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Changing Supply of Grain in Texas

TEXAS AGRICULTURAL EXPERIMENT STATION
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SUMMARY

Grain production and use are of major importance to the Texas farm economy. The farm value of grain grown in Texas after 1950 has varied from 275 to 550 million dollars annually. Cash sales of grain have amounted to about 15 percent of total receipts from crops and livestock in the State. Considerable amounts of grain also are fed to livestock on the farm where it is produced.

Wheat production was about three-fourths of total food grain production in Texas in the 1940's. It declined in relative importance, while rice increased, in the food grain group in the 1950's.

Grain sorghum increased from 21 percent of total feed grain production in 1935-39 to 72 percent in 1955-58, while corn decreased from 52 to 14 percent.

Texas usually grows more than one-fourth of the total U. S. production of rice. Production increased from slightly less than 4 million bags (100 pounds) in 1935 to over 17 million in 1954. It varied from 11 to 15 million bags after 1955. Acreage increased from 167 thousand in 1935 to 637 thousand in 1954, but was less than 500 thousand in 1955-56, and less than 400 thousand in 1957-58. Yield per acre increased from an average of about 20 bags in the middle 1940's to slightly more than 30 bags in 1957-58.

Wheat production in Texas increased from an average of 27 million bushels annually in the late 1930's to 75 million bushels in the late 1940's. Acreage controls and drouth conditions caused a cutback in production in the 1950's. Production averaged 36 million bushels annually in 1954-58. Changes in acreage harvested showed a pattern similar to that of production averaging about 3 million in the late 1930's, over 6 million in the late 1940's and less than 3 million in 1954-58. District 1 is the heaviest wheat production district, but its relative importance has declined, while that of District 2 has increased, since the late 1930's.

Grain sorghum production in Texas increased consistently and substantially during the 24-year period covered in this study. Average annual production was only 30 million bushels in the late 1930's, compared with 184 million in the 1954-58 period. An estimated 273 million bushel crop was grown in 1958. Acreage increased from 2 million in the late 1930's to over 6 million in 1954-58. However, a large portion of the increased production was a result of increased yields rather than increased acreage. Yields doubled in the 24-year period, increasing from an average of 14.2 bushels per acre in the late 1930's to 28.8 bushels in 1954-58. Yield was estimated at 32.5 bushels in 1957 and 35.5 bushels in 1958.

District 2 still contributes more acreage to grain sorghum production in the State than any other district, although it declined from 70 percent of the State acreage in 1939 to 45 percent in 1954. District 1 is the second largest grain sorghum producing area and increased from 12 percent of total acreage in 1939 to 33 percent in 1954.

Corn production in the State has shown a consistent decline since the late 1930's, and the State's production has declined as a proportion of total U. S. production. Annual average production was 76 million bushels in the 1935-39 period and only 36 million bushels in 1954-58. Acreage declined from an average of 4.5 million to 2 million. Yield averaged 21.4 bushels per acre in 1954-58, compared with only 16.5 bushels in the late 1930's.

Oat production in the State has varied considerably from year to year. Average annual production was 36 million bushels in the late 1930's, and 34 million in the 1954-58 period. Yield per acre was 24.1 bushels in the late 1930's compared with 22.6 in recent years.

Changing Supply of Grains in Texas

CLARENCE A. MOORE and HOWARD S. WHITNEY*

GRAIN PRODUCTION AND UTILIZATION are important aspects of the Texas farm economy. The farm value of the seven principal grains grown in the State reached a peak of over 500 million dollars in 1947. The annual farm value was lower in 1950-57, varying between 275 and 431 million dollars, mainly because of drouth and production control programs. It again exceeded 500 million dollars in 1958.

The cash farm income from grains in Texas in recent years amounted to about one-fifth of that from all crops and was more than one-tenth of the total cash farm income from both crops and livestock. Also, a part of the cash income from livestock and poultry is, indirectly, income from feed grains which go into their production. The principal aim of this study is to determine the change and trends in production of individual grains since 1935 and the reasons for these changes.

The State was divided into six grain-producing districts for purposes of analyses and presentation. The district boundaries shown in Figure 1 were selected because (1) the study of location and changes in production in different parts of the State was based on census data, so districts were outlined along census economic area boundaries, (2) the districts were outlined to conform as nearly as possible to broad underlying differences in grain production conditions and (3) a few large districts were preferred to many small areas for clarity of description. The Southwest part of the State was excluded as a grain production district since only small amounts are grown there.

The seven principal grains were divided into two groups—food grain and feed grain. Most wheat, rice and rye are used for human consumption and are included in the food grain group. A small part of the food grains is used as feed for livestock, and some of the feed grains are processed into food for human consumption, but most of the different grains are used according to the group in which they are classified.

Grain sorghum, rice, wheat and corn ranked first to fourth in farm value in 1953-57. However, the relative importance of the different grains varies from year to year. For example, part of the increase in acreage of grain sorghum was caused by a reduction of cotton and wheat

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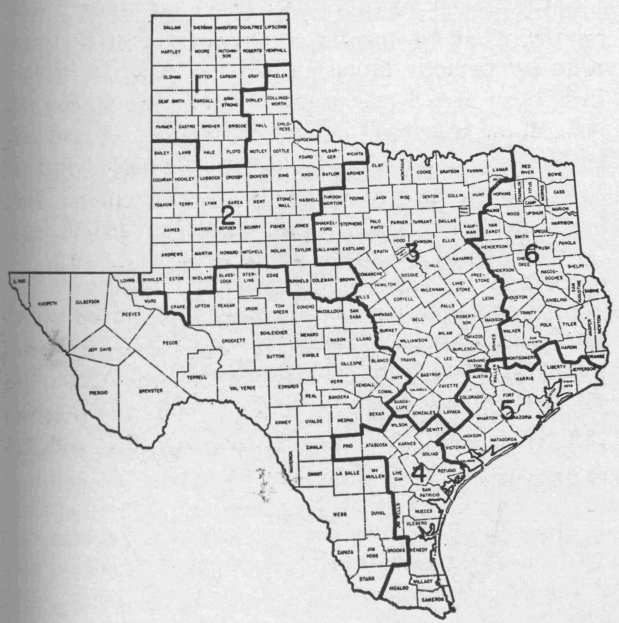

Figure 1. Grain production district boundaries used in this study.

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TABLE 1. RELATIVE IMPORTANCE OF THE FOOD GRAINS IN TEXAS IN TERMS OF PRODUCTION, ACREAGE AND FARM VALUE BY 5-YEAR PERIODS

Grains	Five-year periods				
	1935-39	1940-44	1945-49	1950-54	1955-58[1]
	— — — Percent of total food grains — — —				
	Production[2]				
Wheat	68.9	75.2	78.0	45.0	57.2
Rice	30.9	24.5	21.8	54.5	42.5
Rye	.2	.3	.2	.5	.3
	Acreage harvested				
Wheat	92.4	90.5	92.5	81.8	84.6
Rice	7.3	9.0	7.1	17.2	14.7
Rye	.3	.5	.4	1.0	.7
	Farm value				
Wheat	70.3	69.2	74.7	42.1	51.2
Rice	29.5	30.6	25.1	57.7	48.6
Rye	.2	.2	.2	.2	.2

[1]Four-year average.
[2]Based on bushels.

acreage under production control programs. Unfavorable planting conditions in cotton areas, and wheat crop failures in the Panhandle and Rolling Plains, caused increased plantings of grain sorghum in those areas in some years.

General drouth conditions prevailed in large parts of Texas during 1950-57. This probably distorted to some extent the grain production situation from that which would have prevailed had there been more average rainfall in the State.

The price support program, the soil bank program, the export policy and other action by the Federal Government also exerted an important influence on the production and distribution of grains.

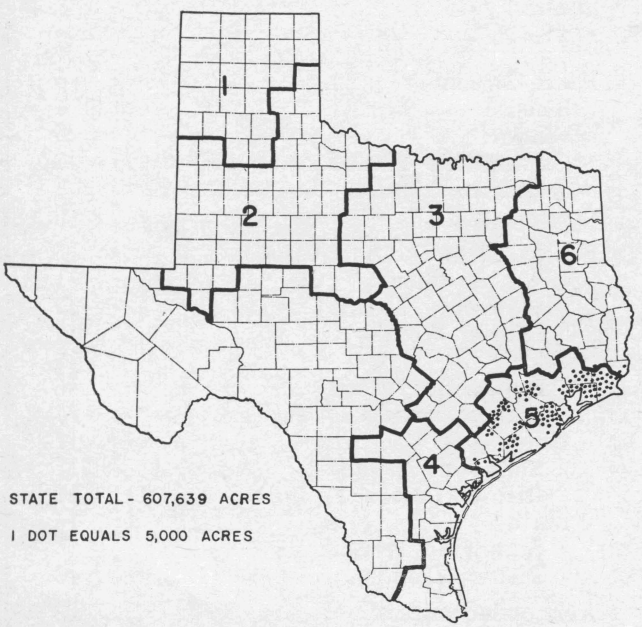


Figure 2. Location of rice production in Texas. Based on census enumeration of acreage harvested.

FOOD GRAINS

The relative importance of the food grains in terms of production, acreage and value are shown in Table 1. Wheat production averaged 69 to 78 percent of total food grain (wheat, rice and rye) production during 1935-49 by 5-year periods. Since 1950, it has declined in relative importance in the food grain group.

Wheat is of greater importance relative to other food grains in terms of acreage rather than production. During 1935-49, the acreage harvested was 90 percent or more of total food grain acreage, but since 1950 it has only been 80 to 85 percent by period averages.

Wheat is grown in semi-arid areas of the State. Only a small part of the wheat acreage is irrigated. Thus, it is grown in less productive areas and under less productive conditions than rice. In the early 1950's rice production was almost 55 percent of total food grain production. However, wheat was hard hit by drouth in those years. It has recovered somewhat since 1955.

During 1935-49 the farm value of the Texas wheat crop was 69 to 75 percent of the total farm value of food grains by 5-year period averages—proportions similar to its importance based on production. In the early 1950's it was slightly above 40 percent, and in recent years slightly over 50 percent, of total farm value of food grains. Rice made up 25 to 31 percent of food grain value in the first three periods, but has been 58 and 49 percent in the two periods since 1950.

Rye is of minor importance in Texas compared with wheat and rice. Its acreage harvested was 1 percent or less of total food grain acreage. Its production was half, or less, of 1 percent and its value only two-tenths of 1 percent, of that of total food grain production and value by periods since 1935.

