Post-emergence | Pre-emergence                      | Post-emergence | Farmers            | Custom operators | Pre-emergence               | Post-emergence   |                                     |                            |                     |
|                    | 1,000 acres   | 1,000 acres    | Dollars                            | Dollars        | Percent            | Percent          |                             |                  |                                     |                            |                     |
| Texas-----         | --            | 250            | --                                 | 8.00           | 10                 | 90               | --                          | Good             | Up                                  | Urgent                     | No                  |
| Southern-----      | --            | 250            | --                                 | 8.00           | 10                 | 90               | --                          | 1-Good           | 1-Up                                | 1-Urgent                   | 1-No                |
| California-----    | --            | 10             | --                                 | 6.50           | 25                 | 75               | --                          | Fair             | Up                                  | Urgent                     | No                  |
| Hawaii-----        | --            | 15             | --                                 | 12.50          | 50                 | 50               | --                          | Fair             | Up                                  | Urgent                     | Yes                 |
| Western-----       | --            | 25             | --                                 | 10.10          | 40                 | 60               | --                          | 2-Fair           | 2-Up                                | 2-Urgent                   | 1-Yes<br>1-No       |
| United States----- | --            | 275            | --                                 | 8.19           | 13                 | 87               | --                          | 1-Good<br>2-Fair | 3-Up                                | 3-Urgent                   | 1-Yes<br>2-No       |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom application and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.  
<sup>2</sup> Sta., stationary.

Table 56.--Rainbelt rangeland: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State | Weed            | Infestation |           | Weed           | Infestation |           | Weed               | Infestation |           | Weed              | Infestation |           | Weed             | Infestation |           | Weed | Infestation |           |
|------------------|-----------------|-------------|-----------|----------------|-------------|-----------|--------------------|-------------|-----------|-------------------|-------------|-----------|------------------|-------------|-----------|------|-------------|-----------|
|                  |                 | Acres       | Trend (1) |                | Acres       | Trend (1) |                    | Acres       | Trend (1) |                   | Acres       | Trend (1) |                  | Acres       | Trend (1) |      | Acres       | Trend (1) |
| Southern:        |                 |             |           |                |             |           |                    |             |           |                   |             |           |                  |             |           |      |             |           |
| Florida-----     | Dogfennel-----  | 10          | Sta.      | Gallberry----- | 20          | Sta.      | Palmetto-----      | 75          | Sta.      | Smutgrass-----    | 10          | Up        | Waxyrtle-----    | 10          | Sta.      |      |             |           |
| Georgia-----     | Palmetto-----   | --          | Sta.      | Persimmon----- | --          | Up        | Sassafras-----     | --          | Sta.      |                   | --          | --        |                  | --          | --        |      |             |           |
| Texas-----       | ELM-----        | 10          | Up        | Huisache-----  | 10          | Up        | Macartney rose---  | 2           | Up        | Post oak-----     | 50          | Up        | Yaupon-----      | 10          | Up        |      |             |           |
| Western:         |                 |             |           |                |             |           |                    |             |           |                   |             |           |                  |             |           |      |             |           |
| California-----  | Blackberry----- | 40          | Sta.      | Gorse-----     | 5           | Up        | Italian thistle--- | 30          | Up        | Pennycress-----   | 20          | Up        | Rush-----        | 15          | Sta.      |      |             |           |
| Oregon-----      | Buttercup-----  | --          | --        | Iris-----      | --          | --        | Tansy ragwort----- | --          | --        | Wild berries----- | --          | --        | Indian rhododen- | --          | --        |      |             |           |
| Hawaii-----      | Boneset-----    | 45          | Up        | Fern-----      | 30          | Up        | Guava-----         | 40          | Sta.      | Hairy fleabane--- | 20          | Up        | iron.            | 30          | Up        |      |             |           |

<sup>1</sup> Sta., stationary.

## Arid Rangelands

Vast acreages are included in the arid rangelands class (table 54). The vegetation on these rangelands consists mostly of species of low grazing value whose replacement by more useful forage would improve carrying capacity. In addition to sagebrush, which is mentioned most often, other species frequently listed as most important in the 13 States reporting include weed bromegrasses, halogeton, pricklypear, mesquite, and other brush species.

## Rainbelt Rangeland

Three Southern and three Western States reported the most important weed and brush problems in rainbelt rangeland (table 56). Sixteen of the species listed were woody plants, 11 were herbaceous. Many of the species are not efficiently controlled by herbicides now registered for use on grazing lands.

## FOREST PLANTINGS

Control of competing vegetation increases chances of success in forest plantings and assures more rapid development of forest species. Acreage reported as receiving herbicidal control is relatively small--117,000 acres. Cost was about \$1.5 million (tables 1 to 5 and 57).

Most important weeds in forest plantings were woody plants (table 58). Next in importance

were perennial herbaceous weeds, followed by annual weeds. Species mentioned by the most States include quackgrass, Canada thistle, bracken, bluegrass, blackberry and pigweed. Research, so far, has shown a high potential for improvement of weed control in forest plantings. More research in this area is badly needed.

Table 57.---Forest Plantings: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region    | Acres treated    |                  | Average cost per acre <sup>1</sup> |                | Acres treated by-- |                  | Effectiveness of herbicides |                            | Herbicides usage trend <sup>2</sup> | Need for better herbicides     | Persistence problem |
|---------------------|------------------|------------------|------------------------------------|----------------|--------------------|------------------|-----------------------------|----------------------------|-------------------------------------|--------------------------------|---------------------|
|                     | Pre-emergence    | Post-emergence   | Pre-emergence                      | Post-emergence | Farmers            | Custom operators | Pre-emergence               | Post-emergence             |                                     |                                |                     |
|                     | 1,000 acres      | 1,000 acres      | Dollars                            | Dollars        | Percent            | Percent          |                             |                            |                                     |                                |                     |
| Connecticut-----    | --               | ( <sup>3</sup> ) | --                                 | 15.00          | 100                | --               | ---                         | Fair                       | Up                                  | Some                           | No                  |
| New Jersey-----     | --               | 29               | --                                 | 15.00          | 95                 | 5                | ---                         | Good                       | Up                                  | Some                           | No                  |
| Vermont-----        | .1               | --               | 5.00                               | --             | 100                | --               | Good                        | ---                        | Up                                  | Little                         | No                  |
| Northeastern-----   | .1               | 29               | 5.00                               | 15.00          | 95                 | 5                | 1-Good                      | 1-Good<br>1-Fair           | 3-Up                                | 2-Some<br>1-Little             | 3-No                |
| Illinois-----       | .6               | .1               | 5.50                               | 6.50           | 100                | --               | Good                        | Good                       | Up                                  | Some                           | No                  |
| Iowa-----           | .5               | .5               | 4.00                               | 4.00           | 95                 | 5                | Fair                        | Fair                       | Sta.                                | Little                         | No                  |
| North Dakota-----   | 8                | .3               | 5.00                               | 1.50           | 90                 | 10               | Good                        | Good                       | Up                                  | Urgent                         | Yes                 |
| North Central-----  | 9.1              | .9               | 4.98                               | 3.44           | 91                 | 9                | 2-Good<br>1-Fair            | 2-Good<br>1-Fair           | 2-Up<br>1-Sta.                      | 1-Urgent<br>1-Some<br>1-Little | 1-Yes<br>2-No       |
| Alabama-----        | --               | 12               | --                                 | 13.00          | 15                 | 85               | ---                         | Good                       | Up                                  | Urgent                         | No                  |
| Arkansas-----       | 10               | 10               | --                                 | 11.00          | 100                | --               | ---                         | Fair                       | Down                                | Some                           | No                  |
| Florida-----        | 10               | .5               | 5.00                               | 4.00           | 30                 | 70               | Fair                        | Fair                       | Up                                  | Some                           | No                  |
| North Carolina----- | --               | 1                | --                                 | 10.00          | 100                | --               | ---                         | Poor                       | Up                                  | Some                           | No                  |
| Tennessee-----      | 1                | 25               | 30.00                              | 20.00          | 10                 | 90               | Fair                        | Poor                       | Up                                  | Some                           | Yes                 |
| Virginia-----       | --               | 2                | --                                 | 10.00          | 25                 | 75               | ---                         | Fair                       | Up                                  | Urgent                         | No                  |
| Southern-----       | 11               | 50.5             | 7.27                               | 15.80          | 31                 | 69               | 2-Fair                      | 1-Good<br>3-Fair<br>2-Poor | 5-Up<br>1-Down                      | 2-Urgent<br>4-Some             | 1-Yes<br>5-No       |
| California-----     | --               | 5                | --                                 | 7.50           | 5                  | 95               | ---                         | Fair                       | Up                                  | Urgent                         | No                  |
| Montana-----        | --               | .5               | --                                 | 6.50           | 100                | --               | ---                         | Good                       | Up                                  | Little                         | Yes                 |
| Oregon-----         | --               | 10               | --                                 | 8.00           | 90                 | 10               | ---                         | Good                       | Sta.                                | Little                         | No                  |
| Washington-----     | --               | 1                | --                                 | 8.00           | 90                 | 10               | ---                         | Good                       | Up                                  | Some                           | Yes                 |
| Hawaii-----         | ( <sup>3</sup> ) | .1               | 10.00                              | 7.50           | 100                | --               | Good                        | Good                       | Up                                  | Some                           | No                  |
| Western-----        | ( <sup>3</sup> ) | 16.6             | 10.00                              | 7.80           | 65                 | 35               | 1-Good                      | 4-Good<br>1-Fair           | 4-Up<br>1-Sta.                      | 1-Urgent<br>2-Some<br>2-Little | 2-Yes<br>3-No       |
| United States-----  | 20.2             | 97.0             | 6.23                               | 14.08          | 57                 | 43               | 4-Good<br>3-Fair            | 8-Good<br>6-Fair<br>2-Poor | 14-Up<br>2-Sta.<br>1-Down           | 4-Urgent<br>9-Some<br>4-Little | 4-Yes<br>13-No      |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.

