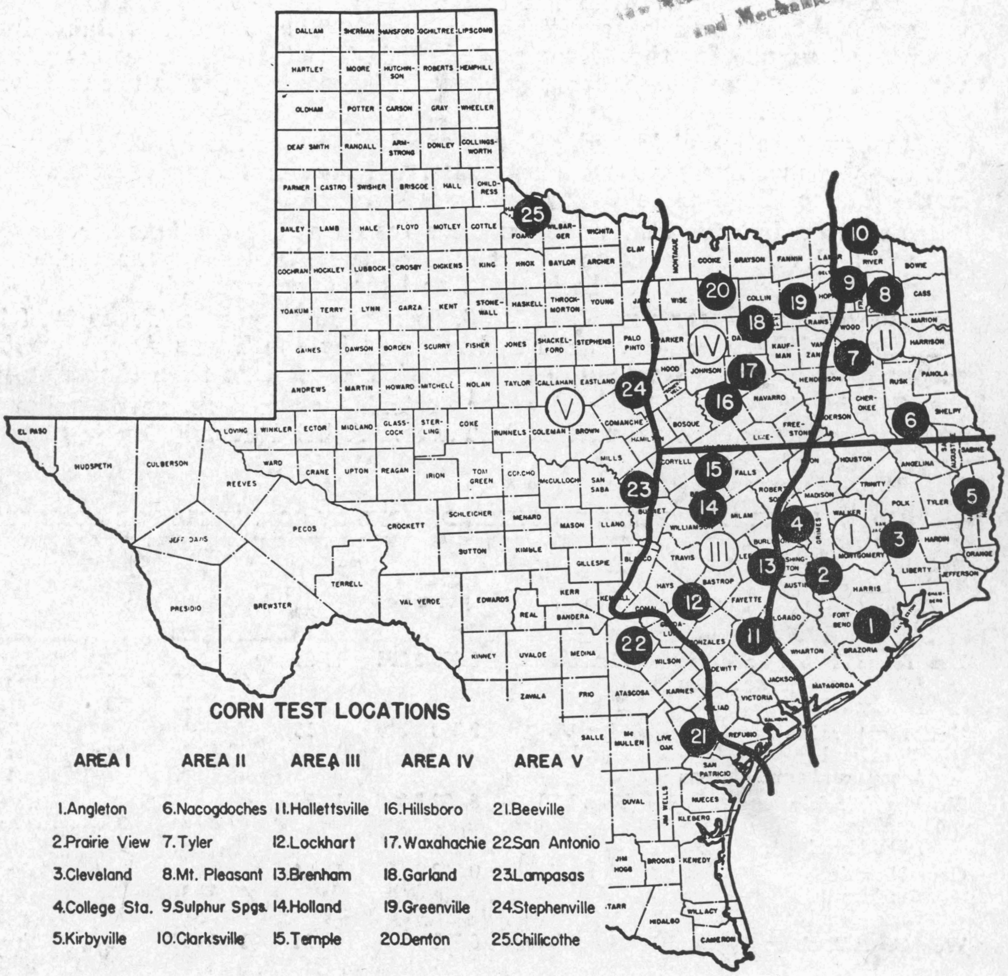
Bulletin 878

Corn Hybrids for Texas



August 1957

TEXAS AGRICULTURAL EXPERIMENT STATION
R. D. LEWIS, DIRECTOR, COLLEGE STATION, TEXAS

DIGEST

Corn hybrids were planted on 81 percent of the Texas corn acreage in 1956. Most of this acreage was devoted to hybrids developed and released by the Texas Agricultural Experiment Station. These hybrids usually outyield open-pollinated varieties by 20 to 40 percent.

Annual Texas corn production is almost 35,000,000 bushels produced on approximately 2,000,000 acres. The low average yield of 17 bushels per acre is caused by insufficient moisture, high temperatures and hot dry winds which are encountered frequently in Texas from the middle of June on through the summer. Corn should be planted to tassel early in June to escape partially the effect of these environmental factors which restrict yields.

Cultural and management practices which supply the high moisture and fertility requirements of corn are essential for good production. General recommendations for these important practices are summarized in Table 1. Adherence to these recommended practices by corn growers throughout the State should result in at least a doubling of the average yield per acre.