Rice

Rice is grown in more than 20 counties in the Coast Prairie of Texas. Most of the production is concentrated in about 15 counties, Figure 2. The localized area of production along the Gulf Coast is a result of physical and economic conditions. A comparatively level topography with slowly permeable subsoil is preferred for efficient irrigation and mechanized production. The availability of water for irrigation from the Neches, Sabine, Trinity, Brazos and Colorado rivers, and from underground water supplies around Katy and Hockley, is favorable to production in the area. The area also has favorable weather conditions, growing season (rice requires 110 to 180 days of high temperatures) and good surface drainage.

Favorable economic factors are its location near Gulf shipping points and a system of rota-

tion with cattle, required for "resting" rice land. Other crops have a comparative economic advantage over rice in other areas where it could be grown.

Although the United States contributes less than 2 percent to the world's total production, Texas ranks first among the states producing rice. Annual production in the State averaged 13.6 million barrels during 1950-57, compared with 12.7 and 11.0 for Louisiana and California, *respectively. Texas usually contributes slightly* more than one-fourth of the total U. S. production, Figure 3.

Since 1940 an increasing proportion of the total disappearance of the U. S. rice crop has been exported. About 74 percent of the total disappearance in 1940-44 was used domestically, compared with only 56 percent during 1950-54 and 50 percent in 1955-56.

Less of the total domestic disappearance has been used for food and more for industrial uses, primarily for beer production. Seventy-seven percent of domestic disappearance was used for food in 1940-44, compared with less than 70 percent during 1950-56. Only 13 percent of domestic disappearance went to industrial uses in 1940-44, compared with nearly 20 percent since 1950.

Changes in production, acreage and yield of rice are shown in Figure 4. Production increased rather consistently from 3,908,000 bags (100 pounds) in 1935 to 17,040,000 in 1954, the peak production year. Decreases in production from the previous year occurred in only 3 of the 20 years ending in 1954. However, production dropped to 14,640,000 bags in 1955, 11,687,000 in 1956 and 11,104,000 in 1957. It was estimated at 11,908,000 bags in 1958. Computation of a least-squares trend equation indicates that production increased at an annual rate of 524,258 bags in 1935-55.

Acreage in rice increased from 167,000 in 1935 to 637,000 in 1954, the peak year. Government controls have cut acreage back since 1954. It was 480,000 in 1955, 403,000 in 1956 and an estimated 347,000 in 1957. Computation of a least-squares trend equation indicates that acreage increased at an annual rate of 19,085 acres from 1935 through 1955.

The average yield of rice was 22 to 25 bags per acre during 1935-40, but dropped to about 16 bags in 1941 and remained relatively low during the 1940's. Recently yields have increased steadily to a high of 32 bags in 1957.

The change in value, price and production of the Texas rice crop by successive 5-year periods is shown in Table 2. Since the value is computed by multiplying production by the average price, changes in value occur only as one or both of production and price changes.

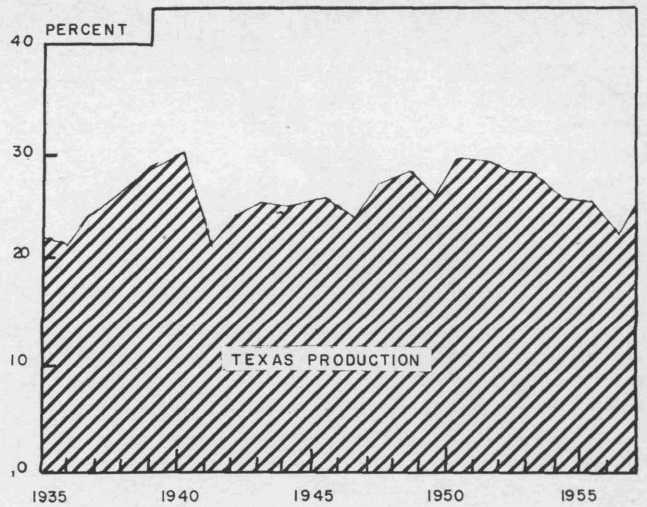


Figure 3. Proportion of total U. S. rice production grown in Texas, 1935-57.

Columns 6 and 7 show the extent to which changes in value of rice from one period to another were caused by changes in price and production. The data indicate that price change was almost four times as important as production change in contributing to the increase in value from the late 1930's to the early 1940's, and was about one-fourth greater in contribu-

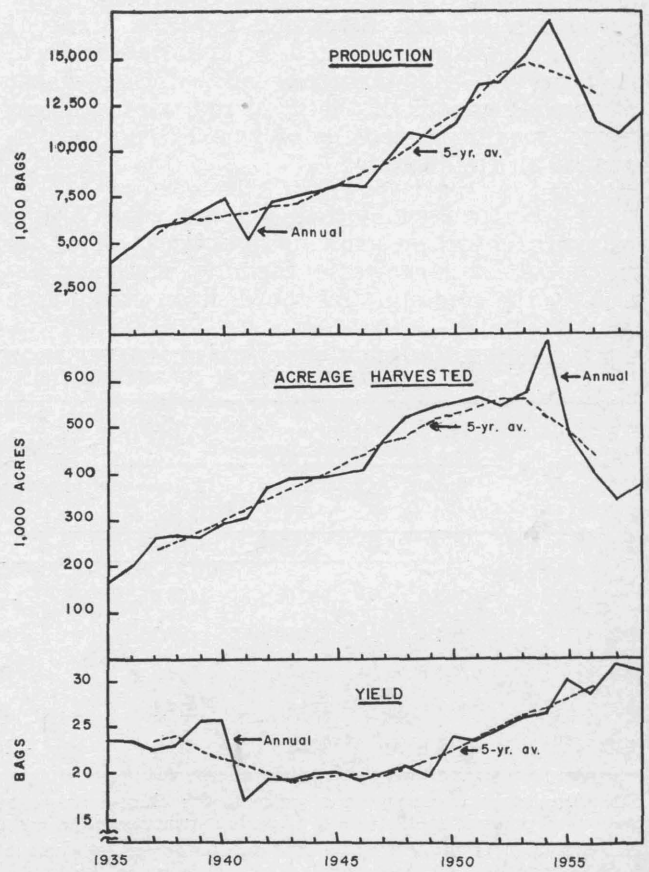


Figure 4. Rice: annual and 5-year moving average of production, acreage harvested and yield in Texas, 1935-58.

ting to the change in value from the early to the late 1940's. Since 1950, production change has been the main cause of change in value, and price change has been a realtively minor cause. Both acreage and production have been cut back considerably in the past few years, under the government's production control efforts, while price has been regulated.

Wheat

The wheat crop was of greater value than any other grain in Texas in the last half of the 1940's. It made up about 37 percent of the total value of the seven principal food and feed grains in the State at that time as compared with about 12 percent for rice, 24 percent for grain sorghum and 19 percent for corn.

Since 1950, the importance of wheat compared with other grains has declined because of unfavorable production conditions and government policy affecting acreage. In 1950-54, acreage in wheat was 21 percent less than in 1945-49, while production was 68 percent less. Drouth in the early years of the 1950's was especially severe in those areas of the State where wheat is grown.

About two-thirds of the wheat crop is grown on the High Plains, slightly less than one-fourth on the Rolling Plains and about 8 percent in the Grand Prairie and Blackland Prairies areas of Texas. It is best adapted to the well-drained, medium and fine-textured soils. Most wheat grown in Texas is of the hard red winter wheat varieties. Spring seeding of wheat is not recommended in the State.

Level topography has exerted considerable influence on wheat-growing practices. The development of large-scale farming methods, especially the combine and the disk or sweep-type plows, made possible the handling of large acreages. Low cost of production by these methods gave wheat an economic advantage over other crops. Therefore, commercial production of wheat for the cash market has centered in the high weather-risk areas of the Great Plains with its level topography favorable for the use of large machines in production.

The quantity of wheat used domestically in the United States has remained relatively constant since the early 1920's. The increase in population has about offset the effect of a decrease in consumption per person. In 1935-39, about nine-tenths of the domestic production was used in the continental United States, and more than six-tenths was processed for food.

Production in 1953-57 was more than 40 percent greater than in 1935-39. With domestic use the same quantity-wise as in earlier periods, only about six-tenths of the recent production was used in the continental United States, and about four-tenths was processed for food. This indicates a greater dependence on export markets to take the increased production in recent years.

Although Texas grows an average of 43,000,000 bushels of wheat annually, this makes up only a relatively small proportion of total U. S. production. Kansas ranks first among the wheat-producing states. Acreage in Texas usually varies from 4 to 9 percent of total U. S. acreage, while the State's production varies from 2 to 7 percent of U. S. production, Figure 5. This indicates lower yields per acre in Texas than the average of the nation.

STATEWIDE TRENDS

The annual and 5-year moving average of production, acreage and yield of wheat in Texas are shown in Figure 6. The prewar 1935-39 average annual production was about 27 million

TABLE 2. RICE: CHANGE IN AVERAGE VALUE, PRODUCTION AND PRICE BY 5-YEAR PERIODS AND THE RELATIVE CONTRIBUTION OF PRODUCTION AND PRICE TO THE CHANGE IN VALUE

Periods	Index of change in			Change in value from previous period	Amount of change in value attributed directly to change in[1]		Amount of change in value attributed to interaction of changes in production and price[2]
	Value	Production	Price		Production	Price	
	Percent						
1935-39	100.0	100.0	100.0	—	—	—	—
1940-44	264.4	127.9	207.1	164.4	27.9	107.1	29.4
1945-49	521.6	172.1	303.6	97.2	34.5	46.6	16.1
1950-54	817.4	257.8	317.8	56.7	49.8	4.7	2.2
1955-58[3]	698.8	224.1	313.1	—14.5	—13.1	—1.5	0.1

[1]The percentage contribution of price to the change in value shown here assumes production remains the same, and contribution of production to change in value assumes price remains the same.

[2]A residual of change in value not accounted for by changes in price and production under assumptions outlined in footnote 1. The sum of the direct and indirect changes in the last 3 columns of the table is equal to the change in value from previous period recorded in column 4.

[3]Four-year period.

bushels, but varied between 11 million and 42 million bushels. The peak 1947 production was 117 million bushels. Production in 1950-57 was at about the 1935-39 level, varying between 14 and 36 million bushels. The 1957 production was more than 33 million bushels. Favorable production conditions in 1958 produced a crop estimated at 73 million bushels with a record average yield of 22 bushels per acre in the State.

The 1935-39 average annual acreage harvested was almost 3 million, but varied from 1.6 million in 1935 to 3.9 million in 1937. The peak 1947 crop was grown on 7.3 million acres. Acreage harvested since 1950 has varied between 1.5 and 3.3 million.

Changes in yield may occur as a result of wheat being grown on more or less productive land, the use of higher or lower yielding varieties, change in the use of fertilizer practices, change in cultural practices, more or less irrigation, or change in weather or growing conditions. Growing conditions probably have been the main influence on wheat yields in Texas, as the marked change in yields from year to year, especially in the 1940's, would indicate. Average yields in the State varied from 7 to 18.5 bushels per acre in 1935-57, the highest occurring in 1944. The average yield of 22 bushels per acre in 1958 was 3.5 bushels greater than the 1944 yield.