<sup>2</sup> Sta., stationary.

<sup>3</sup> Less than 50 acres.

Table 58.--Forest planting: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State | Weed              | Infestation |                           | Weed           | Infestation |                           | Weed          | Infestation |                           | Weed                      | Infestation |                              |
|------------------|-------------------|-------------|---------------------------|----------------|-------------|---------------------------|---------------|-------------|---------------------------|---------------------------|-------------|------------------------------|
|                  |                   | Acres       | Trend<br>( <sup>1</sup> ) |                | Acres       | Trend<br>( <sup>1</sup> ) |               | Acres       | Trend<br>( <sup>1</sup> ) |                           | Acres       | Trend<br>( <sup>1</sup> )    |
| Northeastern:    |                   |             |                           |                |             |                           |               |             |                           |                           |             |                              |
| Connecticut      | Annual grasses    | 100         | Sta.                      | Bentgrass      | 100         | Sta.                      | Bluegrass     | 100         | Sta.                      | Quackgrass                | 100         | Sta.                         |
| Pennsylvania     | Bracken           | 15          | Sta.                      | Brush          | 70          | Down                      | Goldenrod     | 24          | Sta.                      | Lambsquarters             | 12          | Down                         |
| Vermont          | Cinquefoil        | 50          | Sta.                      | Horsetail      | 25          | Sta.                      | Nutsedge      | 25          | Sta.                      | Quackgrass                | 100         | Sta.                         |
| West Virginia    | Bluegrass         | --          | --                        | Crabgrass      | --          | --                        | Foxtail       | --          | --                        | Quackgrass                | --          | --                           |
| North Central:   |                   |             |                           |                |             |                           |               |             |                           |                           |             |                              |
| Illinois         | Canada thistle    | 5           | --                        | Field bindweed | 5           | --                        | Giant foxtail | 10          | --                        | Poison ivy                | 5           | --                           |
| Iowa             | Buttonweed        | 50          | --                        | Green foxtail  | 40          | --                        | Pigweed       | 50          | --                        | Smooth brome              | 25          | --                           |
| North Dakota     | Common ragweed    | 65          | Sta.                      | Kochia         | 60          | Sta.                      | Leafy spurge  | 40          | Up                        | Russian thistle           | 25          | Sta.                         |
| Ohio             | Canada thistle    | 25          | Up                        | Curly dock     | 10          | Sta.                      | Foxtail       | 20          | Sta.                      | Poison ivy                | 10          | Sta.                         |
| Southern:        |                   |             |                           |                |             |                           |               |             |                           |                           |             |                              |
| Alabama          | Hickory           | 20          | Up                        | Oak brush      | 20          | Up                        | Red oak       | 20          | Up                        | Sweetgum                  | 20          | Up                           |
| Arkansas         | Beech             | 10          | Sta.                      | Blackjack oak  | 20          | Sta.                      | Post oak      | 20          | Sta.                      |                           |             |                              |
| Florida          | Gallberry         | 30          | Sta.                      | Palmetto       | 75          | Sta.                      | Scrub oak     | 25          | Sta.                      | Titi                      | 5           | Sta.                         |
| North Carolina   | Blackberry        | 50          | Up                        | Bluegrass      | 60          | Down                      | Crabgrass     | 75          | Down                      | Horsenettle               | 60          | Up                           |
| Tennessee        | Broomsedge        | 40          | Sta.                      | Fescue         | 65          | Up                        | Ironweed      | 30          | Sta.                      | Ragweed                   | 30          | Sta.                         |
| Virginia         | Perennial grasses | 100         | --                        |                | --          | --                        |               | --          |                           |                           | --          | --                           |
| Western:         |                   |             |                           |                |             |                           |               |             |                           |                           |             |                              |
| California       | Bearmat           | 50          | Sta.                      | Bracken        | 15          | Sta.                      | Grass sod     | 50          | Sta.                      | Manzanita                 | 25          | Sta.                         |
| Montana          | Bull thistle      | 10          | Up                        | Canada thistle | 5           | Up                        | Lambsquarters | 50          | Sta.                      | Pigweed                   | 50          | Sta.                         |
| Oregon           | Alder             | --          | Up                        | Bentgrass      | --          | Up                        |               | --          |                           |                           | --          | --                           |
| Washington       | Annual grasses    | 50          | Up                        | Blackberry     | 5           | Up                        | Bracken       | 25          | Up                        | Horsetail                 | 25          | Up                           |
| Hawaii           | Blackberry        | 20          | Up                        | Boneset        | 50          | Up                        | Firebush      | 20          | Up                        | Indian rhododen-<br>dron. | 30          | Up                           |
|                  |                   |             |                           |                |             |                           |               |             |                           |                           |             | Redfruit passion-<br>flower. |

<sup>1</sup> Sta., stationary.

## NONCROPLAND

Noncropland includes ditchbanks; fencerows; feedlots; rights-of-way for highways, railroads, and utility lines; areas around building, and industrial and defense installations. Weed growth in fencerows and in rights-of-way for highways and railroads is a serious problem for agriculture. These areas constitute narrow bands of land through largely agricultural areas where seeds from uncontrolled weeds on the fencerows and rights-of-way provide an extremely troublesome source of weed infestations on adjoining farmlands.

The questionnaires returned from 27 States reported chemical treatment in 1965 on 3,306,000 acres of noncropland at a total cost of \$68,470,000 (tables 1 and 59). This use was about 9 percent less than that reported in 1962 by 31 States but was 68 percent more than the use reported in 1959 by 27 States. Thirty-nine percent of the herbicide applications were made by farmers and other landowners and 61 percent by custom operators (table 1). This was a considerable decrease in percent of applications made by custom operators as compared to 1962 and 1959. Of the total acreage treated, preemergence soil sterilant herbicides were used on 34 percent in 1965, 41 percent in 1962, and only 1.4 percent in 1959. Costs of treatment per acre in 1965 averaged \$32.40 for preemergence treatments and \$14.64 for postemergence treatments (table 3). This was a considerable increase for preemergence treatments and a considerable decrease for postemergence treatments as compared to 1962 when the average costs of the two types of treatment were about the same.

About half of the States reported good results and about half reported fair results from both preemergence and postemergence treatments in 1962 and 1965. In 1959 only one-third of the States reported good results from postemergence treatments. Two-thirds of the States reported no problems of herbicide persistence on noncropland as an average of 1962 and 1965.

Most of the States reported an upward trend in usage of herbicides on noncropland. This trend was slightly less pronounced in 1965 than in 1962 or 1959. The need for better herbicides

for weed control on noncropland was considerably less urgent in 1965 than was reported in 1959 or 1962.

Geographically, the greatest usage of herbicides on noncropland in 1965 was reported from the North Central States and California. California and Iowa each reported four or more times as many acres treated as in any other State. In California 95 percent of the area was treated by custom operators whereas in Iowa 95 percent was treated by farmers or other landowners or managers. The trend of herbicide usage was up in California and in 21 other States but stationary in Iowa and four other States.

Thirty-one States listed 75 weeds, constituting 60 different species or weed types, as being important on noncropland (table 60). The 15 species or types reported most frequently and on the greatest percentages of noncropland in the State in approximate order were as follows: (1) Herbaceous perennial weeds--Canada thistle, bindweed, quackgrass, johnsongrass, and knapweed; (2) annual weeds--ragweed, pigweed, weedy brome-grasses, foxtails, kochia, and Russian thistle; (3) woody plants--poison ivy and oak, blackberry and other briars, honeysuckle, oaks, and other woody plants. Canada thistle and quackgrass were most common in North Central and Western States. Field bindweed, also called bindweed and morningglory, was reported in six Western States and in Nebraska and Oklahoma. It is of special interest that Kansas, Minnesota, and South Dakota, States formerly the most heavily infested with bindweed, did not report it among their five most important weeds. Johnsongrass was reported in all regions except the Northeast while knapweed was important only in Western States.

Ragweed was an important annual weed in all regions except the West. Pigweed was reported most frequently in North Central and Southern States. Weedy brome-grasses were the most important in Western States as were kochia and Russian thistle. Poison ivy and poison oak were reported as important in one State of each region, and one or more other woody species were considered important in one or more States in each region.