Corn performance tests are conducted throughout the corn-growing region of Texas each year to provide growers with information to be used as a basis for selecting the hybrids best suited to the various soil and climatic conditions in Texas. This bulletin contains information on hybrid and variety performance for the 3-year period, 1954-56, at 23 locations over the State. Texas has been divided into five areas for testing purposes. These areas, with the test locations in each, are shown on the front cover.

Information on yield and other characteristics of the hybrids and varieties is presented in tabular form as 3-year averages for each location and each area. In addition, the 1956 results for three tests in the Lower Rio Grande Valley are included.

Fourteen hybrids and varieties were tested at all locations for the 3-year period, 1954-56, and 10 hybrids and varieties were tested at all locations for the 6-year period, 1951-56. Texas 28 was the highest yielding hybrid for both the 3 and the 6-year period.

During the 3-year period, 1954-56, four yellow hybrids, Texas 32, 34, 36 and 38, and a white hybrid, Texas 17W, were developed and released by the Texas Agricultural Experiment Station. These newer hybrids are better adapted for specific conditions than the older hybrids.

Considering both yield and other desirable characters, seven yellow and two white hybrids are recommended for corn production in Texas. A brief description is given of these hybrids with their areas of adaptation.

TABLE 1. GENERAL RECOMMENDATIONS BY SOIL AREAS FOR CORN PRODUCTION IN TEXAS

Soil areas	Planting dates	Plants per acre	Spacing, inches in row	Fertilizer at planting time[1]	Side-dressing of nitrogen[2]	Soil-improving legumes	Hybrids
East Texas Timber Country	Mar. 5-30	6,500-9,000	18-24			Hairy vetch, Singletary peas, Austrian Winter peas, lespedeza	30, 28, 26, 32, 101W, 17W
Loams and sandy loams				30-60-30	60		
Sandy soils				30-60-60	60		
Gulf Coast Prairie	Mar. 15-Apr. 15	9,000	18			Melilotus indica, Hubam, Madrid and Floranna sweetclovers	34, 30, 28, 101W
Blackland				40-40-0	40		
Loams and sandy loams				40-40-20	60		
Blackland Prairie	Mar. 1-20	6,500-9,000	18-24			Hubam, Madrid and Evergreen sweetclovers	28, 36, 26, 30 17W, 101W
Blackland				40-40-0	30		
Mixed land				40-40-20	30		
Grand Prairie	Mar. 1-20	6,500	24			Hubam, Madrid and Evergreen sweetclovers	28, 36, 38 17W
Blackland				40-40-0	30		
Mixed land				40-40-20	30		
West Cross Timbers	Mar. 15-30	6,500	24	15-30-15	30	Hairy vetch, Hubam and Madrid sweetclovers	28, 36, 38 17W
Rio Grande Plain	Feb. 15-Mar. 1	6,500	24			Hubam, Floranna and Melilotus indica sweetclovers	36, 28, 17W
Blackland				20-0-0	30		
Sands and sandy loams				20-40-0	30		
Lower Rio Grande Valley and Winter Garden dist. (under irrigation)	Feb. 1-Mar. 1	13,000-16,000	12			Hubam and Melilotus indica sweetclovers	30, 32
Clays and loams				40-40-0	90		
Sands and sandy loams				40-80-0	90		
Rolling Plains	Mar. 25-Apr. 10	6,500	24			Alfalfa, hairy vetch, Hubam and Madrid sweetclovers	38, 36, 28
Clay loams				20-20-0	30		
Sands and sandy loams				30-30-0	30		
High Plains (irrigated)	Apr. 10-May 1	9,000-12,000	18			Alfalfa, hairy vetch and sweetclovers	28, 30, 36
Clay loams				30-0-0	60		
Sands and sandy loams				30-30-0	60		

[1]Shown as pounds per acre of nitrogen (N), phosphoric acid (P_2O_5) and potash (K_2O), respectively.
[2]Shown as pounds per acre of nitrogen (N).

Corn Hybrids for Texas

A. J. BOCKHOLT, J. S. ROGERS and J. W. COLLIER*

CORN HYBRIDS have largely replaced open-pollinated varieties in Texas since 1940. It is estimated that 81 percent of the corn acreage of the State in 1956 was planted to hybrids. Most of this acreage was devoted to corn hybrids developed and released by the Texas Agricultural Experiment Station. These hybrids usually outyield the open-pollinated varieties by 20 to 40 percent.