The fact that yields since 1950, which included several years of severe drouth conditions, have averaged slightly higher than in the prewar 1935-39 period suggests improvements were made and adopted that increased wheat yield potentials in the State. Growers may be using higher yielding varieties and better cultural practices. Also, there has been a trend toward greater acreages of irrigated wheat. A recent unofficial estimate is that 600,000 acres are irrigated at least once.

Changes in farm value, price and production of wheat in Texas by successive 5-year period averages, and the extent to which the change in value from one period to another was caused by a change in price, production, or both together, are shown in Table 3. For example, the farm value of the Texas wheat crop was 151 percent greater in the early 1940's than in the late 1930's, column 5. Had price been the same in the two periods, the increase in production would have accounted for a 76 percent greater value in the later period, column 6. Or had production been the same in the two periods, the increase in price would have accounted for a 43 percent increase in value. The direct effect of price and production changes, then, amounted to about 119 of the 151-percent value change — leaving 31.6 percent unaccounted for. This 31.6 percent is a result of the interaction of production and price as both changed simultaneously, column 8.

Change in production caused more of the change in value of wheat than did change in price

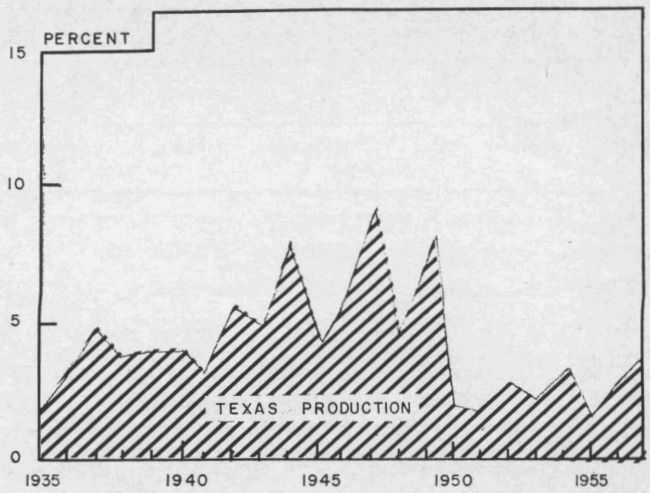


Figure 5. Proportion of total U. S. wheat production grown in Texas, 1935-57.

from the late 1930's to the early 1940's. Change in price was slightly more influential as a cause of change in value from the early to the late 1940's. A large decrease in production was the cause of a decline in value from the late 1940's to the early 1950's, with price averaging almost 12 percent higher in the 1950's. The 1955-58 average farm value of wheat was 23.5 percent above that of 1950-54 (the smallest change

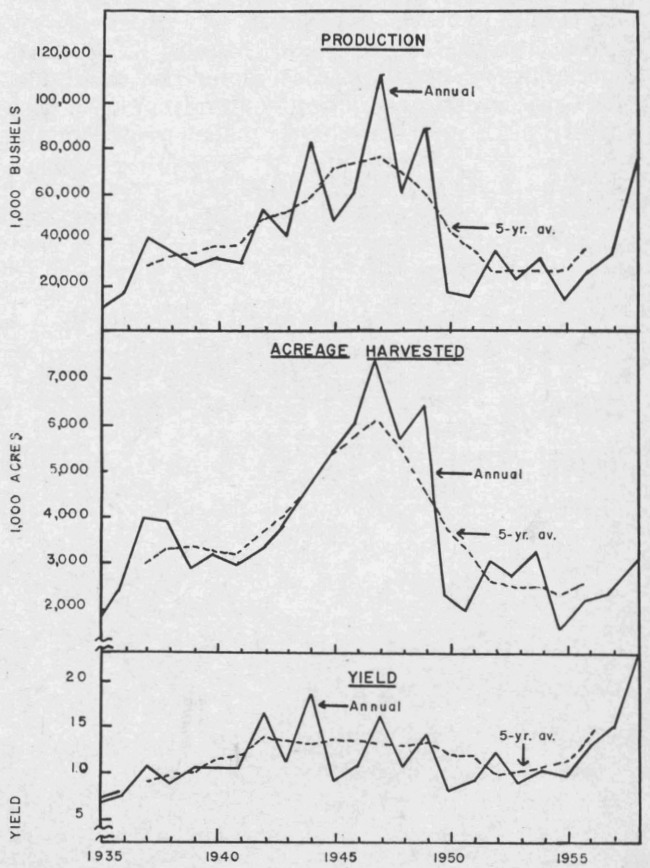


Figure 6. Wheat: annual and 5-year moving average of production, acreage harvested and yield in Texas, 1935-58.

TABLE 3. WHEAT: CHANGE IN THE AVERAGE VALUE, PRODUCTION AND PRICE BY 5-YEAR PERIODS AND THE RELATIVE CONTRIBUTION OF PRODUCTION AND PRICE TO THE CHANGE IN VALUE

Periods	Index of change in			Change in value from previous period	Amount of change in value attributed directly to change in[1]		Amount of change in value attributed to interaction of changes in production and price[2]
	Value	Production	Price		Production	Price	
	Percent						
1935-39	100.0	100.0	100.0	—	—	—	—
1940-44	251.1	176.3	143.2	151.1	76.3	43.2	31.6
1945-49	648.6	276.8	234.6	158.3	57.1	63.8	37.4
1950-54	249.8	95.7	261.7	—61.5	—65.4	11.6	—7.7
1955-58[3]	308.6	135.3	228.4	23.5	41.5	—12.7	—5.3

[1]The percentage contribution of price to the change in value shown here assumes production remains the same, and contribution of production to change in value assumes price remains the same.

[2]A residual of change in value not accounted for by changes in price and production under assumptions outlined in footnote 1. The sum of the direct and indirect changes in the last 3 columns of the table is equal to the changes in value from previous period recorded in column 5.

[3]Four-year period.

recorded from one period to another). A rather large increase in production (influenced by the 1958 crop) overweighed a decline in average price to cause the increase in the average value of recent years.

DISTRICT TRENDS

The location intensity of wheat in terms of acreage harvested based on the 1954 census enumeration is shown in Figure 7. Most of the wheat is grown in Districts 1, 2 and 3. In District 2, heavy production is along the east side, with scattered production extending into the western part, and little or no wheat grown in the southwestern tip of the district. Production in District 3 is scattered rather thinly in the upper part, with little or no wheat grown in an area covering the lower part and extending up on the east side to about the middle of the east boundary.

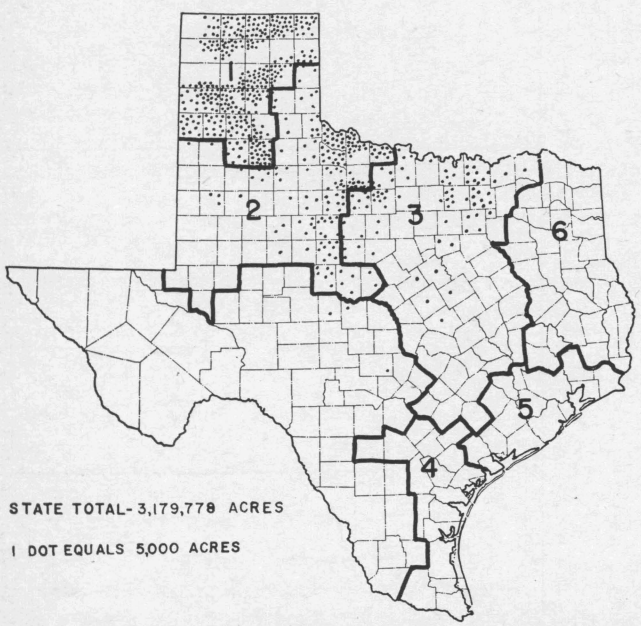


Figure 7. Location of wheat production in Texas. Based on census enumeration of acreage harvested in 1954, expanded by an adjustment based on AMS crop reporting estimates in those counties omitted from the census enumeration. The census-reported State total was 3,022,518 acres.

The proportions of the State's total wheat acreage harvested in Districts 1, 2 and 3 based on census data and for the last 4 census years are shown in Table 4. District 1 showed a declining proportion of the total acreage since 1939. It grew 77 percent (over three-fourths) of the total acreage in 1939, only 72 percent in 1944, 62 percent (the most marked decrease) in 1949 and 58 percent in 1954. District 2 showed a consistent increase in proportion of total wheat acreage harvested from one census to another, having 11 percent in 1939 and 28 percent in 1954. District 3

TABLE 4. PROPORTION OF STATE WHEAT ACREAGE HARVESTED IN SPECIFIED DISTRICTS BY CENSUS YEARS

Districts	Proportion of State total wheat acreage harvested by districts			
	1939	1944	1949	1954
	Percent			
1	77.0	72.3	62.2	58.5
2	11.4	15.6	25.0	27.7
3[1]	10.7	10.4	10.7	13.2
Rest of State	0.9	1.7	2.1	0.6
State total	100.0	100.0	100.0	100.0

[1]Small acreages were reported in economic areas 9 and 10 in the southern part of District 3 in 1939, 1944 and 1949. Such information was not included in the 1954 census for those areas, but was thrown in with the State total. In other parts of District 3 where this information was not recorded in some counties by the 1954 census, crop reporting estimates were used. The adjustments described here are so minor they would have little or no effect on results presented in the table.

remained about the same, excepting a slightly higher proportion in 1954 than in previous census years.

Annual data on wheat are available from the Crop Reporting Service estimates and can be broken down and arranged by districts. For the census years (1939, 1944, 1949 and 1954) the proportions of acreage harvested by districts, based on the crop reporting estimates, were almost identical to those based on the census enumeration, differing only by tenths of a percent.

However, the annual data were somewhat more revealing of the relative trends of wheat acreage in the three districts than that provided by the census. Annual data tend to register changing proportions from year to year because of differences in weather conditions among the districts. Therefore, the proportions of the total acreage harvested in each of the three districts are computed on the basis of 5-year period averages in Table 5 to "average-out" the effect of any marked annual weather differences between districts.

The Crop Reporting Service data show an increase in the proportion of wheat acreage in District 1 from the late 1930's to the early 1940's. This was a time when wheat acreage was increasing in the State as a whole. The data indicate acreage increased more rapidly during that time in District 1 than in Districts 2 and 3, since both the latter districts showed a lower proportion of the State total in 1940-44 than in 1935-39. Since the early 1940's, District 1 has harvested a lower proportion of the total acreage each subsequent 5-year period, and Districts 2 and 3 have harvested a greater proportion. District 1 averaged almost three-fourths of total wheat acreage in the early 1940's but has harvested less than half in recent years.

