

Chapter 9. Irrigation, Land Improvement Practices, and Use of Agricultural Chemicals

Introduction—Farm production, particularly crop production, is affected significantly by water supply, the supply of plant nutrients, the control of plant insects and diseases, the control of weeds, and other cultural practices. In some parts of the United States, there is inadequate precipitation for the production of most crops and crop production is possible only because water is supplied by irrigation. In other parts of the United States, the water supply for maximum plant growth is not adequate during some parts of the growing season because of the variation in rainfall or inadequate rainfall. Irrigation and water management are important factors in securing satisfactory crop yields. Contour cultivation is used to conserve moisture by creating ridges and trenches which temporarily retain water, allowing more time for the water to infiltrate the soil and thus reduce water run off. Stripcropping in which alternate strips of close growing crops and intertilled crops or bands of fallow land are grown with rows at right angles to the slope, slows down the movement of water, filters out silt, permits greater water infiltration, and helps prevent soil blowing.

The application of dusts and spraying for the prevention and control of insects and diseases has become widespread and is an important practice for maintaining and improving crop production. The elimination of weeds in crops through the use of chemicals is a relatively new farm practice. Weeds compete with crops for soil nutrients, water, and light. The weed problem is important in all climates or areas of the United States. In arid regions where irrigation is used, the water toll taken by weeds is large. In semi-arid areas, the elimination of poor quality herbage and useless shrubs is important for the improvement of grazing lands. Until recently the control of weeds depended upon the use of machinery, animal energy, and human energy. Recently, chemical herbicides have partially replaced mechanical weed control for many crops and in many areas.

The increased use of fertilizer and lime has been an important factor in increasing crop yields and crop

production. The use of fertilizer and lime and the more effective use of water have continued to increase the efficiency of plant nutrients and water by increasing the amount of vegetation above ground, reducing water run off, increasing water infiltration, reducing water evaporation, hastening the maturity of crops which is very important in semi-arid areas and overall by significantly increasing yields.

This chapter presents data obtained in the 1964 Census of Agriculture relating to the extent of the use of the farm management practices of irrigation, use of contour farming, use of stripcropping, use of sprays and dusts for the control of insects and diseases, use of herbicides, the control of insects on livestock by spraying, dusting, or other methods, and the use of fertilizer and lime. Data on the use of sprays and dusts for the control of insects and diseases on crops, on the use of herbicides, and in the treatment of livestock for the control of insects were obtained in 1964 for the first time in any nationwide census of agriculture.

The statistics on use of irrigation were collected for all farms. The data for the use of agricultural chemicals, fertilizer, lime, contour farming, and stripcropping were collected for a sample comprising all farms with 1,000 acres or more, all farms with less than 1,000 acres and with a value of all farm products sold of \$100,000 or more, and one-fifth of the remaining farms. The statistics for items for which information was collected for a sample of farms represents estimates for all farms. For a more detailed description of the sample, the procedures used in making estimates for all farms based upon data for the sample, and for a statement of the reliability of the estimates, reference should be made to the introduction to this volume.

This chapter has three parts— part 1 contains data relating to irrigation; part 2 contains data relating to the use of fertilizer and lime; and part 3 contains statistics relating to contour farming, stripcropping, and the use of agricultural chemicals, except fertilizer and lime.

Part 1—Irrigation

Introduction—Irrigation of agricultural land is important in all areas of the United States and is particularly important in the western part where precipitation is not adequate for the production of many crops without the use of irrigation.

Questions regarding irrigation of farm and ranch lands have been included in each decennial census of agriculture beginning with 1890, and in each mid-decennial census beginning with 1935. The kinds of irrigation information in each census of agriculture is summarized briefly below:

Census of—Information obtained

- 1890. . Total acres irrigated
Number of artesian wells flowing
- 1900. . Acres irrigated by water
 - (a) from natural streams and
 - (b) from pumped or artesian wells
- 1910. . Acres of land irrigated
Acres of pasture irrigated

- 1920. . Acres of land irrigated
Expenditure for irrigation water
- 1930. . Acres of irrigated cropland and
acres and quantity of each crop
harvested on irrigated land
- 1935. . Total acres from which irrigated
crops were harvested
- 1940. . Acres of land from which irrigated crops
were harvested and total acres of irrigated
land used only for pasture
- 1945. . Total acres of land irrigated
- 1950. . Total acres of land irrigated and acres
irrigated by sprinklers
- 1954. . Total acres irrigated
- 1959. . Total acres irrigated and acres
irrigated by sprinklers
- 1964. . Total acres irrigated
Acres of irrigated land used only for
pasture or grazing
Acres of cropland harvested irrigated
Quantity of selected crops harvested from
irrigated land
Acres of each crop harvested from irrigated
land

Since irrigation has been of much greater importance in the West, more detailed information on irrigation in the Western States has been obtained in each census since 1900. Beginning with 1902, and continuing for 1910, 1920, 1930, 1940, 1950 and 1960, a special census of irrigation enterprises has been taken in 17 to 20 States, including the 17 Western States. Moreover, more detailed data on the use of irrigated land and on the acreage and quantity of crops harvested from irrigated land have been obtained for the Western States for most censuses. For a more detailed description of data obtained for irrigated land, and for data for censuses prior to 1964 see the introduction to volume III, Irrigation of Agricultural Lands, 1959 Census of Agriculture.