Corn hybrid acreages, total corn acreages and average yields per acre from 1941 through 1956 are shown in Table 2. An increase in the average yield, as a result of the increase in acreage planted to corn hybrids, is not readily apparent from these data. With the exception of several very poor corn years, however, the average yield per acre has increased as a result of the widespread use of improved corn hybrids. More favorable growing seasons will provide better evidence of the ability of these hybrids to increase corn production in Texas.

Corn is one of the more important field crops grown in Texas. Along with grain sorghum, it furnishes the major portion of feed grain produced in the State.

Annual Texas corn production is about 35,000,000 bushels. This amount fluctuates as a result of variable weather conditions and changing acreages. Most of the production is confined to the central and eastern parts of the State where moisture conditions are relatively favorable for corn porduction. Some corn is grown in certain parts of West Texas, but limited rainfall during the growing season in these areas makes corn production hazardous. Corn also is grown on a small portion of the irrigated acreage of the State.

Most of the corn crop is fed on the farm where it is produced. In recent years, however, 25 to 40 percent of the production has been entering commercial channels. About 2.5 percent of the total Texas corn acreage is harvested as silage and about 1 percent of the annual corn crop is used for human consumption.

There has been a marked decline in total corn acreage in Texas in recent years primarily as a result of expanded sorghum acreages. In recent years, the corn acreage has become stabilized at around 2,000,000 acres annually. This trend, as well as the corn hybrid acreage and average peracre yield during 1940-56, are shown in Figure 1.

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TABLE 2. TOTAL CORN ACREAGE, CORN HYBRID ACREAGE, PERCENTAGE OF ACREAGE PLANTED TO CORN HYBRIDS AND AVERAGE YIELD OF CORN IN TEXAS, 1941-56[1]

Year	Harvested acreage	Hybrid acreage	Percentage planted to hybrids	Average yield, bushels per acre
1941	4,546,000	31,820	0.7	15.0
1942	4,910,000	58,920	1.2	14.5
1943	4,714,000	70,710	1.5	16.0
1944	3,960,000	118,800	3.0	14.4
1945	3,394,000	509,000	15.0	16.0
1946	3,156,000	726,000	23.0	17.0
1947	2,809,000	997,000	35.5	16.5
1948	2,584,000	1,305,000	50.5	16.5
1949	2,426,000	1,237,000	51.0	22.5
1950	2,959,000	1,687,000	57.0	21.0
1951	2,249,000	1,451,000	64.5	18.5
1952	2,174,000	1,554,000	71.5	18.5
1953	1,942,000	1,447,000	74.5	16.5
1954	1,967,000	1,426,000	72.5	16.0
1955	2,083,000	1,521,000	73.0	23.5
1956	1,958,000	1,586,000	81.0	13.5
Average	2,989,000			17.2

[1]Data from Agricultural Marketing Service, U. S. Department of Agriculture.

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During this period, the annual harvested corn acreage dropped from slightly under 5,000,000 to a low of less than 2,000,000 in 1956. With the advent of sorghum hybrids, future corn acreages will depend primarily on the relative value of sorghum.

Although a large acreage is planted to corn each year, the total Texas production is limited by the low average yield. The average yield during 1941-56 was only 17.2 bushels per acre. A shortage of moisture during the latter part of the growing season is a major cause of low yield. This limiting effect of insufficient moisture can be reduced through the proper use of fertilizers and soil-improving crops, and the planting of adapted hybrids.

PRODUCTION PRACTICES

Corn grows rapidly and uses a large amount of water and fertilizer elements from the soil in a short time. During its period of rapid growth, corn requires more water per acre than any other field crop. The high requirement for water and plant food elements by corn is because of the large amount of plant material per acre that corn produces. For good corn production, cultural and management practices should be followed that will supply these high requirements. Wider use of such practices and the planting of adapted hybrids should do much to increase corn yields in Texas.

General recommendations by soil areas for corn production in Texas are given in Table 1. The individual farmer should adjust these recommendations to fit his particular situation.

The primary factors limiting corn production in Texas are a shortage of moisture, high maximum temperatures, hot dry winds and low soil fertility. Low moisture and high temperatures seriously limit corn production when they occur during the most critical period in the life of the corn plant, which is approximately 10 days before until 20 days after tasseling. Pollination and development of the ear and grain take place during this period. In Texas, this critical period usually occurs during June and early July.