Table 59.---Noncropland: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region   | Acres treated |                  | Average cost per acre <sup>1</sup> |                | Acreage treated by-- |                  | Effectiveness of herbicides |                  | Herbicides usage trend <sup>2</sup> | Need for better herbicides      | Persistence problem |
|--------------------|---------------|------------------|------------------------------------|----------------|----------------------|------------------|-----------------------------|------------------|-------------------------------------|---------------------------------|---------------------|
|                    | Pre-emergence | Post-emergence   | Pre-emergence                      | Post-emergence | Farmers              | Custom operators | Pre-emergence               | Post-emergence   |                                     |                                 |                     |
|                    | 1,000 acres   | 1,000 acres      | Dollars                            | Dollars        | Percent              | Percent          |                             |                  |                                     |                                 |                     |
| Connecticut-----   | --            | 1                | --                                 | 10.00          | 100                  | --               | ---                         | Fair             | Up                                  | Some                            | No                  |
| Delaware-----      | --            | 20               | --                                 | 30.00          | 10                   | 90               | ---                         | Good             | Up                                  | Some                            | No                  |
| New Jersey-----    | --            | 28               | --                                 | 15.00          | 70                   | 30               | ---                         | Good             | Up                                  | Some                            | No                  |
| Pennsylvania-----  | --            | 45               | --                                 | 32.00          | 10                   | 90               | ---                         | Good             | Up                                  | Some                            | No                  |
| Northeastern-----  | --            | 94               | --                                 | 26.28          | 29                   | 71               | ---                         | 3-Good<br>1-Fair | 4-Up                                | 4-Some                          | 4-No                |
| Illinois-----      | --            | 100              | --                                 | 10.00          | 80                   | 20               | ---                         | Fair             | Up                                  | Some                            | No                  |
| Iowa-----          | 500           | 500              | 50.00                              | 5.00           | 95                   | 5                | Fair                        | Fair             | Sta.                                | Some                            | No                  |
| Kansas-----        | --            | 250              | --                                 | 5.00           | 5                    | 95               | ---                         | Fair             | Sta.                                | Urgent                          | Yes                 |
| Minnesota-----     | --            | 250              | --                                 | 15.00          | 25                   | 75               | ---                         | Fair             | Up                                  | Little                          | No                  |
| Missouri-----      | --            | 20               | --                                 | 60.00          | 100                  | --               | ---                         | Good             | Up                                  | Little                          | No                  |
| North Dakota-----  | --            | 20               | --                                 | 2.50           | 10                   | 90               | ---                         | Good             | Up                                  | Some                            | No                  |
| Ohio-----          | --            | 20               | --                                 | 3.50           | 60                   | 40               | ---                         | Good             | Up                                  | Some                            | No                  |
| South Dakota-----  | 5             | 100              | 50.00                              | 2.00           | 10                   | 90               | ---                         | Good             | Up                                  | Some                            | ψ                   |
| North Central----- | 505           | 1,260            | 50.00                              | 7.95           | 65                   | 35               | ---                         | 1-Good<br>1-Fair | 6-Up<br>2-Sta.                      | 1-Urgent<br>5-Some<br>2-Little  | 1-Yes<br>7-No       |
| Georgia-----       | --            | 10               | --                                 | 20.00          | 100                  | --               | ---                         | Good             | Up                                  | Some                            | No                  |
| Kentucky-----      | --            | ( <sup>3</sup> ) | --                                 | 60.00          | 60                   | 40               | ---                         | Fair             | Up                                  | Some                            | No                  |
| Tennessee-----     | --            | 25               | --                                 | 30.00          | 5                    | 95               | ---                         | Good             | Up                                  | Some                            | Yes                 |
| Texas-----         | 12            | --               | 8.00                               | --             | 83                   | 17               | Fair                        | ---              | Up                                  | Some                            | No                  |
| Virginia-----      | --            | 3                | --                                 | 10.00          | 70                   | 30               | ---                         | Fair             | Up                                  | Some                            | No                  |
| Southern-----      | 12            | 38               | 8.00                               | 25.79          | 47                   | 53               | ---                         | 1-Fair           | 5-Up                                | 5-Some                          | 1-Yes<br>4-No       |
| Arizona-----       | 10            | 20               | 25.00                              | 25.00          | 50                   | 50               | ---                         | Good             | Up                                  | Little                          | No                  |
| California-----    | 600           | 700              | 18.00                              | 25.00          | 5                    | 95               | ---                         | Good             | Up                                  | Some                            | Yes                 |
| Idaho-----         | --            | .3               | --                                 | 10.00          | 80                   | 20               | ---                         | Fair             | Sta.                                | Some                            | No                  |
| Montana-----       | 1             | 2                | 10.00                              | 4.50           | 90                   | 10               | Fair                        | Fair             | Up                                  | Some                            | No                  |
| Nevada-----        | --            | 5                | --                                 | 3.00           | 25                   | 75               | ---                         | Good             | Up                                  | Urgent                          | No                  |
| Oregon-----        | --            | 1                | --                                 | 4.00           | 90                   | 10               | ---                         | Good             | Sta.                                | Little                          | No                  |
| Utah-----          | .6            | 4                | 50.00                              | 10.00          | 70                   | 30               | Fair                        | Fair             | Up                                  | Some                            | No                  |
| Washington-----    | --            | 50               | --                                 | 6.00           | 10                   | 90               | ---                         | Good             | Up                                  | Some                            | Yes                 |
| Wyoming-----       | 2             | --               | 100.00                             | --             | 50                   | 50               | ---                         | Good             | Sta.                                | Some                            | Yes                 |
| Hawaii-----        | --            | .5               | --                                 | 10.00          | 100                  | --               | ---                         | Good             | Up                                  | Little                          | No                  |
| Western-----       | 613.6         | 782.8            | 18.40                              | 23.47          | 7                    | 93               | ---                         | 3-Good<br>2-Fair | 7-Up<br>3-Sta.                      | 1-Urgent<br>6-Some<br>3-Little  | 3-Yes<br>7-No       |
| United States----- | 1,130.6       | 2,174.8          | 32.40                              | 12.90          | 39                   | 61               | ---                         | 4-Good<br>4-Fair | 22-Up<br>5-Sta.                     | 2-Urgent<br>20-Some<br>5-Little | 5-Yes<br>22-No      |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.

<sup>2</sup> Sta., stationary.

<sup>3</sup> Less than 50 acres.