Rye

Rye is considerably less important than wheat and rice as a grain crop in Texas. In general, it is a byproduct since most rye acreage is grown for winter pasture and is harvested only if it makes grain after pasturing.

In the 1935-39 period, the Texas rye crop was only two-tenths of 1 percent of total U. S. production, and acreage harvested was in the same proportion to the U. S. total acreage. In 1953-57, Texas production was 1 percent of total U. S. production. This slightly greater proportion in recent years was due both to an increase in rye production in the State and a decrease in the Nation. However, the Texas crop was harvested from 1.7 percent of total U. S. acreage in the recent 5-year period, indicating the State's yield per acre was not as high relative to average U. S. yields as it was in the late 1930's.

TABLE 5. PROPORTION OF TOTAL STATE WHEAT ACREAGE HARVESTED BY DISTRICTS, CROP REPORTING ESTIMATES, 5-YEAR PERIOD AVERAGES

Districts	Period				
	1935-39	1940-44	1945-49	1950-54	1955-57[1]
	Percent				
1	62.4	74.4	64.4	51.3	49.6
2	20.0	15.0	23.2	31.5	29.5
3	16.1	9.2	10.6	15.5	20.1
Rest of Estate	1.5	1.4	1.8	1.7	0.8
State total	100.0	100.0	100.0	100.0	100.0

[1]Three-year period average.

Rye can be grown in all states, but the chief areas of production are in the northern and eastern states. Highest yields are obtained on rich, well-drained loam soils, but it is more productive than other grains on infertile, sandy or acid soils. It usually yields less grain than winter wheat under conditions favorable to the latter crop and, as a consequence, is usually sown on poorer soils and with poorer seedbed preparation than is wheat.

The annual and 5-year moving averages of rye production, acreage and yield in Texas are

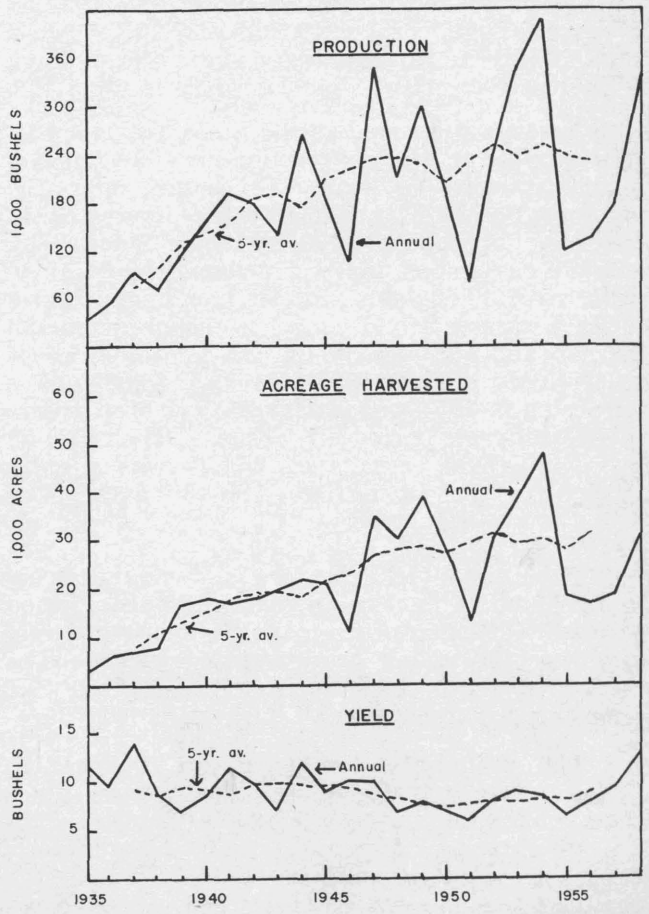


Figure 8. Rye: annual and 5-year moving average of production, acreage harvested and yield in Texas, 1935-58.

TABLE 6. RYE: CHANGE IN THE AVERAGE VALUE, PRODUCTION AND PRICE BY 5-YEAR PERIODS AND THE RELATIVE CONTRIBUTION OF PRODUCTION AND PRICE TO THE CHANGE IN VALUE

Periods	Index of change in			Change in value from previous period	Amount of change in value attributed directly to change in[1]		Amount of change in value attributed to interaction of changes in production and price[2]
	Value	Production	Price		Production	Price	
	Percent						
1935-39	100.0	100.0	100.0	—	—	—	—
1940-44	285.7	244.7	117.2	185.7	144.7	17.2	23.8
1945-49	714.3	306.6	234.4	150.0	25.3	100.0	24.7
1950-54	675.5	335.5	203.1	—5.4	9.4	—13.3	—1.5
1955-58[3]	387.8	255.3	153.1	—42.6	—23.9	—24.6	5.9

[1]The percentage contribution of price to the change in value shown here assumes production remains the same, and contribution of production to change in value assumes price remains the same.

[2]A residual of change in value not accounted for by changes in price and production under assumptions outlined in footnote 1. The sum of the direct and indirect changes in the last 3 columns of the table is equal to the change in value from previous period recorded in column 5.

[3]Four-year period.

shown in Figure 8. Excepting a slight setback in 1938, production increased from 36,000 bushels in 1935 to 196,000 in 1941. Since 1941, it has registered ups and downs due to change in both acreage and yields. The general trend, as indicated by the 5-year moving average, has been one of increasing production. A least-squares trend equation shows an annual increase of almost 8,500 bushels during 1935-55. The 1954-58 average annual production of 237,200 bushels was slightly more than three times the average annual production of 76,400 bushels in 1935-39.

Acreage harvested in the State shows a pattern similar to that of production. The movement upward was fairly consistent, however, through 1944. The 22,000 acres harvested in 1944 compared with 3,000 in 1935. Since 1945, acreage registered ups and downs from year to year, with a long-run pattern trending upward. A least-squares trend equation shows an annual increase in rye acreage in the State of about 1,200 acres during 1935-55. The 48,000 acres harvested in 1954 was the largest rye crop grown in the 24-year period in Texas. The 1954-58 average annual acreage of 25,800 was slightly more than three times the 1935-39 average of 8,200.

The annual yield per acre is low, varying between 6 and 14 bushels during the 24-year period studied. There appears to be no long-run trend of either increasing or decreasing yields. The 5-year average yield during 1954-58 was 9.1 bushels compared with 9.3 bushels in 1935-39.

The annual farm value of rye produced in Texas in the early 1940's was almost three times the annual value in the late 1930's, Table 6. Production increase was considerably more important than price increase in contributing to the change in value between the two periods. However, higher prices were more important in contributing to a 150 percent greater value of the rye crop in the late 1940's than in the early 1940's. The value of the rye crop decreased from the late 1940's to the early 1950's, and registered a more marked decrease from 1950-54 to 1955-58. Lower prices accounted for the earlier decline in value and both production and price were lower in 1955-58 than in 1950-54, contributing to lower value of the rye crops.

FEED GRAINS

Total production of the four feed grains in Texas varied from year to year during the 24 years studied. There was no discernible tendency toward a long-run increase or decrease in production, although the average production during 1955-58 was considerably higher than pre-

TABLE 7. RELATIVE IMPORTANCE OF THE FEED GRAINS IN TEXAS IN TERMS OF PRODUCTION, ACREAGE AND FARM VALUE BY 5-YEAR PERIODS, 1935-58

Grains	Five-year periods				
	1935-39	1940-44	1945-49	1950-54	1955-58[1]
	Percent of total feed grains				
	Production				
Grain sorghum	20.9	38.1	47.7	58.9	72.1
Corn	52.5	41.0	30.9	24.4	14.0
Oats	25.2	17.8	19.7	15.7	12.1
Barley	1.4	3.1	1.7	1.0	1.8
	Acreage harvested				
Grain sorghum	25.6	37.1	48.7	57.0	65.7
Corn	54.7	46.0	33.2	27.4	17.1
Oats	18.1	13.8	16.2	14.3	14.7
Barley	1.6	3.1	1.9	1.3	2.5
	Farm value				
Grain sorghum	21.5	39.2	49.9	59.3	73.1
Corn	61.0	46.0	36.1	29.5	17.0
Oats	16.2	12.1	12.5	10.3	8.1
Barley	1.3	2.7	1.5	.9	1.8

[1]A 4-year average.

vious periods. However, there were marked changes and trends in the production of individual grains. These are reflected in a change in the relative importance of the grains in the feed grain group. Overall, grain sorghum showed a marked increase, corn a marked decline and oats a slight decrease in their relative importance in the feed grain group during 1935-57, Table 7.

Grain sorghum increased from 21 percent of the 1935-39 production of the four feed grains to 72 percent of the 1955-58 production. Corn decreased from 52 percent in the earlier period to only 14 percent in the recent one. The increase of grain sorghum, and the decrease of corn, in relative importance was consistent from one period to another. Oats dropped from 25 percent in the late 1930's to 12 percent of total production in 1955-58.

The gain in relative importance of grain sorghum was about the same in terms of the total farm value of feed grains as in production, increasing from 22 percent in 1935-39 to 73 percent in 1955-58. Corn was more important in terms of value than production, but showed a similar decline in importance by both measures. It dropped from 61 percent in 1935-39 to 17 percent in 1955-58. Oats were less important in terms of value than production, although the pattern of change in relative importance was the same by both measures.

In 1935-39 grain sorghum was harvested from about one-fourth, and corn from over half of the total feed grain acreage. In recent years the relative status of the two grains in terms of acreage was reversed, with corn acreage only 17 percent and grain sorghum acreage 66 percent of total feed grain acreage. Oats acreage was 18 percent of the total in 1935-39 and about 15 percent in 1955-58.

Barley is of minor importance compared with other feed grains, regardless of which measure is used. It varied from less than 1 to 2.7 percent of total value, from 1 to 3.1 percent of total production and from 1.3 to 3.1 percent of total acreage of the feed grains by period averages.

Grain Sorghum

Grain sorghum is adapted to a wide variety of environmental conditions and can be grown successfully over a large part of Texas. Technical developments, such as improved varieties and hybrids and irrigation, plus economical and political developments played an important role in the expansion of grain sorghum production by giving it a more preferred position profitwise than other crops with which it competes.