Irrigation data for the 1964 Census of Agriculture—
Data are available for all States for 1964 for—

- Farms with irrigation
- Land in irrigated farms
- Irrigated land in farms
- Irrigated land used only for pasture or grazing
- Irrigated land from which crops were harvested
- Acres of each crop harvested from irrigated land
- Data for acres and quantity harvested for some crops harvested from irrigated land

The data for farms with irrigation and irrigated land in farms are given in county table 1 of volume I of the reports of the 1964 Census of Agriculture. Data for the number of farms and uses of land in farms with irrigation are presented in county table 2, and data for the acres and quantity harvested for selected crops are given in county table 14 of volume I of the reports of the 1964 Census of Agriculture.

For 1964, the data on acreage and quantity harvested for crops harvested from irrigated land varies by Region and State. For the States of North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas, and for the States east of these States, except the State of Louisiana, data are available for crops harvested on irrigated land as follows:

1. Acres irrigated and the quantity harvested for one or two important irrigated crops in each State.

The list of crops and the acreage of these crops harvested from irrigated land and the relation of the irrigated land from which these crops were harvested to the total acreage of irrigated land from which crops were harvested are given in the following table. For 36 States, the acreage in the selected crops harvested from irrigated land represented 59 percent of the total acreage of irrigated cropland harvested in these States.

2. The acreage for each "other" crop harvested from irrigated land.

For the 17 Western States (North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Texas, Montana, Wyoming, Colorado, New Mexico, Utah, Nevada, Idaho, Arizona, Washington, Oregon, and California) and Louisiana and Hawaii, data for crops harvested from irrigated land were tabulated separately for:

1. Crops harvested from irrigated land for which all the acreage of the crop harvested on the farm was harvested from irrigated land. For these crops, totals were obtained for acres harvested and quantity harvested during the office processing.

State	Acres of irrigated land from which crops were harvested	Crops for which acres and quantity harvested for portion of crop irrigated were obtained		
		Name of crops	Total acres of crops harvested from irrigated land	Acres for 1 or 2 crops harvested from irrigated land as a percent of irrigated cropland harvested
United States....	11,965,485		7,045,729	58.9
The North.....	3,560,509		2,197,537	61.7
The South.....	8,404,976		4,848,192	57.7
New England:				
Maine.....	3,987	Irish potatoes	1,768	44.3
New Hampshire....	2,406	Irish potatoes	210	8.7
Vermont.....	863	Irish potatoes	5	0.6
Massachusetts....	22,953	Irish potatoes, tobacco	2,289	10.0
Rhode Island.....	1,334	Irish potatoes	490	36.7
Connecticut.....	13,786	Irish potatoes, tobacco	8,806	63.9
Middle Atlantic:				
New York.....	76,910	Irish potatoes, corn for grain	32,802	42.6
New Jersey.....	95,106	Irish potatoes, corn for grain	14,606	15.4
Pennsylvania.....	20,177	Irish potatoes, corn for grain	4,340	21.5
East North Central:				
Ohio.....	16,930	Irish potatoes, corn for grain	3,133	18.5
Indiana.....	16,720	Irish potatoes, corn for grain	9,034	54.0
Illinois.....	14,147	Corn for grain, soybeans for beans	6,171	43.6
Michigan.....	47,215	Irish potatoes, corn for grain	11,020	23.3
Wisconsin.....	60,614	Irish potatoes, corn for grain	28,815	47.5
West North Central:				
Minnesota.....	17,164	Irish potatoes, corn for grain	10,155	59.2
Iowa.....	21,464	Corn for grain, soybeans for beans	15,981	74.5
Missouri.....	56,739	Cotton, soybeans for beans	22,534	39.7
North Dakota.....	48,745	Barley, spring wheat other than durum	6,566	13.5
South Dakota.....	113,475	Barley, spring wheat other than durum	5,030	4.4
Nebraska.....	2,061,747	Corn for grain, sorghums for grain	1,477,997	71.7
Kansas.....	848,027	Wheat, sorghums for grain	535,785	63.2
South Atlantic:				
Delaware.....	17,372	Irish potatoes, corn for grain	7,131	41.0
Maryland.....	15,266	Irish potatoes, corn for grain	1,527	10.0
Virginia.....	48,291	Irish potatoes, tobacco	24,871	51.5
West Virginia....	1,931	Irish potatoes, corn for grain	175	9.1
North Carolina...	94,324	Irish potatoes, tobacco	80,600	85.5
South Carolina...	16,851	Tobacco, cotton	8,433	50.0
Georgia.....	59,260	Tobacco, cotton	36,165	61.0
Florida.....	881,173	Tobacco, corn for grain	14,404	1.6
East South Central:				
Kentucky.....	13,548	Tobacco, corn for grain	10,957	80.9
Tennessee.....	9,156	Tobacco, corn for grain	2,525	27.6
Alabama.....	11,126	Cotton, corn for grain	6,737	60.6
Mississippi.....	117,608	Cotton, corn for grain	56,179	47.8
West South Central:				
Arkansas.....	960,219	Cotton, soybeans for beans	506,636	52.8
Oklahoma.....	260,027	Cotton, wheat	129,925	50.0
Texas.....	5,898,824	Cotton, sorghums for grain	3,961,927	67.2