Unfavorable environmental factors usually become serious limiting factors for most of Texas around the middle of June. Therefore, farmers should adopt practices which would bring their corn into tassel around June 1. This can be done by planting adapted hybrids at the dates recommended in Table 1. When planting is delayed, or if it is necessary to replant, hybrids with earlier maturity should be used.

The low fertility or low-moisture holding capacity of many soils frequently limit corn yields in Texas. Nitrogen and, less frequently, phosphorus and potash applications are required to provide adequate fertility in many areas, Table 1. Recommended soil-improving crops may be used to improve the physical condition and, therefore, the moisture-holding capacity of many soils.

The limiting effect of insufficient moisture also can be reduced through good cultural practices and by using the optimum number of

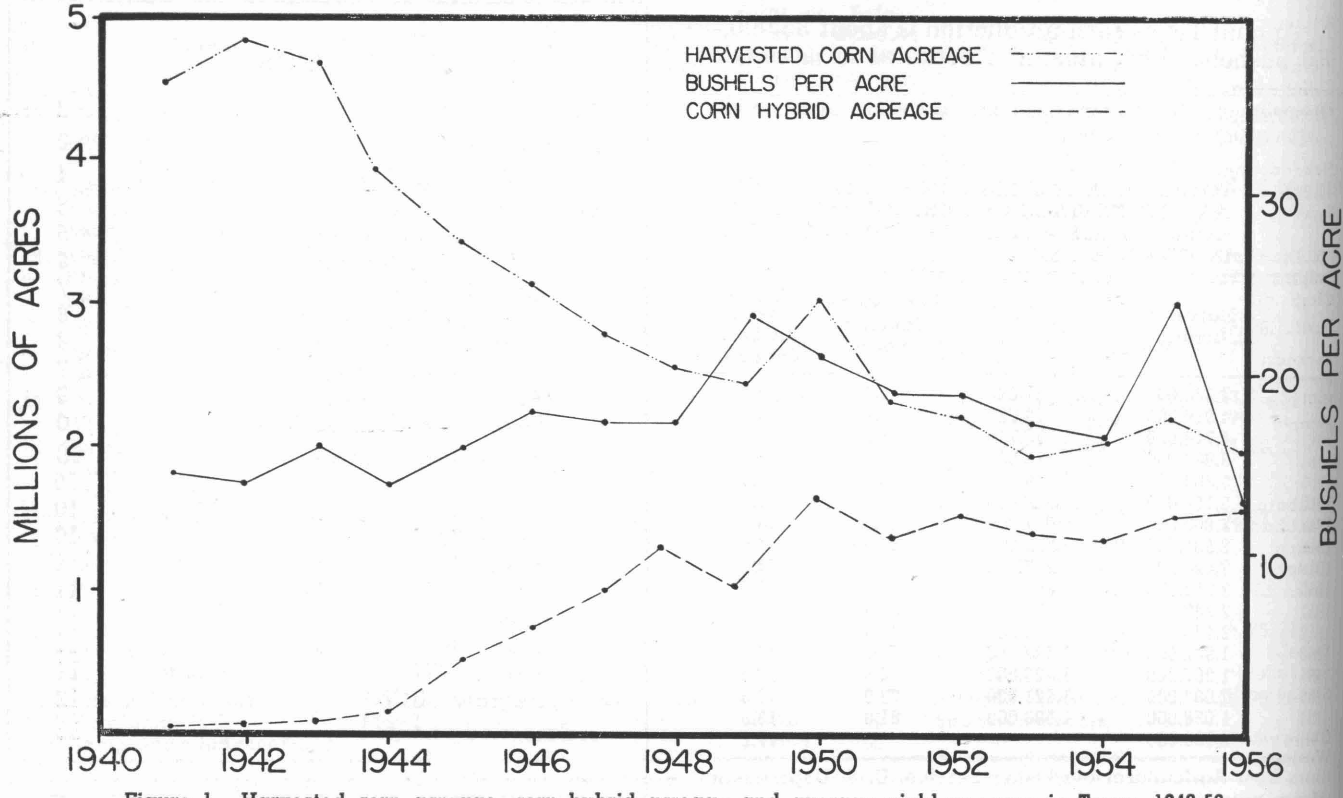

Figure 1. Harvested corn acreage, corn hybrid acreage and average yield per acre in Texas, 1940-56.

corn plants per acre. In areas where shortage of moisture at planting time is a problem, early preparation of the seedbed usually insures enough soil moisture for germination and early seedling growth. Weeds should be controlled by cultivation to keep them from competing with the corn plants for nutrients and soil moisture. Shallow cultivations after the seedling stage are recommended, since deep cultivations destroy or injure many roots and weaken the corn plant, thereby reducing yields.