Table 60.---Noncropland: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State | Weed               | Infestation |           | Weed                | Infestation |           | Weed               | Infestation |           | Weed               | Infestation |           |
|------------------|--------------------|-------------|-----------|---------------------|-------------|-----------|--------------------|-------------|-----------|--------------------|-------------|-----------|
|                  |                    | Acres       | Trend (1) |                     | Acres       | Trend (1) |                    | Acres       | Trend (1) |                    | Acres       | Trend (1) |
| Northeastern:    |                    |             |           |                     |             |           |                    |             |           |                    |             |           |
| Connecticut---   | Canada thistle---  | 5 Sta.      | Up        | Goldenrod-----      | 75 Sta.     | Up        | Japanese knotweed- | 5           | Up        | Poison ivy-----    | 40 Sta.     | Up        |
| Delaware-----    | Common reed-----   | 20 Up       | Up        | Craggrass-----      | 90 Up       | Up        | Honeysuckle-----   | 50          | Up        | Ragweed-----       | 75 Up       | Up        |
| New Jersey-----  | Common reed-----   | --          | ---       | Mixed brush-----    | --          | ---       | Perennial grasses- | --          | ---       | ---                | --          | ---       |
| Vermont-----     | Japanese knotweed- | 10 Down     | Down      | Poison ivy-----     | 20 Down     | Down      | Quackgrass-----    | 50          | Sta.      | Ragweed-----       | 50 Down     | Down      |
| West Virginia--  | Blackberry-----    | --          | Up        | Greenbrier-----     | --          | Up        | Sassafras-----     | --          | Up        | Scrub oak-----     | --          | Up        |
| North Central:   |                    |             |           |                     |             |           |                    |             |           |                    |             |           |
| Illinois-----    | Broomsedge-----    | 25          | ---       | Giant foxtail-----  | 70          | ---       | Johnsongrass-----  | 20          | ---       | Quackgrass-----    | 15          | ---       |
| Indiana-----     | Canada thistle---  | --          | Sta.      | Horseweed-----      | --          | Sta.      | Johnsongrass-----  | 6           | Sta.      | Poison ivy-----    | --          | Sta.      |
| Iowa-----        | Buttonweed-----    | 50          | ---       | Giant foxtail-----  | 50          | ---       | Green foxtail----- | 100         | ---       | Lambquarters-----  | 100         | ---       |
| Kansas-----      | Giant ragweed----- | 40          | Sta.      | Johnsongrass-----   | 30          | Up        | Musk thistle-----  | 20          | Up        | Smartweed-----     | 25          | Sta.      |
| Minnesota-----   | Canada thistle---  | 80          | Up        | Leafy spurge-----   | 5           | Down      | Quackgrass-----    | 80          | Up        | Ragweed-----       | 50          | Sta.      |
| Nebraska-----    | Bindweed-----      | 95          | Sta.      | Foxtail-----        | 20          | Sta.      | Pigweed-----       | 60          | Up        | Ragweed-----       | 80          | Up        |
| North Dakota--   | Canada thistle---  | 15          | Up        | Floodman thistle--  | 20          | Sta.      | Goldenrod-----     | 20          | Sta.      | Leafy spurge-----  | 30          | Up        |
| Ohio-----        | Canada thistle---  | 30          | Up        | Goldenrod-----      | 35          | Sta.      | Johnsongrass-----  | 15          | Up        | Quackgrass-----    | 35          | Up        |
| South Dakota--   | Canada thistle---  | --          | ---       | Japanese brome----- | --          | ---       | Kochia-----        | --          | ---       | Milkweed-----      | --          | ---       |
| Southern:        |                    |             |           |                     |             |           |                    |             |           |                    |             |           |
| Arkansas-----    | Croton-----        | --          | Up        | Dock-----           | --          | Up        | Johnsongrass-----  | --          | ---       | Pigweed-----       | --          | Up        |
| Kentucky-----    | Cheat-----         | 40          | Sta.      | Honeysuckle-----    | 20          | Sta.      | Johnsongrass-----  | 20          | Up        | Musk thistle-----  | 30          | Up        |
| North Carolina-  | Bermudagrass-----  | --          | Sta.      | Johnsongrass-----   | --          | Sta.      | Nutsedge-----      | --          | Up        | Ragweed-----       | --          | Down      |
| Oklahoma-----    | Johnsongrass-----  | 90          | Up        | Morningglory-----   | 40          | Up        | Pigweed-----       | 85          | Up        | Russian thistle--- | 50          | Up        |
| Tennessee-----   | Blackberry-----    | 95          | Sta.      | Broomsedge-----     | 95          | Sta.      | Persimmon-----     | 95          | Sta.      | Sassafras-----     | 95          | Sta.      |
| Texas-----       | Ash-----           | 1           | Sta.      | ELM-----            | 1           | Sta.      | Hickory-----       | 5           | Up        | Oak-----           | 2           | Up        |
| Western:         |                    |             |           |                     |             |           |                    |             |           |                    |             |           |
| Arizona-----     | Bermudagrass-----  | 20          | ---       | Johnsongrass-----   | 10          | ---       | Pigweed-----       | 50          | ---       | Wild mustard-----  | 70          | ---       |
| California-----  | Alkali grass-----  | 5           | Sta.      | Bermudagrass-----   | 10          | Up        | Dallisgrass-----   | 5           | Up        | Field bindweed---  | 20          | Sta.      |
| Colorado-----    | Canada thistle---  | 25          | Up        | Field bindweed---   | 70          | Up        | Kochia-----        | 75          | Up        | Quackgrass-----    | 10          | Sta.      |
| Idaho-----       | Field bindweed---  | --          | Sta.      | Quackgrass-----     | --          | Sta.      | Russian knapweed-- | --          | Up        | ---                | --          | ---       |
| Montana-----     | Canada thistle---  | 2           | Up        | Palmarian toadflax  | --          | Up        | Leafy spurge-----  | 1           | Up        | Spotted knapweed-- | 1           | Up        |
| Nevada-----      | Hairy whitetop---  | 5           | Sta.      | Halogeton-----      | 10          | Sta.      | Puncturevine-----  | 10          | Up        | Russian knapweed-- | 5           | Up        |
| New Mexico-----  | Barryardgrass----- | --          | Sta.      | Bindweed-----       | --          | Sta.      | Dock-----          | --          | Sta.      | Johnsongrass-----  | --          | Sta.      |
| Oregon-----      | Bentgrass-----     | 2           | Up        | Blackberry-----     | 2           | Up        | Poison oak-----    | 1           | Up        | Roses-----         | 1           | Up        |
| Utah-----        | Canada thistle---  | --          | Sta.      | Hairy whitetop---   | --          | Sta.      | Kochia-----        | --          | Down      | Morningglory-----  | --          | Sta.      |
| Washington-----  | Horseweed-----     | 20          | Up        | Prickly lettuce---  | 20          | Up        | Puncturevine-----  | 20          | Up        | Sandbur-----       | 20          | Up        |
| Wyoming-----     | Canada thistle---  | 5           | Up        | Field bindweed---   | 5           | Up        | Kochia-----        | 20          | Sta.      | Russian knapweed-- | 5           | Up        |

1 Sta., stationary

The trend of weed infestations was strongly up for Canada thistle, johnsongrass, Russian knapweed, and bindweed in all States that reported them as important problems. The trends for quackgrass and most of the important annual weeds except pigweeds were

stationary or downward in most States that reported them as important. The trend for blackberry and other briars was up in nearly all States, but the trends for poison ivy and oak and most other woody plants except oaks were downward.

## AQUATIC AREAS

Aquatic areas include farm ponds, lakes, reservoirs, earth tanks, and irrigation and drainage canals. Most of these areas are subject to serious weed infestations.

Weeds in aquatic areas were reported separately from other noncrop areas for the first time in 1965. Thirteen States reported treatment of 84,000 acres of aquatic weeds with herbicides (tables 1 and 61). Fifty-six percent of the areas were treated by custom operators and 44 percent by farmers. Most of the applications were made postemergence at an average cost of \$22.33 per acre (tables 2 and 3). The cost of preemergence treatments on a relatively small total area was \$43.65 per acre. Most of the States reported only fair results from either preemergence or postemergence treatments (table 4). Problems of herbicide persistence existed in seven of the 13 States reporting. Nevertheless, the trend of herbicide usage in aquatic areas was up in nine States (table 5). All of the States reported

an urgent or moderate need for better herbicides to control aquatic weeds.

Seventy-eight percent of the reported area of aquatic weeds treated with herbicides was in Florida, Georgia, and California (table 61). No report was received from Louisiana where use of herbicides for aquatic weed control is more extensive than in any other State.

Twenty-three States listed 36 weeds, constituting 27 different species or weed types, as important in aquatic areas (table 62). The 12 species or types reported most frequently and on the greatest percentages of aquatic sites in approximate order were algae, pondweeds, cattail, elodea, duckweed, coontail, waterhyacinth, alligatorweed, watermilfoil, parrotfeather, waterlily and bulrush. Algae, pondweeds, cattail, and elodea were reported from all parts of the country. Alligatorweed and waterhyacinth were reported from Southern States and waterhyacinth also from Hawaii.



Table 61.--Aquatics: Estimated extent, cost, and effectiveness of chemical weed control, usage trend, need for better herbicides, and residue problems, by States and geographic divisions, 1965

| State and region   | Acres treated |                | Average cost per acre <sup>1</sup> |                | Acreage treated by-- |                  | Effectiveness of herbicides |                   | Herbicides usage trend <sup>2</sup> | Need for better herbicides | Persistence problem |
|--------------------|---------------|----------------|------------------------------------|----------------|----------------------|------------------|-----------------------------|-------------------|-------------------------------------|----------------------------|---------------------|
|                    | Pre-emergence | Post-emergence | Pre-emergence                      | Post-emergence | Farmers              | Custom operators | Pre-emergence               | Post-emergence    |                                     |                            |                     |
|                    | 1,000 acres   | 1,000 acres    | Dollars                            | Dollars        | Percent              | Percent          |                             |                   |                                     |                            |                     |
| Connecticut-----   | --            | .4             | --                                 | 35.00          | 25                   | 75               | Fair                        | Fair              | Up                                  | Some                       | Yes                 |
| Pennsylvania-----  | 1             | 4              | 25.00                              | 25.00          | 90                   | 10               | ----                        | ----              | Sta.                                | Some                       | No                  |
| Northeastern-----  | 1             | 4.4            | 25.00                              | 25.91          | 85                   | 15               | ----                        | 2-Fair            | 1-Up<br>1-Sta.                      | 2-Some                     | 1-Yes<br>1-No       |
| Iowa-----          | .1            | .1             | 10.00                              | 2.00           | 95                   | 5                | Fair                        | Fair              | Up                                  | Urgent                     | Yes                 |
| North Central----- | .1            | .1             | 10.00                              | 2.00           | 95                   | 5                | 1-Fair                      | 1-Fair            | 1-Up                                | 1-Urgent                   | 1-Yes               |
| Arkansas-----      | --            | 2              | --                                 | 20.00          | 100                  | --               | ----                        | Fair              | Sta.                                | Urgent                     | No                  |
| Florida-----       | --            | 20             | --                                 | 15.00          | 10                   | 90               | ----                        | Fair              | Up                                  | Some                       | Yes                 |
| Georgia-----       | --            | 20             | --                                 | 10.00          | 100                  | --               | ----                        | Good              | Up                                  | Some                       | No                  |
| Virginia-----      | --            | 3              | --                                 | 50.00          | 50                   | 50               | ----                        | Fair              | Up                                  | Some                       | No                  |
| Southern-----      | --            | 45.0           | --                                 | 15.33          | 57                   | 43               | ----                        | 1-Good<br>3-Fair  | 3-Up<br>1-Sta.                      | 1-Urgent<br>3-Some         | 1-Yes<br>3-No       |
| Arizona-----       | --            | .5             | --                                 | 25.00          | 90                   | 10               | Fair                        | Fair              | Sta.                                | Urgent                     | No                  |
| California-----    | .5            | 25             | 75.00                              | 35.00          | 10                   | 90               | Fair                        | Fair              | Up                                  | Urgent                     | Yes                 |
| Montana-----       | --            | .5             | --                                 | 10.00          | 80                   | 20               | ----                        | Good              | Up                                  | Some                       | No                  |
| Utah-----          | --            | .5             | --                                 | 25.00          | 50                   | 50               | ----                        | Good              | Up                                  | Some                       | Yes                 |
| Wyoming-----       | 1             | 3              | 50.00                              | 20.00          | 10                   | 90               | Fair                        | Fair              | Sta.                                | Some                       | Yes                 |
| Hawaii-----        | --            | 2              | --                                 | 20.00          | 100                  | --               | ----                        | Fair              | Up                                  | Urgent                     | Yes                 |
| Western-----       | 1.5           | 31.5           | 58.33                              | 31.90          | 18                   | 82               | 3-Fair                      | 2-Good<br>4-Fair  | 4-Up<br>2-Sta.                      | 3-Urgent<br>3-Some         | 4-Yes<br>2-No       |
| United States----  | 2.6           | 81.0           | 43.65                              | 22.33          | 44                   | 56               | 4-Fair                      | 3-Good<br>10-Fair | 9-Up<br>4-Sta.                      | 5-Urgent<br>8-Some         | 7-Yes<br>6-No       |

<sup>1</sup> Includes herbicide equipment and labor for treatment made by farmers. Represents cost of herbicide custom applications and/or cost of farmer-applied herbicides. Regional and United States averages are for acreages on which costs were reported.