Short types of grain sorghum suitable for mechanical harvesting with combines were developed in the late 1930's. Supplemental irrigation in the more arid areas where the grain is

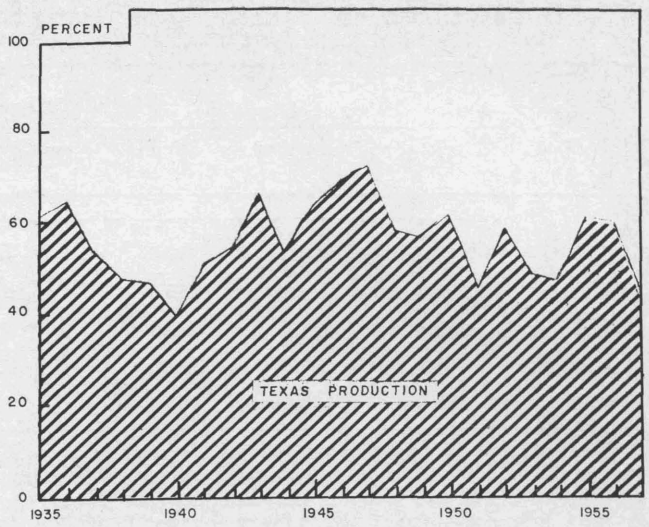


Figure 9. Proportion of total U. S. production of grain sorghum grown in Texas, 1935-57.

grown has been increasing and has received impetus in drouth years. Acreage controls in the late 1930's and after World War II on crops competing with grain sorghum for land favored the expansion of grain sorghum production. More recently, the development of higher yielding hybrids has made possible increased returns per acre. This, along with improvements in ferti-

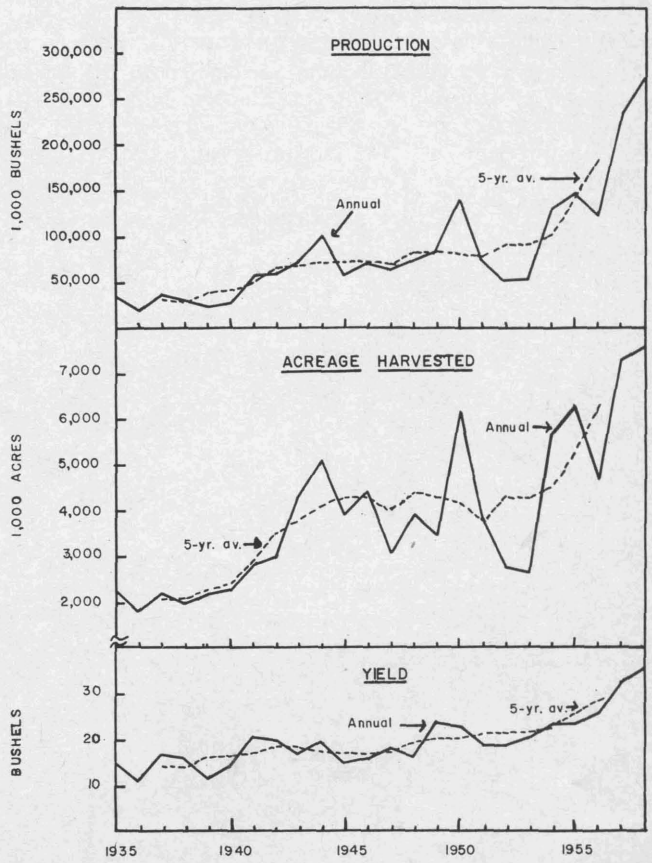


Figure 10. Grain sorghum: annual and 5-year moving average of production, acreage harvested and yield in Texas, 1935-58.

TABLE 8. GRAIN SORGHUM: CHANGE IN THE AVERAGE VALUE, PRODUCTION AND PRICE BY 5-YEAR PERIODS AND THE RELATIVE CONTRIBUTION OF PRODUCTION AND PRICE TO THE CHANGE IN VALUE

Periods	Index of change in			Change in value from previous period	Amount of change in value attributed directly to change in[1]		Amount of change in value attributed to interaction of changes in production and price[2]
	Value	Production	Price		Production	Price	
	Percent						
1935-39	100.0	100.0	100.0	—	—	—	—
1940-44	323.0	214.3	150.0	223.0	114.3	50.0	58.7
1945-49	583.1	234.5	246.3	80.5	9.4	64.2	6.9
1950-54	707.7	307.1	227.8	21.4	30.9	—7.5	—2.0
1955-58[3]	1202.4	646.2	185.2	69.9	110.4	—18.7	—21.8

[1]The percentage contribution of price to the change in value shown here assumes production remains the same, and contribution of production to change in value assumes price remains the same.

[2]A residual of change in value not accounted for by changes in price and production under assumptions outlined in footnote 1. The sum of the direct and indirect changes in the last 3 columns of the table is equal to the change in value from previous period recorded in column 5.

[3]Four-year period.

lizer use and other production practices, improved its economic advantage. A favorable position for export markets, the development of grain sorghum marketing and processing facilities and an increasing awareness of the feeding value of grain sorghum favored producers in the State with an increasing demand for their product as their production expanded.

Texas contributes a large part to the Nation's total grain sorghum production, Figure 9. The State's production has varied from 40 to 74 percent of the Nation's total since 1935. Acreage harvested in the State has varied from 35 to 70 percent of the Nation's acreage. Thus, yield per acre in Texas averages slightly higher than in the United States as a whole.

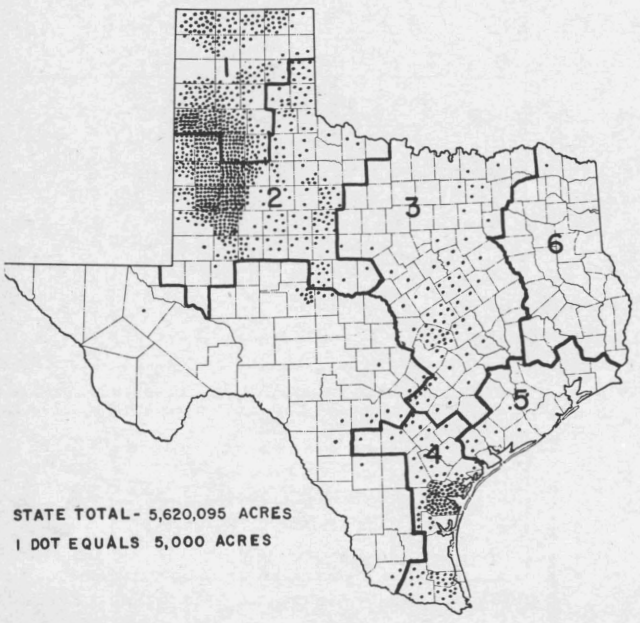


Figure 11. Location of grain sorghum production in Texas. Based on census enumeration of acreage harvested in 1954.

STATEWIDE TRENDS

The trend is one of rather marked increase in grain sorghum production in the State, Figure 10. But there has been rather sharp reversals in some years. From a low of 20 million bushels in 1936 it climbed to almost 100 million in 1944, but dropped to 59 million in 1945. It climbed again to almost 145 million bushels in 1950, and again reversed itself to reach a low 54 million in 1952. With the exception of a slight setback in 1956 it has shown marked increases since. The 238 million bushels grown in 1957 were 60 percent greater than the previous record of 148 million in 1955. The 1958 crop was estimated at 273 million bushels. The 1954-58 average production of 184 million bushels was about six times as large as the 1935-39 average of 30 million. A least-squares trend equation showed production increased by about 4.5 million bushels a year during 1935-55.

The pattern of acreage harvested is similar to that of production, although increases have not been as large. There were three exceptions.

TABLE 9. PROPORTION OF TOTAL STATE ACREAGE OF GRAIN SORGHUM GROWN IN SPECIFIED DISTRICTS BY CENSUS YEARS

District	Census years			
	1939	1944	1949	1954
	Percent			
1	12.2	22.6	25.5	33.0
2	71.2	64.5	46.5	44.7
3	9.1	4.3	9.3	7.4
4	3.2	5.5	11.9	11.5
5	.6	.3	.6	1.0
6	.5	.1	.2	.1
Other districts	3.2	2.7	6.0	2.3
State total	100.0	100.0	100.0	100.0

TABLE 10. RELATIVE CHANGE SINCE 1939 IN ACREAGE OF GRAIN SORGHUM HARVESTED BY DISTRICTS AND CENSUS YEARS

District	Census years			
	1939	1944	1949	1954
	Percent			
1	100	410	327	686
2	100	201	102	160
3	100	104	161	208
4	100	378	579	909
5	100	122	145	427
6	100	35	48	36
State total	100	222	157	255

In 1939 acreage harvested increased but production decreased, from the previous year; in 1949 acreage harvested decreased, but production increased, over 1948; and in 1953 there was a slight decrease in acreage harvested accompanied by a slight increase in production over that of 1952. A least-squares trend equation showed an increase of 150 thousand acres a year during 1935-55.

Yields show considerable change from year to year, a result of seasonal weather variation in areas where grain sorghum is grown. However, there was a rather consistent upward trend in State yields throughout the period studied. Annual average yields varied from 11 bushels in 1936 to an estimated 35.5 bushels in 1958. The 5-year average yield of 1954-58 was 28.8 bushels per acre, twice the 14.2 bushel average in 1935-39. A least-squares trend equation indicates yield increased by about one-half bushel per acre per year in 1935-55.

Factors contributing to the increase in yields cannot be identified separately and their effect measured. The adoption of improved varieties, developed in the 1930's, and an increase in supplemental irrigation probably were major contributing factors. Increased use of higher yielding hybrids no doubt helped improve yields beginning in 1957. Possibly better land preparation, seeding and cultivation, as well as increased use of fertilizer, contributed to higher yields. Too, as acreage controls were put into effect on cotton and wheat, land formerly used for those crops was shifted to grain sorghum. This diverted acreage may have been more productive in general than land formerly used for grain sorghum.

The change in value, price and production by 5-year periods, and the relative importance of price and production in contributing to the change in value from one period to another, are shown in Table 8. The increase in production from the late 1930's to the early 1940's was about twice as important as the change in price in contributing to an increase in value of the grain sorghum crop to more than three times its 1935-39 average. Price was the main factor in the increase in value from the early to the late 1940's. Increases in value of the crop in the two periods since 1950 were a result of increases in production sufficiently great to more than compensate for decreases in the average price that occurred in both periods.

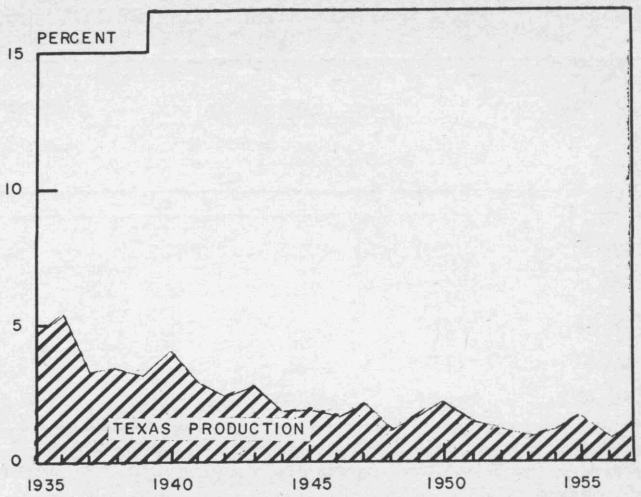


Figure 12. Proportion of total U. S. production of corn grown in Texas, 1935-57.