The optimum number of corn plants per acre, or stand, is largely a problem for the individual grower. The primary factors governing the planting rate are fertility of the soil, the rainfall and the capacity of the soil to store and hold moisture. Generally plant spacings of about 24 inches in the row (6,500 to 7,000 plants per acre) are best in dry areas, and for light sandy soils or soils with medium to low fertility. On highly fertile sandy or sandy loam soils, and on heavier soils with fairly high fertility, spacings of about 18 inches in the row (8,500 to 9,000 plants per acre) are recommended. Under irrigation, spacings of 12 to 9 inches in the row (12,000 to 16,000 plants per acre) are required for maximum yields.

PERFORMANCE TESTS

Corn performance tests are conducted each year at a number of locations in the State to determine which hybrids should be recommended for a particular area. This testing program also affords an opportunity for comparing new hybrid combinations with those now grown throughout the State. New hybrids are released after results from the tests have proved them superior to present hybrids.

Yields based on results of 3 or more years' tests are considerably more reliable than those for 1 year, and furnish satisfactory information on which to predict future performance.

This bulletin contains information on the performance of hybrids for the 3-year period, 1954-56, at 23 locations throughout the State. A summary for the 6-year period, 1951-56, on yield and other characteristics also is presented.

Description of Tests

Texas has been divided into five areas for testing purposes. These areas, with the test locations in each, are shown on the front cover. An

TABLE 3. SOIL TYPES AND METEOROLOGICAL DATA OF LOCATIONS AT WHICH TESTS WERE CONDUCTED

Area and test location	Soil type	Rainfall			Length of growing season			
			Inches				Average date	
		Years of record	Average annual	Average for growing season[1]	Years of record	Average days	Last killing frost in spring	First killing frost in fall
			AREA I					
Angleton	Lake Charles clay	43	48.03	19.27	42	276	Feb. 26	Nov. 29
Cleveland	Hockley fine sandy loam	52	51.15	22.26	53	261	Mar. 7	Nov. 23
Prairie View	Hockley fine sandy loam	54	40.45	17.79				
College Station	Miller clay	10	38.39	17.15	63	259	Mar. 9	Nov. 23
Kirbyville	Bowie fine sandy loam	27	53.84	23.64	27	242	Mar. 16	Nov. 13
			AREA II					
Nacogdoches	Nacogdoches and Bowie fine sandy loam	57	47.02	21.48	56	246	Mar. 17	Nov. 18
Tyler	Kirvin and Bowie fine sandy loam	48	41.80	20.41	46	245	Mar. 18	Nov. 18
Mt. Pleasant	Kirvin fine sandy loam	40	43.87	20.18	40	228	Mar. 25	Nov. 8
Sulphur Springs	Crockett fine sandy loam	42	39.62	19.59	30	245	Mar. 17	Nov. 13
Clarksville	Norwood clay loam	62	47.92	23.34	53	241	Mar. 19	Nov. 15
			AREA III					
Lockhart	Houston Black clay	63	32.83	15.86	63	268	Mar. 3	Nov. 26
Brenham	Houston Black clay	72	39.90	17.35	72	260	Mar. 2	Nov. 17
Holland	Austin clay	60	32.66	15.81	54	257	Mar. 10	Nov. 22
Temple	Austin clay and Houston Black clay	73	34.43	16.35	65	251	Mar. 16	Nov. 22
			AREA IV					
Hillsboro	Houston Black clay	52	36.91	18.15	52	251	Mar. 16	Nov. 22
Waxahachie	Lewisville clay	59	35.05	17.44	46	232	Mar. 25	Nov. 12
Denton	Denton and San Saba clays	42	33.34	16.10	42	228	Mar. 27	Nov. 10
Garland	Houston Black clay	39	34.42	17.07	57	250	Mar. 18	Nov. 23
Greenville	Hunt clay	56	40.18	19.81	55	234	Mar. 23	Nov. 12
			AREA V					
Beeville	Clareville clay loam	61	30.23	14.20	59	287	Feb. 19	Dec. 3
San Antonio	Frio clay loam	83	27.18	12.86	72	279	Feb. 24	Nov. 30
Stephenville	Windthorst and Stephenville fine sandy loam	20	30.32	13.87	20	236	Mar. 23	Nov. 14
Chillicothe	Abilene loam	51	25.12	12.76	50	230	Mar. 22	Nov. 7
Weslaco	Willacy fine sandy loam	32	24.39	10.81	30	329	Jan. 24	Dec. 19

[1]March through July.

attempt was made to include five test locations in each area. The division of the State in this manner affords an opportunity to determine any differences in adaptation to moisture levels or latitudes that may exist among the corn hybrids and varieties tested.