<sup>2</sup> Sta., stationary.

Table 62.--Aquatics: Five most important weeds listed alphabetically within States, acreage infested, and infestation trend, 1965

| Region and State | Weed              | Infestation |           | Weed              | Infestation |           | Weed              | Infestation |           | Weed             | Infestation |           |
|------------------|-------------------|-------------|-----------|-------------------|-------------|-----------|-------------------|-------------|-----------|------------------|-------------|-----------|
|                  |                   | Acres       | Trend (1) |                   | Acres       | Trend (1) |                   | Acres       | Trend (1) |                  | Acres       | Trend (1) |
| Northeastern:    |                   |             |           |                   |             |           |                   |             |           |                  |             |           |
| Connecticut      | Algae             | 60          | Up        | Elodea            | 40          | Up        | Pondweed          | 40          | Up        | Southern naiad   | 40          | Up        |
| New Jersey       | Cabomba           | --          | Sta.      | Common reed       | --          | Up        | Spatterdock       | 50          | Up        | Vallisneria      | --          | Sta.      |
| Pennsylvania     | Algae             | 35          | Up        | Cattail           | 20          | Down      | Duckweed          | 18          | Up        | Elodea           | 30          | Down      |
| Vermont          | Algae             | 50          | Up        | Filamentous algae | 40          | Up        | Pondweed          | 40          | Sta.      | Vallisneria      | 30          | Sta.      |
| North Central:   |                   |             |           |                   |             |           |                   |             |           |                  |             |           |
| Illinois         | Cabomba           | --          | Sta.      | Chara             | --          | Up        | Duckweed          | --          | Up        | Elodea           | --          | Sta.      |
| Indiana          | Algae             | --          | Sta.      | Coontail          | 75          | Sta.      | Duckweed          | --          | Sta.      | Pondweed         | --          | Sta.      |
| Iowa             | Arrowhead         | 50          | Sta.      | Coontail          | 75          | Sta.      | Duckweed          | 50          | Sta.      | Pondweed         | 75          | Sta.      |
| Ohio             | Algae             | 60          | Sta.      | Cattail           | 10          | Sta.      | Chara             | 20          | Up        | Pondweed         | 15          | Up        |
| Southern:        |                   |             |           |                   |             |           |                   |             |           |                  |             |           |
| Arkansas         | Algae             | --          | Up        | Cattail           | --          | Sta.      | Coontail          | --          | Up        | Duckweed         | --          | Up        |
| Florida          | Alligatorweed     | 10          | Up        | Coontail          | 80          | Up        | Naiad             | 40          | Up        | Waterhyacinth    | 80          | Up        |
| Georgia          | Algae             | 15          | Up        | Cattail           | 5           | Up        | Elodea            | 5           | Up        | Parrotfeather    | 10          | Up        |
| Louisiana        | Alligatorweed     | 35          | Up        | Elodea            | 15          | Sta.      | Lotus             | 10          | Sta.      | Pondweed         | 15          | Sta.      |
| North Carolina   | Algae             | 40          | Sta.      | Alligatorweed     | 20          | Up        | Bladderwort       | 15          | Sta.      | Duckweed         | 15          | Sta.      |
| South Carolina   | Alligatorweed     | 35          | Up        | Cattail           | 25          | Up        | Duckweed          | 20          | Up        | Elodea           | 20          | Up        |
| Western:         |                   |             |           |                   |             |           |                   |             |           |                  |             |           |
| Arizona          | Cattail           | 10          | --        | Chara             | 15          | --        | Filamentous algae | 95          | --        | Sago pondweed    | 75          | --        |
| California       | American pondweed | 15          | Up        | Cattail           | 20          | Sta.      | Hardstem bulrush  | 20          | Sta.      | Sago pondweed    | 15          | Up        |
| Idaho            | Parrotfeather     | --          | Up        | --                | --          | --        | --                | --          | --        | --               | --          | --        |
| Montana          | Algae             | --          | Up        | Bulrushes         | --          | Down      | Cattail           | --          | Sta.      | Leafy pondweed   | --          | Sta.      |
| Nevada           | Cattail           | --          | Up        | Rush              | --          | Up        | Sedges            | --          | Up        | Reed canarygrass | --          | Up        |
| Oregon           | American pondweed | --          | Up        | Cattail           | --          | Up        | Pondweed          | --          | Up        | Pondweed         | --          | Up        |
| Utah             | Algae             | 50          | Up        | Bulrushes         | 35          | Sta.      | Cattail           | 35          | Sta.      | Pondweed         | 20          | Up        |
| Washington       | Algae             | --          | Up        | Cattail           | --          | Up        | Pondweed          | --          | Up        | Parrotfeather    | --          | Up        |
| Hawaii           | Elodea            | 25          | Up        | Filamentous algae | 25          | Up        | Paragrass         | 25          | Up        | Parrotfeather    | 10          | Up        |

1 Sta., stationary.

# APPENDIX

## Weeds Listed Among the Five Most Important Weeds in the Various Crop or Commodity Areas Surveyed

Standardized common names approved by the Terminology Committee, Weed Science Society of America, were assigned where possible to all weeds listed in the survey. Listings are arranged alphabetically by common or colloquial names. In the best judgment of the botanist, the correct scientific name was also assigned.

| <u>COMMON NAME</u>         | <u>SCIENTIFIC NAME</u>                             |
|----------------------------|--|
| A'alii -----               | <u>Dodonaea viscosa</u> (L.) Jacq.                 |
| Alfalfa, volunteer -----   | <u>Medicago sativa</u> L.                          |
| Algae -----                | a complex  |
| Algae, filamentous -----   | a complex  |
| Alder -----                | <u>Alnus</u> spp.                                  |
| Alder, red -----           | <u>Alnus rubra</u> Bong.                           |
| Alkaligrass -----          | <u>Puccinellia</u> spp.                            |
| Alligatorweed -----        | <u>Alternanthera philoxeroides</u> (Mart.) Griseb. |
| Alyssum, hoary -----       | <u>Berteroa incana</u> (L.) DC.                    |
| Amaranth, spiny -----      | <u>Amaranthus spinosus</u> L.                      |
| Apple-of-Peru -----        | <u>Nicandra physalodes</u> (L.) Gaertn.            |
| Arrowgrass -----           | <u>Triglochin</u> spp.                             |
| Arrowhead -----            | <u>Sagittaria</u> spp.                             |
| Ash -----                  | <u>Fraxinus</u> spp.                               |
| Barbwiregrass -----        | <u>Cymbopogon refractus</u> (R.Br.) A. Camus       |
| Barley, foxtail -----      | <u>Hordeum jubatum</u> L.                          |
| Barley, little -----       | <u>Hordeum pusillum</u> Nutt.                      |
| Barley, wild -----         | <u>Hordeum leporinum</u> Link                      |
| Barnyardgrass -----        | <u>Echinochloa crusgalli</u> (L.) Beauv.           |
| Baronetgrass -----         | <u>Echinochloa</u> sp.                             |
| Bearmat -----              | <u>Chamaebatia foliolosa</u> Benth.                |
| Bedstraw -----             | <u>Galium</u> spp.                                 |
| Beech -----                | <u>Fagus</u> spp.                                  |
| Bellflower, creeping ----- | <u>Campanula rapunculoides</u> L.                  |
| Bentgrass -----            | <u>Agrostis</u> sp.                                |
| Bentgrass, rough -----     | <u>Agrostis scabra</u> Willd.                      |
| Bermudagrass -----         | <u>Cynodon dactylon</u> (L.) Pers.                 |
| Berries, wild -----        | a complex  |
| Betony -----               | <u>Stachys</u> sp.                                 |
| Betony, artichoke -----    | <u>Stachys sieboldii</u> Miq.                      |
| Betony, Florida -----      | <u>Stachys floridana</u> Shuttlw.                  |
| Bindweed -----             | <u>Convolvulus</u> spp.                            |
| Bindweed, field -----      | <u>Convolvulus arvensis</u> L.                     |
| Blackberry -----           | <u>Rubus</u> spp.                                  |
| Blackbush -----            | <u>Coleogyne ramosissima</u> Torr.                 |
| Bladderwort -----          | <u>Utricularia</u> spp.                            |
| Bluegrass -----            | <u>Poa</u> spp.                                    |
| Bluegrass, annual -----    | <u>Poa annua</u> L.                                |
| Blueweed, Texas -----      | <u>Helianthus ciliaris</u> DC.                     |