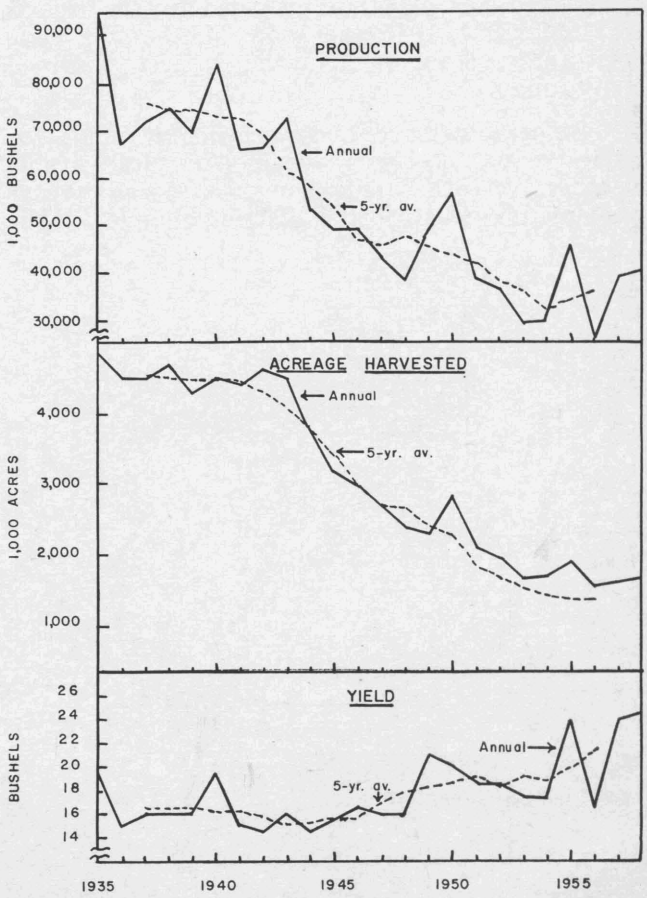


Figure 13. Corn: annual and 5-year moving average of production, acreage harvested and yield in Texas, 1935-58.

TABLE 11. CORN: CHANGE IN THE AVERAGE VALUE, PRODUCTION AND PRICE BY 5-YEAR PERIODS AND THE RELATIVE CONTRIBUTION OF PRODUCTION AND PRICE TO THE CHANGE IN VALUE

Periods	Index of change in			Change in value from previous period	Amount of change in value attributed directly to change in[1]		Amount of change in value attributed to interaction of changes in production and price[2]
	Value	Production	Price		Production	Price	
	Percent						
1935-39	100.0	100.0	100.0	—	—	—	—
1940-44	133.7	91.9	144.3	33.7	—8.1	44.3	—2.5
1945-49	149.0	60.8	244.3	11.4	—33.9	69.3	—24.0
1950-54	124.4	50.8	242.6	—16.5	—16.4	—0.7	0.6
1955-58[3]	98.4	50.0	195.1	—20.9	—1.5	—19.6	0.2

[1]The percentage contribution of price to the change in value shown here assumes production remains the same, and contribution of production to change in value assumes price remains the same.

[2]A residual of change in value not accounted for by changes in price and production under assumptions outlined in footnote 1. The sum of the direct and indirect changes in the last 3 columns of the table is equal to the change in value from previous period recorded in column 5.

[3]Four-year period.

DISTRICT TRENDS

The location and concentration of grain sorghum acreage in the State are shown in Figure 11. There are scattered small acreages in some counties and districts not shown on the map.

The only data available for discussing changes that occurred in the major production areas in Texas are that provided by the census for 1939, 1944, 1949 and 1954. These data have been analyzed for each of the districts outlined on the map.

Since data by districts are not available for other years, highly favorable or unfavorable weather, or other conditions, in census years possibly may distort the district changes. The State data in Figure 10 show that 1944 acreage was high, compared with that of years before and after, and that 1949 acreage was low. Thus the higher 1944 acreage compared to 1939 shown for the State and some districts exaggerates the trend during that period. Similarly, the lower acreage of 1949 compared to 1944 distorts the change in the late 1940's.

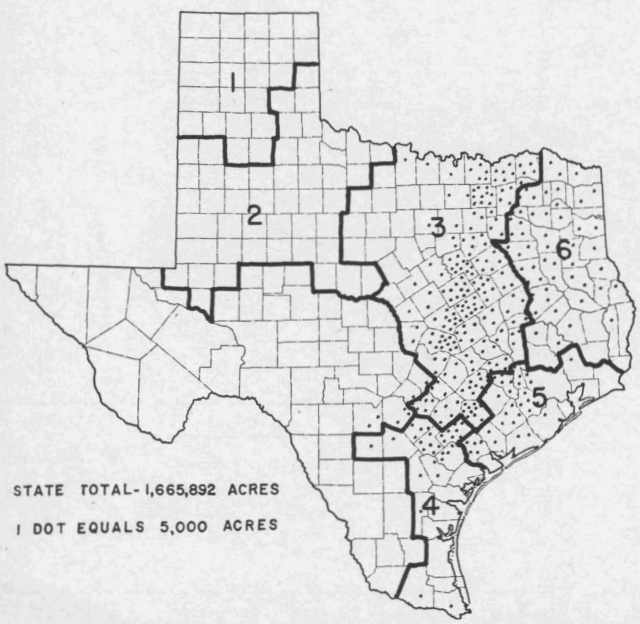


Figure 14. Location of corn production in Texas. Based on census enumeration of acreage harvested in 1954.

In spite of the high and low status of the 1944 and 1949 data from that which preceded and followed those years, the 1954 census data compared with that of 1939 probably indicates fairly accurately the changes that took place in the State and its major districts. This characteristic of the 1944 and 1949 census data does not affect its reliability in determining changes in the relative importance of the different districts in contributing to the State's total production.

The relative importance of the districts' contribution to total State acreage by census years is shown in Table 9. The proportion grown in District 1 showed a consistent increase from one

TABLE 12. PROPORTION OF TOTAL STATE ACREAGE OF CORN GROWN IN SPECIFIED DISTRICTS BY CENSUS YEARS

Districts	Census years			
	1939	1944	1949	1954
	Percent			
1	0.4	0.6	0.4	0.4
2	3.7	4.2	2.6	.7
3	55.7	56.6	56.9	61.0
4	5.7	11.1	11.7	10.2
5	8.0	6.7	7.5	10.5
6	23.0	15.7	16.1	15.5
Rest of State	3.5	5.1	4.8	1.7
State total	100.0	100.0	100.0	100.0

census year to another, contributing 12 percent in 1939, compared with 33 percent in 1954.

Although the greatest proportion of the State's total acreage of grain sorghum is grown in District 2, this acreage showed a consistent decline from one census year to another. It was 71 percent of total acreage in 1939 and only 45 percent in 1954.

While other districts grow relatively small proportions of the State's total acreage, District 4 expanded considerably in the late 1930's and in the 1940's. The district contributed over 11 percent of the total State acreage in 1949 and 1954, compared with only 3 percent in 1939.

The data show a change in the relative importance of the districts in the State's overall acreage in grain sorghum. While the proportion of the State's total acreage grown in District 2 was only about 45 percent in 1954 as compared with 71 percent in 1939, the total acreage grown in District 2 was almost 60 percent greater in 1954 than in 1939, Table 10. While District 4 grew slightly more than 11 percent of the State acreage in 1954 compared with 3 percent in 1939, the district had more than nine times as much acreage in grain sorghum in 1954 as in 1939, the largest percentage expansion in acreage among the districts. These two examples show that overall acreage in Texas was expanding during the period, and a decrease in importance, such as occurred in District 2, was because acreage did not increase as rapidly in that district as it did in others.

The 1954 acreage in District 4 was nine times as large as in 1939. Acreage expanded in sections and on farms where it was previously grown in the district, but acreage also expanded into other sections in the district—for example, into the four counties making up the lower tip of Texas.

District 1 showed the next greatest change with 1954 acreage almost seven times that of 1939. The increase occurred by grain sorghum expanding north and east in the district as well as greater intensity of acreage in the southwest corner.

District 5 also showed considerable increase —a 1954 acreage over four times as large as 1939. However, the district is relatively unimportant in grain sorghum production; rice is the major crop.

Corn

Corn can be grown in most of Texas. However, competition with corn produced under optimum conditions in the Corn Belt States, and other crops that have economic advantages or are better adapted, has limited its production in several areas of the State.

TABLE 13. RELATIVE CHANGE SINCE 1939 IN ACREAGE OF CORN HARVESTED FOR GRAIN BY DISTRICTS, CENSUS YEARS

Districts	Census years			
	1939	1944	1949	1954
	Percent			
1	100.0	146.3	56.7	49.2
2	100.0	94.8	36.9	7.3
3	100.0	85.5	53.0	42.6
4	100.0	163.8	106.0	69.1
5	100.0	69.9	48.3	50.9
6	100.0	57.5	36.2	26.2
Rest of State	100.0	121.5	71.2	18.9
State total	100.0	84.1	51.9	38.9

Corn, unless irrigated, grows best in Texas east of the 30-inch rainfall belt. In addition to soil moisture conditions, high temperatures and low humidity frequently damage corn west of this area, except on the High Plains. Insufficient moisture late in the growing season, lack of adequate soil fertility and poor soil physical conditions probably are most responsible for low yields of corn in the State.

Texas acreage and production have decreased as a proportion of the Nation's total corn crop

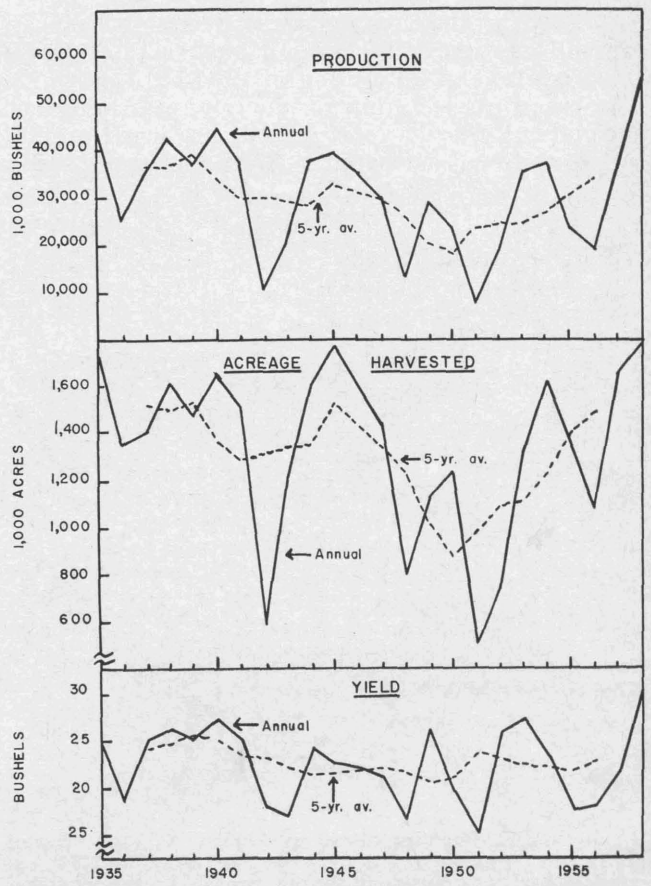


Figure 15. Oats: annual and 5-year moving average of production, acreage harvested and yield in Texas, 1935-58.