Data for the most important crops in this group of crops are published in county table 14 of volume I of the reports of the 1964 Census of Agriculture, under the heading "Crops for which the entire acreage was irrigated."

2. Crops harvested from irrigated land for which only part of the acres of the crop harvested was harvested from irrigated land. For these crops, only the acres harvested from irrigated land were obtained. The irrigated acreage for each of the important crops for the 19 States is given in table 8. Data for the important crops in this group are published for each county in county table 14, of volume I of the reports for the 1964 Census of Agriculture under the heading "Crops for which only a part of the acreage was irrigated."

Irrigated land in farms—Irrigation has made possible the use of arid and semi-arid lands in the West for agricultural purposes. To a much smaller extent, it is used in the humid areas of the East and in Hawaii and has increased production of some crops significantly in these areas. In 1964, irrigated lands in the United States totaled 37.1 million acres. The regional distribution of this land was as follows:

Area	Million acres
11 Western States and Hawaii.....	23.3
6 Great Plains States (North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas).....	10.0
31 Eastern States.....	3.8

Much of the irrigated land is concentrated in special areas: in the cotton; fruit; and vegetable-producing areas and valleys of California; in the High Plains and Lower Rio Grande Valley of Texas; in Southern Idaho; in a few valleys in Oregon, Washington, and Colorado; and on livestock ranches scattered throughout the West where irrigated land produces hay for use between grazing seasons.

The acreage of irrigated land increased almost 4 million acres from 1959 to 1964. More than half the increase occurred in the South. States with an increase of more than 100,000 acres from 1959 to 1964 were: Kansas, 242,000; Florida, 804,000; Arkansas, 262,000; Oklahoma, 104,000; Texas, 729,000; Idaho, 225,000; Wyoming, 101,000; Nevada, 282,000; Washington, 143,000; Oregon, 223,000; and California, 203,000.

The acreage and increase of irrigated land in farms, 1890 to 1964, were as follows:

Year and area	Acres irrigated (million acres)	Increase from preceding census (million acres)
United States:		
1964.....	37.1	3.9
1959.....	33.2	3.6
1954.....	29.6	3.8
1950.....	25.8	5.3
1945.....	20.5	2.5
1940.....	18.0	5.0
1935.....	13.0	-1.6
1930.....	14.6	6.9
1900.....	7.7	4.0
1890.....	3.7	-

The change in the area of irrigated land since 1950 by areas are indicated by the following data:

Irrigated acres	11 Western States and Hawaii (million acres)	6 Great Plains States (million acres)	31 Eastern States (million acres)
1964.....	23.3	10.0	3.8
1959.....	22.0	9.0	2.2
1954.....	20.5	6.4	2.7
1950.....	20.0	4.1	1.7

More than half of the 11.2 million acre increase in irrigated land since 1950, occurred in the Great Plains States. The increase in the Eastern States was almost as large as in the 11 Western States. The increase in the Great Plains States resulted from the expansion of well irrigation in the High Plains area of Texas, Oklahoma, and Kansas, and in Western Nebraska.

Irrigated land by use, 1964-- The acreage of irrigated land by use for 1964 was as follows:

Subject	Million acres
Total.....	37.1
Cropland harvested.....	30.8
Pasture or grazing.....	5.5
Other cropland uses.....	.8

The other cropland uses were primarily for soil-improvement crops, and land in summer fallow.

Crops harvested from irrigated land, 1964 and 1959—

Tables 5 and 6 present data for the 31.6 million acres of crops harvested from the 30.7 million acres of irrigated land from which crops were harvested in 1964. Table 7 also shows for the 1959 census the acreage of each crop harvested from irrigated land. The data for the 1959 census are not fully comparable with those for the 1964 census, as the acreage represents totals for acres harvested from irrigated land in 1960 for 30 Eastern States and for acres harvested from irrigated land in 1959 for 17 Western States, Louisiana, and Hawaii.

Table 8 presents comparative data for each crop harvested for 17 Western States, Louisiana, and Hawaii for the 1964 and 1959 censuses.