COMMON NAMESCIENTIFIC NAME

|                          |   |
|--------------------------|---|
| Boneset-----             | <u>Eupatorium perfoliatum</u> L.                |
| Bracken-----             | <u>Pteridium</u> spp.                           |
| Brome, downy-----        | <u>Bromus tectorum</u> L.                       |
| Brome, Japanese-----     | <u>Bromus japonicus</u> Thunb.                  |
| Brome, smooth-----       | <u>Bromus inermis</u> Leyss.                    |
| Brome-grasses, weed----- | <u>Bromus</u> spp.                              |
| Broomsedge-----          | <u>Andropogon virginicus</u> L.                 |
| Brush-----               | a complex                                       |
| Brush, elm-----          | <u>Ulmus</u> spp.                               |
| Brush, hazel-----        | <u>Corylus</u> spp.                             |
| Brush, mixed-----        | a complex                                       |
| Brush, oak-----          | <u>Quercus</u> spp.                             |
| Buckbrush-----           | <u>Symphoricarpos orbiculatus</u> Moench        |
| Buckwheat, wild-----     | <u>Polygonum convolvulus</u> L.                 |
| Bullnettle-----          | <u>Cnidioscolus stimulosus</u> (Michx.) Gray    |
| Bulrush, hardstem-----   | <u>Scirpus acutus</u> Muhl.                     |
| Bulrushes-----           | <u>Scirpus</u> spp.                             |
| Burdock-----             | <u>Arctium</u> spp.                             |
| Burreed, water-----      | <u>Sparganium fluctuans</u> (Morong) Robinson   |
| Bursage, woollyleaf----- | <u>Franseria tomentosa</u> Gray                 |
| Buttercup-----           | <u>Ranunculus</u> spp.                          |
| Buttonweed-----          | <u>Diodia virginiana</u> L.                     |
| Cabomba-----             | <u>Cabomba caroliniana</u> Gray                 |
| Cacti-----               | a complex                                       |
| Campion, meadow-----     | <u>Lychnis flos-cuculi</u> L.                   |
| Canarygrass, reed-----   | <u>Phalaris arundinacea</u> L.                  |
| Cane, wild-----          | <u>Sorghum bicolor</u> (L.) Moench              |
| Caraway-----             | <u>Carum carvi</u> L.                           |
| Carrot, wild-----        | <u>Daucus carota</u> L.                         |
| Catchfly-----            | <u>Silene</u> spp.                              |
| Cattail-----             | <u>Typha</u> spp.                               |
| Chamise-----             | <u>Adenostoma fasciculatum</u> Hook. & Arn.     |
| Chamomile, corn-----     | <u>Anthemis arvensis</u> L.                     |
| Chara-----               | <u>Chara</u> spp.                               |
| Cheat-----               | <u>Bromus secalinus</u> L.                      |
| Cherry, wild-----        | <u>Prunus</u> spp.                              |
| Chickweed-----           | a complex                                       |
| Chickweed, common-----   | <u>Stellaria media</u> (L.) Cyrillo             |
| Chicory-----             | <u>Cichorium intybus</u> L.                     |
| Cinquefoil-----          | <u>Potentilla</u> spp.                          |
| Clover, white-----       | <u>Trifolium repens</u> L.                      |
| Cockle, corn-----        | <u>Agrostemma githago</u> L.                    |
| Cockle, cow-----         | <u>Saponaria vaccaria</u> L.                    |
| Cockle, white-----       | <u>Lychnis alba</u> Mill.                       |
| Cocklebur-----           | <u>Xanthium</u> spp.                            |
| Coontail-----            | <u>Ceratophyllum</u> spp.                       |
| Crabgrass-----           | <u>Digitaria</u> spp.                           |
| Creeper, Virginia-----   | <u>Parthenocissus quinquefolia</u> (L.) Planch. |
| Creosotebush-----        | <u>Larrea tridentata</u> (DC.) Coville          |
| Crotalaria-----          | <u>Crotalaria</u> spp.                          |

COMMON NAMESCIENTIFIC NAME

Croton -----  
 Crowfootgrass -----  
 Cucumber, wild -----  
 Daisy -----  
 Daisy, oxeye -----  
 Dallisgrass -----  
 Dandelion -----  
 Darnel -----  
 Dichondra -----  
  
 Dock -----  
 Dock, curly -----  
 Dodder -----  
 Dogfennel -----  
 Dogtail, crested -----  
 Dropseed -----  
 Ducksalad -----  
 Duckweed -----  
 Elm -----  
 Elms and ashes, certain -----  
 Elodea -----  
 Eveningprimrose -----  
 Fern -----  
 Fescue -----  
 Fescue, rattail -----  
 Fiddleneck -----  
 Fiddleneck, Douglas -----  
 Fingergrass, feather -----  
 Fingergrass, swollen -----  
 Fir, balsam -----  
 Firebush -----  
 Flatsedge -----  
 Fleabane -----  
 Fleabane, hairy -----  
 Flixweed -----  
 Fountaingrass -----  
 Foxtail -----  
 Foxtail, bristly -----  
 Foxtail, giant -----  
 Foxtail, green -----  
 Foxtail, yellow -----  
 Galinsoga, hairy -----  
 Galinsoga, smallflower -----  
 Gallberry -----  
 Garlic, wild -----  
 Geranium, Carolina -----  
 Goldenrod -----  
 Goosefoot -----  
 Goosefoot, nettleleaf -----  
 Goosegrass -----

Croton spp.  
Dactyloctenium aegyptium (L.) Beauv.  
Echinocystis lobata (Michx.) Torr. & Gray  
Chrysanthemum spp.  
Chrysanthemum leucanthemum L.  
Paspalum dilatatum Poir.  
Taraxacum spp.  
Lolium temulentum L.  
Dichondra repens Forst. var. carolinensis  
 (Michx.) Choisy  
Rumex spp.  
Rumex crispus L.  
Cuscuta spp.  
Eupatorium capillifolium (Lam.) Small  
Cynosurus cristatus L.  
Sporobolus spp.  
Heteranthera limosa (Sw.) Willd.  
Lemna spp.  
Ulmus spp.  
 a complex  
Elodea spp.  
Oenothera spp.  
 a complex  
Festuca spp.  
Vulpia myuros (L.) K. C. Gmel.  
Amsinckia spp.  
Amsinckia douglasiana A. DC.  
Chloris virgata Swartz  
Chloris inflata Link  
Abies balsamea (L.) Mill.  
Myrica faya Ait.  
Cyperus spp.  
Erigeron spp.  
Conyza bonariensis (L.) Cronq.  
Descurania sophia (L.) Prantl  
Pennisetum ruppellii Steud.  
Setaria spp.  
Setaria verticillata (L.) Beauv.  
Setaria faberii Herrm.  
Setaria viridis (L.) Beauv.  
Setaria glauca (L.) Beauv.  
Galinsoga ciliata (Raf.) Blake  
Galinsoga parviflora Cav.  
Ilex glabra (L.) Gray  
Allium vineale L.  
Geranium carolinianum L.  
Solidago spp.  
Chenopodium spp.  
Chenopodium murale L.  
Eleusine indica (L.) Gaertn.