TABLE 14. OATS: CHANGE IN THE AVERAGE VALUE, PRODUCTION AND PRICE BY 5-YEAR PERIODS AND THE RELATIVE CONTRIBUTION OF PRODUCTION AND PRICE TO THE CHANGE IN VALUE

Periods	Index of change in			Change in value from previous period	Amount of change in value attributed directly to change in[1]		Amount of change in value attributed to interaction of changes in production and price[2]
	Value	Production	Price		Production	Price	
	Percent						
1935-39	100.0	100.0	100.0	—	—	—	—
1940-44	131.2	83.2	155.9	31.2	—16.8	55.9	—7.9
1945-49	193.1	80.7	238.2	47.2	—3.1	52.8	—2.5
1950-54	161.9	67.8	235.3	—16.1	—15.9	—1.2	1.0
1955-58[3]	176.2	89.8	194.1	8.8	32.5	—17.5	—6.2

[1]The percentage contribution of price to the change in value shown here assumes production remains the same, and contribution of production to change in value assumes price remains the same.

[2]A residual of change in value not accounted for by changes in price and production under assumptions outlined in footnote 1. The sum of the direct and indirect changes in the last 3 columns of the table is equal to the change in value from previous period recorded in column 5.

[3]Four-year period.

from the late 1930's to recent years. Annual production has varied between 5.4 and less than 1 percent of total U. S. production since 1935, Figure 12. State acreage was a larger proportion of total U. S. acreage than was production, varying from 6.7 to 2.4 percent. This indicates lower yields per acre in Texas than the average for the Nation.

STATEWIDE TRENDS

Corn production in Texas declined from an annual average of 76 million bushels in 1935-39 to an average of 36 million in 1954-58, Figure 13. The trend of declining production was apparent throughout the 24-year period, although annual ups and downs occurred. A least-squares trend equation shows an annual decrease of 2.6 million bushels a year during 1935-56.

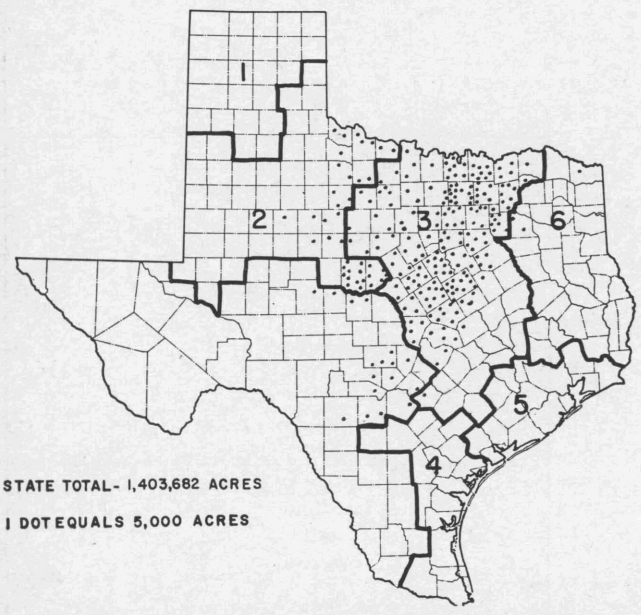


Figure 16. Location of oat production in Texas. Based on census enumeration of acreage harvested in 1954, expanded by an adjustment based on AMS crop-reporting estimates in those counties omitted from the census enumeration. The census-reported State total was 742,020 acres.

Acreage harvested declined from an average of 4½ million a year in 1935-39 to less than 2 million in 1954-58. A least-squares trend equation indicates an annual decrease of 179,250 acres during 1935-56.

The average annual yield per acre in the State varied between 14 and 24 bushels. Yields have been somewhat higher in the 1950's than previously. The average annual yield was 21.4 bushels per acre during 1954-58, compared with 16.5 bushels in 1935-39.

The farm value of corn for grain was 33.7 percent higher in the early 1940's than the late 1930's, Table 11. An increase in price more than offset a decrease in production in contributing to the increase in value. From the early to the late 1940's, the price rose 69 percent to bring about an 11-percent increase in value in spite of a 34-percent decrease in production. The decline in production from the late 1940's to the early 1950's, with the price only slightly lower, caused a 16.5-percent decline in value. Lower prices caused most of the 20.9-percent decline in value of the corn crop in the past 4 years from the 1950-54 average.

DISTRICT TRENDS

The concentration of corn acreage in Texas based on the 1954 census, is shown in Figure 14. Some corn is grown in all districts, but does not show up in some districts on the map, since some counties had less than 2,500 acres.

The heaviest concentration of corn acreage is in District 3, but little is grown in the northwest part of the district. Most of the acreage in District 4 is in the northern part.

The proportion of the State's total acreage by districts and census years is shown in Table

TABLE 15. PROPORTION OF TOTAL STATE ACREAGE OF OATS GROWN IN SPECIFIED DISTRICTS BY CENSUS YEARS

Districts	Census years		
	1939	1944	1949
	— — — — Percent — — — —		
1	2.2	3.9	1.6
2	9.4	18.5	16.6
3	77.5	56.9	58.0
4	.2	1.1	1.3
5		1.0	.5
6	2.8	1.2	.9
Rest of State	7.9	17.4	21.1
State total	100.0	100.0	100.0

12. There has been little change in the concentration of corn acreage for grain since 1939. The proportion of the State acreage grown in District 3 was 61 percent in 1954 compared with 56 percent in 1939. District 3 grows 55 to 60 percent of the total State acreage, District 6 grows 15 to 20 percent, and Districts 4 and 5 grow 6 to 12 percent, respectively.

The 1954 State acreage was only 40 percent as large as that of 1939, Table 13. Acreage in District 3 was 43 percent of the 1939 acreage. Acreage in Districts 4 and 5 did not decrease as much percentagewise as did the overall State acreage. District 6 grew only 26 percent as much acreage in 1954 as in 1939.

Oats

Oats are adapted to a wide range of soils but grow best on deep, fertile, well-drained loams. Wide fluctuations occur in harvested acreage because of winterkilling (1942, 1943, 1948 and 1951), diseases and drouth. Oats are a low-value crop and when conditions are not favorable for grain maturity the farmer continues using them for winter pasture and grazes them off.

Oat production for grain in Texas is a small portion of total U. S. production. Annual production in the State varied from less than 1 to 3.9 percent of total U. S. oat production during the 24-years studied. The State acreage harvested for grain was a somewhat greater proportion of the national acreage, varying from 1.4 to 4.7 percent. Texas generally has a lower yield than the U. S. average.

TABLE 16. RELATIVE CHANGE SINCE 1939 IN ACREAGE HARVESTED OF OATS IN DISTRICTS 1 AND 2 BY CENSUS YEARS

Districts	Census years		
	1939	1944	1949
	— — — — — Percent — — — — —		
2	100.0	203.5	144.6
3	100.0	76.3	61.7

STATEWIDE TRENDS

The principal characteristic of oat production in Texas is the large year-to-year change, Figure 15. However, there appeared to be a tendency toward decreasing production from the late 1930's to the middle 1950's. The 5-year average production was 36 million in the late 1930's compared with 25 million in 1950-54. Production during 1935-57 varied between a high of 44.6 million bushels in 1940 and a low of 7.5 million bushels in 1951. The large 1958 crop was estimated at 53 million bushels. A least-squares trend equation showed a decrease of 726 thousand bushels a year during 1935-56.

Acreage harvested for grain also changes widely from year to year. It varied between a high of 1.8 million acres and a low of .5 million. A least-squares trend equation showed a decrease of 19 thousand acres a year in 1935-56. The trend toward less acreage for grain may be caused by increased use of the crop for livestock pasture.

Yield per acre varied between 27 bushels and 15 bushels. The 5-year average yield of 24 bushels in the late 1930's was only slightly greater than 22.6 bushels in 1954-58.

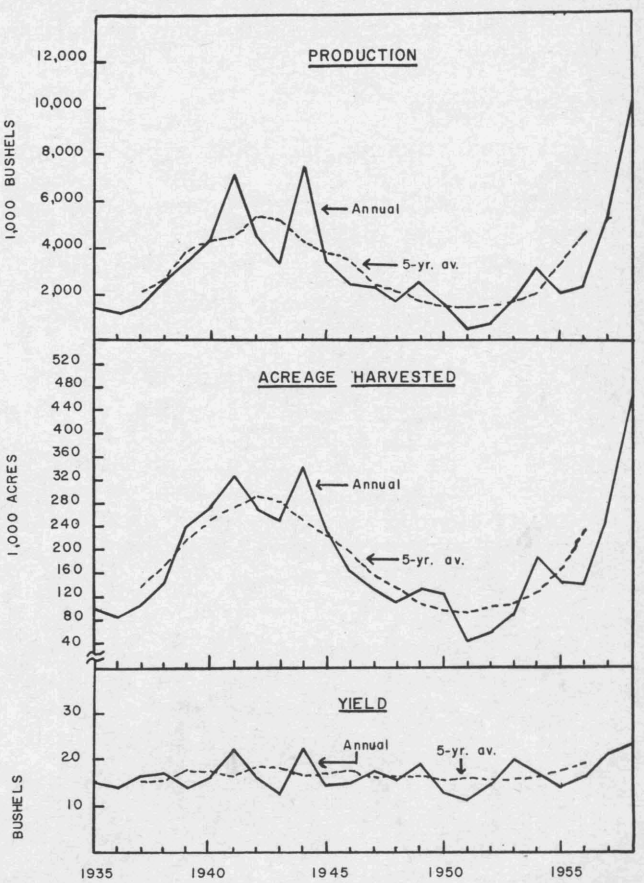


Figure 17. Barley: annual and 5-year moving average of production, acreage harvested and yield in Texas, 1935-58.