COMMON NAMESCIENTIFIC NAME

|                              |  |
|------------------------------|--|
| Gorse-----                   | <u>Ulex europaeus</u> L.                         |
| Grasses -----                | a complex  |
| Grasses, annual -----        | a complex  |
| Grasses, hay -----           | a complex  |
| Grasses, perennial -----     | a complex  |
| Greasewood-----              | <u>Sarcobatus vermiculatus</u> (Hook.) Torr.     |
| Greenbrier -----             | <u>Smilax</u> spp.                               |
| Groundcherry-----            | <u>Physalis</u> spp.                             |
| Guava-----                   | <u>Psidium guajava</u> L.                        |
| Gumweed-----                 | <u>Grindelia squarrosa</u> (Pursh) Dunal         |
| Halogeton -----              | <u>Halogeton glomeratus</u> (Bieb.) C.A. Mey.    |
| Hawkbit, fall -----          | <u>Leontodon autumnalis</u> L.                   |
| Hawkweed -----               | <u>Hieracium</u> spp.                            |
| Hawkweed, yellow-----        | <u>Hieracium pratense</u> Tausch                 |
| Hellebore, false -----       | <u>Veratrum californicum</u> Durand              |
| Hempnettle -----             | <u>Galeopsis tetrahit</u> L.                     |
| Henbit-----                  | <u>Lamium amplexicaule</u> L.                    |
| Hickory-----                 | <u>Carya</u> spp.                                |
| Honeysuckle-----             | <u>Lonicera</u> spp.                             |
| Horsebrush -----             | <u>Tetradymia</u> spp.                           |
| Horsenettle -----            | <u>Solanum carolinense</u> L.                    |
| Horsetail-----               | <u>Equisetum</u> spp.                            |
| Horseweed-----               | <u>Erigeron canadensis</u> L.                    |
| Huisache -----               | <u>Acacia farnesiana</u> (L.) Willd.             |
| Iris -----                   | <u>Iris</u> spp.                                 |
| Ironweed -----               | <u>Vernonia</u> spp.                             |
| Ivy, ground -----            | <u>Glechoma hederacea</u> L.                     |
| Ivy, poison-----             | <u>Rhus radicans</u> L.                          |
| Jimsonweed-----              | <u>Datura stramonium</u> L.                      |
| Johnsongrass -----           | <u>Sorghum halepense</u> (L.) Pers.              |
| Jointvetch, northern -----   | <u>Aeschynomene virginica</u> (L.) BSP.          |
| Junglerice-----              | <u>Echinochloa colonum</u> (L.) Link             |
| Juniper -----                | <u>Juniperus</u> spp.                            |
| Kikuyugrass-----             | <u>Pennisetum clandestinum</u> Hochst. ex Chiov. |
| Knapweed -----               | <u>Centaurea</u> spp.                            |
| Knapweed, diffuse-----       | <u>Centaurea diffusa</u> Lam.                    |
| Knapweed, Russian -----      | <u>Centaurea repens</u> L.                       |
| Knapweed, spotted-----       | <u>Centaurea maculosa</u> Lam.                   |
| Knawel -----                 | <u>Scleranthus annuus</u> L.                     |
| Knotweed-----                | <u>Polygonum</u> spp.                            |
| Knotweed, Japanese-----      | <u>Polygonum cuspidatum</u> Sieb. & Zucc.        |
| Knotweed, prostrate -----    | <u>Polygonum aviculare</u> L.                    |
| Knotweed, silversheath ----- | <u>Polygonum argyrocoleon</u> Steud.             |
| Kochia -----                 | <u>Kochia scoparia</u> (L.) Schrad.              |
| Kyllinga -----               | <u>Kyllinga brevifolia</u> Rottb.                |
| Ladysthumb-----              | <u>Polygonum persicaria</u> L.                   |
| Lambsquarters-----           | <u>Chenopodium album</u> L.                      |
| Lantana-----                 | <u>Lantana camara</u> L.                         |
| Larkspur-----                | <u>Delphinium</u> spp.                           |
| Larkspur, low -----          | <u>Delphinium nelsonii</u> Greene                |

COMMON NAMESCIENTIFIC NAME

|                                  |   |
|----------------------------------|---|
| Larkspur, tall -----             | <u>Delphinium barbeyi</u> (Huth) Huth   |
| Lettuce, prickly -----           | <u>Lactuca serriola</u> L.  |
| Loco-----                        | <u>Astragalus</u> spp.  |
| Lotus -----                      | <u>Nelumbo lutea</u> (Willd.) Pers.   |
| Mallow -----                     | <u>Malva</u> spp.   |
| Mallow, little -----             | <u>Malva parviflora</u> L.  |
| Manzanita -----                  | <u>Arctostaphylos</u> spp.  |
| Matweed -----                    | <u>Brayulinea densa</u> (Willd.) Small  |
| Medic, black -----               | <u>Medicago lupulina</u> L.   |
| Medusahead-----                  | <u>Taeniatherum asperum</u> (Sim.) Nevski   |
| Mesquite-----                    | <u>Prosopis</u> spp.  |
| Milkvine -----                   | <u>Gonolobus</u> sp.  |
| Milkweed-----                    | <u>Asclepias</u> spp.   |
| Milkweed, common -----           | <u>Asclepias syriaca</u> L.   |
| Morningglory-----                | <u>Ipomoea</u> spp.   |
| Mugwort -----                    | <u>Artemisia vulgaris</u> L.  |
| Muhly, wirestem-----             | <u>Muhlenbergia frondosa</u> (Poir.) Fern.  |
| Mulesears-----                   | <u>Wyethia amplexicaulis</u> Nutt.  |
| Mullein-----                     | <u>Verbascum</u> spp.   |
| Mustard -----                    | a complex   |
| Mustard, blue-----               | <u>Chorisporea tenella</u> (Willd.) DC.   |
| Mustard, wild-----               | <u>Brassica kaber</u> (DC.) L.C. Wheeler var.<br><u>pinnatifida</u> (Stokes) L.C. Wheeler |
| Naiad -----                      | <u>Najas</u> spp.   |
| Naiad, southern -----            | <u>Najas guadalupensis</u> (Spreng.) Magnus   |
| Nettle-----                      | <u>Urtica</u> spp.  |
| Nightshade-----                  | <u>Solanum</u> spp.   |
| Nightshade, apple-of-Sodom ----- | <u>Solanum sodomeum</u> L.  |
| Nightshade, black -----          | <u>Solanum nigrum</u> L.  |
| Nimblewill-----                  | <u>Muhlenbergia schreberi</u> J. F. Gmel.   |
| Nutsedge-----                    | <u>Cyperus</u> spp.   |
| Nutsedge, purple-----            | <u>Cyperus rotundus</u> L.  |
| Nutsedge, yellow-----            | <u>Cyperus esculentus</u> L.  |
| Oak -----                        | <u>Quercus</u> spp.   |
| Oak, blackjack -----             | <u>Quercus marilandica</u> Muenchh.   |
| Oak, live-----                   | <u>Quercus virginiana</u> Mill.   |
| Oak, poison -----                | <u>Rhus toxicodendron</u> L.  |
| Oak, post-----                   | <u>Quercus stellata</u> Wangh.  |
| Oak, red -----                   | <u>Quercus rubra</u> L.   |
| Oak, scrub-----                  | <u>Quercus</u> spp.   |
| Oak, turkey -----                | <u>Quercus laevis</u> Walt.   |
| Oats, wild -----                 | <u>Avena fatua</u> L.   |
| Onion, wild -----                | <u>Allium canadense</u> L.  |
| Orchardgrass-----                | <u>Dactylis glomerata</u> L.  |
| Palmetto-----                    | <u>Sabal</u> spp.   |
| Panicum -----                    | <u>Panicum</u> spp.   |
| Panicum, browntop -----          | <u>Panicum fasciculatum</u> Swartz var. <u>reticulatum</u><br>(Torr.) Beal                |
| Panicum, fall-----               | <u>Panicum dichotomiflorum</u> Michx.   |
| Panicum, Texas -----             | <u>Panicum texanum</u> Buckl.   |

COMMON NAMESCIENTIFIC NAME

|   |  |
|---|--|
| Paragrass-----  | <u>Panicum purpurascens</u> Raddi  |
| Parrotfeather-----  | <u>Myriophyllum brasiliense</u> Camb.  |
| Partridgepea-----   | <u>Cassia fasciculata</u> Michx.   |
| Paspalum-----   | <u>Paspalum</u> spp.   |
| Passionflower, redfruit-----                              | <u>Passiflora foetida</u> L.   |
| Pennycress-----   | <u>Thlaspi arvense</u> L.  |
| Pennywort-----  | <u>Hydrocotyle</u> spp.  |
| Peppertree, Brazil-----                                   | <u>Schinus terebinthifolius</u> Raddi  |
| Pepperweed-----   | <u>Lepidium</u> spp.   |
| Pepperweed, field-----                                    | <u>Lepidium campestre</u> (L.) R. Br.  |
| Persimmon-----  | <u>Diospyros</u> spp.  |
| Pigeongrass-----  | <u>Setaria</u> spp.  |
| Pigweed-----  | <u>Amaranthus</u> spp.   |
| Pigweed, redroot-----                                     | <u>Amaranthus retroflexus</u> L.   |
| Pingue-----   | <u>Hymenoxys richardsonii</u> (Hook. ) Cock. var.<br><u>floribunda</u> (Gray) Parker |
| Plantain-----   | <u>Plantago</u> spp.   |
| Plantain, broadleaf-----                                  | <u>Plantago major</u> L.   |
| Plantain, buckhorn-----                                   | <u>Plantago lanceolata</u> L.  |
| Plants, woody-----  | a complex  |
| Pondweed-----   | <u>Potamogeton</u> spp.  |
| Pondweed, American-----                                   | <u>Potamogeton nodosus</u> Poir.   |
| Pondweed, leafy-----                                      | <u>Potamogeton foliosus</u> Raf.   |
| Pondweed, sago-----                                       | <u>Potamogeton pectinatus</u> L.   |
| Poorjoe-----  | <u>Diodia teres</u> Walt.  |
| Povertyweed-----  | <u>Iva axillaris</u> Pursh   |
| Pricklypear-----  | <u>Opuntia</u> spp.  |
| Pukiawe-----  | <u>Styphelia tameiameia</u> (Cham.) F. Muell.  |
| Puncturevine-----   | <u>Tribulus terrestris</u> L.  |
| Purpletop-----  | <u>Triodia flava</u> (L.) Smyth  |
| Purslane-----   | <u>Portulaca oleracea</u> L.   |
| Purslane, Florida-----                                    | <u>Richardia scabra</u> L.   |
| Quackgrass-----   | <u>Agropyron repens</u> (L.) Beauv.  |
| Rabbitbrush-----  | <u>Chrysothamnus</u> spp.  |
| Rabbitbrush, Greene-----                                  | <u>Chrysothamnus greenei</u> (A. Gray) Greene  |
| Radish, wild-----   | <u>Raphanus raphanistrum</u> L.  |
| Ragweed-----  | <u>Ambrosia</u> spp.   |
| Ragweed, common-----                                      | <u>Ambrosia artemisiifolia</u> L.  |
| Ragweed, giant-----                                       | <u>Ambrosia trifida</u> L.   |
| Ragwort, tansy-----                                       | <u>Senecio jacobaea</u> L.   |
| Reed, common-----   | <u>Phragmites communis</u> Trin.   |
| Rescuegrass-----  | <u>Bromus willdenowii</u> Kunth  |
| Rhododendron, Indian<br>(possibly Rosemyrtle, downy)----- | ( <u>Rhodomyrtus tomentosa</u> (Ait.) Hassk.)  |
| Rice, red-----  | <u>Oryza sativa</u> L.   |
| Rocket, London-----                                       | <u>Sisymbrium irio</u> L.  |
| Rocket, yellow-----                                       | <u>Barbarea vulgaris</u> R. Br.  |
| Rose, Macartney-----                                      | <u>Rosa bracteata</u> Wendl.   |
| Rose, multiflora-----                                     | <u>Rosa multiflora</u> Thunb.  |
| Roses-----  | <u>Rosa</u> spp.   |