TABLE 17. BARLEY: CHANGE IN THE AVERAGE VALUE, PRODUCTION AND PRICE BY 5-YEAR PERIODS AND THE RELATIVE CONTRIBUTION OF PRODUCTION AND PRICE TO THE CHANGE IN VALUE

Periods	Index of change in			Change in value from previous period	Amount of change in value attributed directly to change in[1]		Amount of change in value attributed to interaction of changes in production and price[2]
	Value	Production	Price		Production	Price	
	Percent						
1935-39	100.0	100.0	100.0	—	—	—	—
1940-44	386.6	259.2	147.8	286.6	159.2	47.8	79.6
1945-49	300.9	121.2	245.7	—22.2	—53.2	66.2	—35.2
1950-54	186.4	76.7	241.3	—38.1	—36.7	—1.8	0.4
1955-58[3]	467.4	242.8	191.3	150.8	216.5	—20.7	—45.0

[1]The percentage contribution of price to the change in value shown here assumes production remains the same, and contribution of production to change in value assumes price remains the same.

[2]A residual of change in value not accounted for by changes in price and production under assumptions outlined in footnote 1. The sum of the direct and indirect changes in the last 3 columns of the table is equal to the change in value from previous period recorded in column 5.

[3]Four-year period.

A 56-percent increase in average price more than offset a 17-percent decrease in average production from the late 1930's to the early 1940's to cause a 31-percent increase in the value of the Texas oat grain crop, Table 14. Increase in price also accounted for the increase in value from the early 1940's to the late 1940's, with production only slightly lower. A decline in production was the major cause of a decrease in value in the early 1950's. In summary, price was the more dominant factor contributing to value change in the 1940's but was more stable than production in the 1950's.

DISTRICT TRENDS

Oat production in the State is heavily concentrated in District 3, Figure 16. However, there is little production in the lower eastern and southern tip of the district. There also is a concentration of oat production along the eastern boundary of District 2.

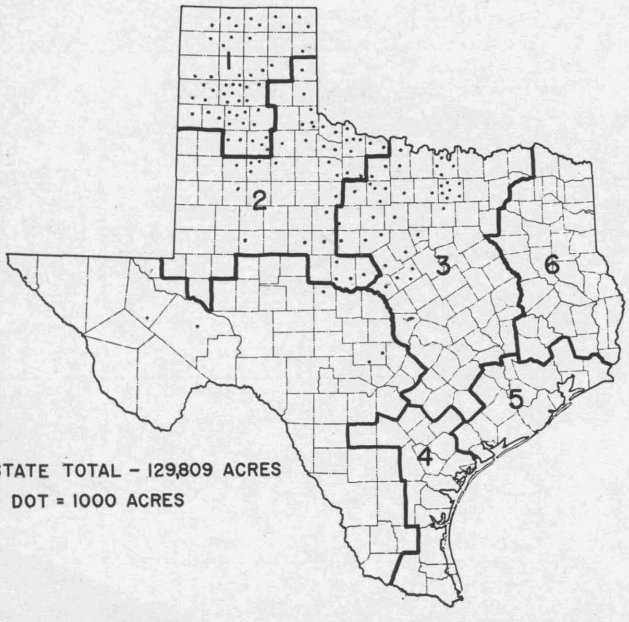


Figure 18. Distribution of barley in Texas, 1954.

District 3 grows over half of the State's total acreage, Table 15. In 1939 over 77 percent of total acreage was grown in the district, but the proportion dropped to 57 and 58 percent in 1944 and 1949, respectively. Because of incomplete county coverage by the 1954 census, data for years later than 1949 are not available.

District 2 grew about 9 percent of the State acreage in 1939, compared with over 18 percent in 1944. It grew slightly less than 17 percent in 1949.

Acreage grown in District 3 in 1944 was only 76 percent of the amount grown in 1939, Table 16. The 1949 acreage was even lower—only 62 percent of the 1939 acreage.

The 1944 acreage in District 2 was over twice the amount grown in 1939, but the 1949 acreage was only 45 percent above the 1939 acreage.

Acreage in other districts is relatively small. There has been an increase in oat acreage since 1939 in areas bordering the lower western boundary of District 3 and below the southeast corner of District 2.

Barley

Barley ranks well below other feed grains in acreage and farm value as a Texas crop. While it can be grown on many soil types it does best on well-drained loams. It is not well adapted to sandy soils or poorly drained soils and does not grow well in areas of high rainfall.

Although a large portion of the U. S. domestic disappearance of barley is used as feed, about one-fourth is used for alcohol and alcoholic beverages. A larger portion was used for this latter purpose in the last decade than in the late 1930's and early 1940's.

Texas produces only a small portion of the total U. S. barley crop. Usual production in the early 1940's exceeded 1 percent of total U. S. production, but has been less than 1 percent since the late 1940's.

STATEWIDE TRENDS

Production varied between .5 and 7.5 million bushels from 1935 through 1957, with the peak in 1944, Figure 17. However, the 1958 record crop was estimated at over 10 million bushels. Average production in the late 1930's was slightly over 2 million bushels. This compares with an average of over 5 million in the early 1940's, 2.5 million in the late 1940's and 4.6 million bushels in 1954-58. The latter period average was considerably influenced by the heavy 1958 crop.

Acreage varied between 45 thousand in 1951 and 441 thousand in 1958. The 1935-39 average of 136 thousand compares with 291 thousand in the early 1940's, 156 thousand in the late 1940's, 102 thousand in the early 1950's and 237 thousand in the 1954-58 period.

The average yield per acre for the State varied between 11.5 and 23 bushels. The 5-year moving average shows no tendency for yields to increase. Yields were somewhat higher in the 1940's than the late 1930's. The 1954-58 average yield was 19.5 bushels compared with 15.2 during 1935-39, but the recent 5-year average was influenced by a 21-bushel-per-acre yield in 1957 and an estimated 23 bushels in 1958.

A 159-percent increase in average annual production from the late 1930's to the early 1940's, along with a 48-percent increase in average price, contributed to a 287-percent increase in average farm value of the barley crop, Table 17. Decreases in production in the late 1940's more than offset increases in price to cause a 22-percent decline in value. Further declines in production in the early 1950's caused the value of the barley crop to drop still more. Production in 1954-58 was over three times the 1950-54 average, and counterbalanced a 21-percent lower price level to increase the value by 151 percent.

DISTRICT TRENDS

Most of the barley in Texas is produced in Districts 1, 2 and 3, Figure 18.

TABLE 18. PROPORTION OF STATE ACREAGE OF BARLEY GROWN IN SPECIFIED DISTRICTS BY CENSUS YEARS

District	Census years			
	1939	1944	1949	1954
	Percent			
1	35.2	64.2	37.3	32.4
2	21.8	11.7	20.5	27.0
3	39.0	21.3	34.3	32.7[1]
Other districts	4.0	2.8	7.9	7.9[1]
State total	100.0	100.0	100.0	100.0

[1]Since the census did not enumerate barley acreage in 1954 in some counties where it is grown, the acreage for District 3 and the State was estimated. The basis for estimating total 1954 acreage in District 3 was the percentage change that occurred between 1949 and 1954 in the acreage in counties that were enumerated. A similar basis was used in estimating total State acreage in 1954.

From 92 to 97 percent of the total acreage was grown in those three districts during recent census years, Table 18. The census data show no significant trend in proportions grown in the districts, even though marked changes occurred from one census to another. Rather, it appears that the proportion by districts varied between census years because of weather or other unpredictable factors.

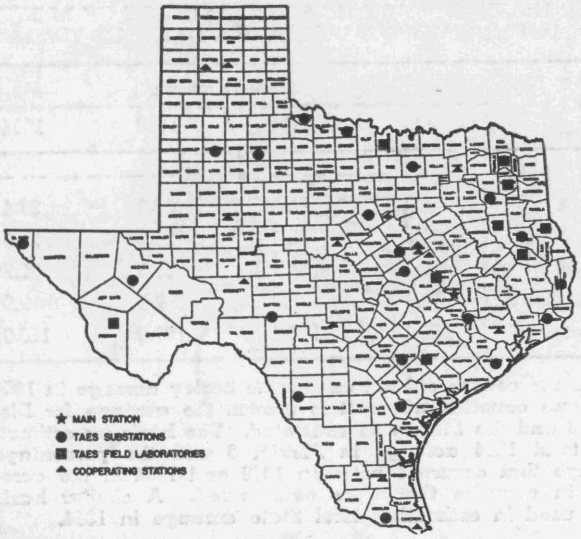
District 1, as an example, grew 64 percent of the total State acreage in 1944 compared with only 35 percent in 1939. However, the proportions grown in the district dropped to 37 percent in 1949 and 32 percent in 1954—proportions similar to the 1939 level.

District 2 grew 22 percent of total acreage in 1939, only 12 percent in 1944, 20 percent in 1949 and 27 percent in 1954.

Districts 1 and 3 usually contribute roughly a third each to the State's total production, while District 2 contributes about a fourth.

ACKNOWLEDGMENTS

This study was made under the Texas Agricultural Experiment Station's State Contributing Project to the Southern Regional Cooperative Grain Marketing Project No. SM-11, "Marketing and Utilization of Grain in the South."



Location of field research units of the Texas Agricultural Experiment Station and cooperating agencies

State-wide Research

★

The Texas Agricultural Experiment Station is the public agricultural research agency of the State of Texas, and is one of ten parts of the Texas A&M College System

ORGANIZATION

IN THE MAIN STATION, with headquarters at College Station, are 16 subject-matter departments, 2 service departments, 3 regulatory services and the administrative staff. Located out in the major agricultural areas of Texas are 21 substations and 9 field laboratories. In addition, there are 14 cooperating stations owned by other agencies. Cooperating agencies include the Texas Forest Service, Game and Fish Commission of Texas, Texas Prison System, U. S. Department of Agriculture, University of Texas, Texas Technological College, Texas College of Arts and Industries and the King Ranch. Some experiments are conducted on farms and ranches and in rural homes.

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THE TEXAS STATION is conducting about 400 active research projects, grouped in 25 programs, which include all phases of agriculture in Texas. Among these are:

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Conservation and use of water
Grasses and legumes
Grain crops
Cotton and other fiber crops
Vegetable crops
Citrus and other subtropical fruits
Fruits and nuts
Oil seed crops
Ornamental plants
Brush and weeds
Insects
Beef cattle
Dairy cattle
Sheep and goats
Swine
Chickens and turkeys
Animal diseases and parasites
Fish and game
Farm and ranch engineering
Farm and ranch business
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Rural home economics
Rural agricultural economics
Plant diseases

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AGRICULTURAL RESEARCH seeks the WHATS, the WHYS, the WHENS, the WHERES and the HOWS of hundreds of problems which confront operators of farms and ranches, and the many industries depending on or serving agriculture. Workers of the Main Station and the field units of the Texas Agricultural Experiment Station seek diligently to find solutions to these problems.

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