COMMON NAMESCIENTIFIC NAME

Rush-----  
 Ryegrasses -----  
 Sage-----  
 Sage, Mediterranean -----  
 Sagebrush -----  
 Sagebrush, big -----  
 Sagebrush, fringed -----  
 Sagebrush, low -----  
 Saltcedar-----  
 Saltgrass-----  
 Sandbur-----  
 Sassafras -----  
 Sedges -----  
 Seedlings, tree-----  
 Sensitiveplant-----  
 Sesbania, hemp-----  
 Shepherdspurse -----  
 Sicklepod-----  
 Sida, prickly -----  
 Signalgrass -----  
 Skeletonweed, rush -----  
 Smartweed-----  
 Smartweed, swamp -----  
 Smutgrass-----  
 Snakeroot, white-----  
 Snakeweed-----  
 Sneezeweed, bitter -----  
 Snow-on-the-mountain-----  
 Snowberry, western-----  
 Sod, grass-----  
 Sod species -----  
 Soliva-----  
 Sorrel, red -----  
 Sourgrass -----  
 Sowthistle -----  
 Sowthistle, perennial-----  
 Spatterdock -----  
 Speedwell -----  
 Sprangletop -----  
 Spurge -----  
 Spurge, leafy -----  
 Spurge, prostrate -----  
 Spurge, spotted-----  
 Spurry, corn -----  
 Star-of-Bethlehem -----  
 Stargrass -----  
 Starthistle-----  
 Starthistle, yellow-----  
 Starwort, little-----  
 Sumac-----

Juncus spp.  
Lolium spp.  
Salvia spp.  
Salvia aethiopsis L.  
Artemisia spp.  
Artemisia tridentata Nutt.  
Artemisia frigida Willd.  
Artemisia arbuscula Pursh  
Tamarix pentandra Pall.  
Distichlis stricta (Torr.) Rydb.  
Cenchrus spp.  
Sassafras albidum (Nutt.) Nees  
Carex spp.  
 a complex  
Mimosa pudica L.  
Sesbania exaltata (Raf.) Cory  
Capsella bursa-pastoris (L.) Medic.  
Cassia tora L.  
Sida spinosa L.  
Brachiaria spp.  
Chondrilla juncea L.  
Polygonum spp.  
Polygonum coccineum Muhl.  
Sporobolus poiretii (Roem. & Schult.) Hitchc.  
Eupatorium rugosum Houtt.  
Gutierrezia spp.  
Helenium amarum (Rafin.) H. Rock  
Euphorbia marginata Pursh  
Symphoricarpos occidentalis Hook.  
 a complex  
 a complex  
Soliva sessilis R. & P.  
Rumex acetosella L.  
Trichachne insularis (L.) Nees  
Sonchus spp.  
Sonchus arvensis L.  
Nuphar luteum Sibth. & Sm.  
Veronica spp.  
Leptochloa spp.  
Euphorbia spp.  
Euphorbia esula L.  
Euphorbia supina Raf. ex Boiss.  
Euphorbia maculata L.  
Spergula arvensis L.  
Ornithogalum umbellatum L.  
Chloris divaricata R. Br.  
Centaurea spp.  
Centaurea solstitialis L.  
Stellaria graminea L.  
Rhus spp.

COMMON NAMESCIENTIFIC NAME

|                             |   |
|-----------------------------|---|
| Sumpweed -----              | <u>Iva ciliata</u> Willd.   |
| Sunflower -----             | <u>Helianthus</u> spp.  |
| Sunflower, Maximilian ----- | <u>Helianthus maximiliani</u> Schrad.   |
| Sweetgum -----              | <u>Liquidambar styraciflua</u> L.   |
| Switchgrass -----           | <u>Panicum virgatum</u> L.  |
| Tanoak -----                | <u>Lithocarpus densiflora</u> (Hook. & Arn.) Rehd.                            |
| Tansymustard -----          | <u>Descurainia pinnata</u> (Walt.) Britt.                                     |
| Tarbush -----               | <u>Flourensia cernua</u> DC.  |
| Tarweed -----               | <u>Madia</u> spp.   |
| Tasselflower, red -----     | <u>Emilia sonchifolia</u> (L.) DC.  |
| Thistle, blessed -----      | <u>Cnicus benedictus</u> L.   |
| Thistle, bull -----         | <u>Cirsium vulgare</u> (Savi) Tenore  |
| Thistle, Canada -----       | <u>Cirsium arvense</u> (L.) Scop.   |
| Thistle, Flodman -----      | <u>Cirsium flodmani</u> (Rydb.) Arthur  |
| Thistle, Italian -----      | <u>Carduus pycnocephalus</u> L.   |
| Thistle, musk -----         | <u>Carduus nutans</u> L.  |
| Thistle, Russian -----      | <u>Salsola kali</u> L. var. <u>tenuifolia</u> Tausch                          |
| Thistle, Scotch -----       | <u>Onopordum acanthium</u> L.   |
| Thistle, walted -----       | <u>Carduus crispus</u> L.   |
| Thistles -----              | a complex   |
| Threeawn -----              | <u>Aristida</u> spp.  |
| Timothy -----               | <u>Phleum pratense</u> L.   |
| Titi -----                  | <u>Cliftonia monophylla</u> (Lam.) Britt. ex Sarg.                            |
| Toadflax, Dalmatian -----   | <u>Linaria dalmatica</u> (L.) Mill.   |
| Toadflax, yellow -----      | <u>Linaria vulgaris</u> Hill  |
| Tobacco, tree -----         | <u>Nicotiana glauca</u> Graham  |
| Torpedograss -----          | <u>Panicum repens</u> L.  |
| Trefoil -----               | <u>Lotus</u> spp.   |
| Trumpet creeper -----       | <u>Campsis radicans</u> (L.) Seem.  |
| Vallisneria -----           | <u>Vallisneria americana</u> Michx.   |
| Velvetgrass -----           | <u>Holcus lanatus</u> L.  |
| Velvetleaf -----            | <u>Abutilon theophrasti</u> Medic.  |
| Vervain -----               | <u>Verbenā</u> spp.   |
| Vetch -----                 | <u>Vicia</u> spp.   |
| Vine, tie -----             | a complex   |
| Vines, perennial -----      | a complex   |
| Waterbuttermcup -----       | <u>Ranunculus</u> spp.  |
| Watergrass complex -----    | a complex   |
| Waterhyacinth -----         | <u>Eichhornia crassipes</u> (Mart.) Solms                                     |
| Waterlettuce -----          | <u>Pistia stratiotes</u> L.   |
| Waterlily -----             | <u>Nymphaea</u> spp.  |
| Watermilfoil -----          | <u>Myriophyllum</u> spp.  |
| Waterprimrose -----         | <u>Jussiaea</u> spp.  |
| Waterstargrass -----        | <u>Heteranthera dubia</u> (Jacq.) MacM.                                       |
| Waxmyrtle -----             | <u>Myrica</u> spp.  |
| Whitebrush -----            | <u>Aloysia lycioides</u> Cham.  |
| Whitetop, hairy -----       | <u>Cardaria pubescens</u> (C.A. Mey.) Rollins var.<br><u>elongata</u> Rollins |
| Willow -----                | <u>Salix</u> spp.   |
| Wintercress -----           | <u>Barbarea verna</u> (Mill.) Aschers   |

COMMON NAME

SCIENTIFIC NAME

Wolftail-----  
Woodsorrel-----  
Wormwood-----  
Wormwood, sagewort-----  
Yankeeeweed-----  
Yarrow-----  
Yarrow, western-----  
Yaupon-----  
Yucca-----

Lycurus phleoides HBK  
Oxalis spp.  
Artemisia spp.  
Artemisia campestris L.  
Eupatorium compositifolium Walt.  
Achillea spp.  
Achillea millefolium L. (A. lanulosa Nutt.)  
Ilex vomitoria Ait.  
Yucca spp.