The five areas and test locations in each are shown with the soil type and meteorological data for each location in Table 3. Most of the tests were conducted at substations, but some were grown with cooperating farmers. During this 3-year period, a total of 72 tests were planted with results being obtained from only 45 because of unfavorable climatic conditions.

Each test contained 25 entries. They were selected from Texas hybrids developed by the Texas Agricultural Experiment Station which are now grown by farmers, commercial hybrids developed by commercial seed companies, experimental hybrids developed by the Texas Station and open-pollinated varieties.

Of the 25 entries, 14 were tested at all locations during 1954-56, while at least 15 were kept constant within each area for this same period. Ten were tested during the 6-year period, 1951-56. The remaining entries, which were primarily experimental hybrids, varied with areas and years and are not included in this report. Data are presented for all entries which were tested at all locations in an area for the entire 3-year period.

All tests were designed as 5 x 5 triple lattices with six replications, but were analyzed as randomized blocks since little efficiency was gained from the triple lattice analysis.

A combined analysis was made for each location of the entries which were constant for the 3-year period. Average yields of the individual entries in each test, rather than the individual plot yields, were used in making these combined analyses. Standard errors were computed from the interaction of hybrids x years, and the difference required for significance is reported for each location. A combined analysis also was made for each area, and the differences between hybrids were tested for significance by the within-hybrid variance. The differences required for significance for both areas and individual locations are shown in Tables 6 through 10. The difference in yield between any two entries must equal or exceed the amount shown at the bottom of each column to give odds of 19 to 1 that such difference is real and not due to chance.

Discussion of Results

Weather conditions were extremely unfavorable for corn production during 2 of the 3 test years covered in this report. Insufficient moisture severely reduced corn yields in 1954 and 1956 when the statewide average yields per acre were 16.0 and 13.5 bushels, respectively, Table 2. In

TABLE 4. PERFORMANCE DATA ON YIELD AND OTHER CHARACTERS

Entries	Acre yield, bushels	Root lodging, %	Stalk breakage, %	Unsound ears, %	Worm damage score[1]	Shelling, %	Days to silk	Ears per plant
3-YEAR AVERAGE, 1954-56								
Texas 28	44.3	9.9	11.7	9.3	2.6	81.1	76.1	1.2
Texas 26	44.1	10.2	12.7	9.0	2.8	80.9	75.4	1.2
Texas 32	43.9	8.4	12.4	9.9	3.1	82.1	76.2	1.2
Texas 30	42.5	6.9	9.9	7.6	2.2	80.9	76.3	1.0
Texas 15W	41.3	6.1	7.5	8.5	3.0	80.2	77.1	1.1
Texas 17W	40.1	6.1	7.7	7.5	2.5	79.0	73.8	1.1
Asgrow 101W	40.0	5.3	11.3	5.6	2.2	80.7	77.8	1.3
United U72	38.1	4.8	11.4	8.8	2.5	82.1	74.7	1.1
Keystone 222	37.5	6.2	17.5	10.9	3.1	81.4	76.9	1.1
Funk G711	37.4	4.7	23.2	11.6	2.9	79.9	78.0	1.0
DeKalb 1002	37.0	4.8	12.1	15.0	3.0	78.8	74.7	1.0
TRF 3	35.6	6.3	8.2	9.9	2.7	77.0	74.0	1.0
Surcropper	31.2	10.1	13.0	13.1	2.7	78.6	78.7	.9
Ferguson's Yellow Dent	29.2	16.9	19.3	16.7	2.8	79.8	79.2	.9
Number of tests included	45	38	40	43	43	15	12	41
6-YEAR AVERAGE, 1951-56								
Texas 28	44.4	12.6	10.2	8.5	2.6	80.8	80.8	1.1
Texas 26	43.7	12.3	11.3	7.9	2.7	80.5	80.4	1.1
Texas 30	42.8	8.9	9.1	7.1	2.2	80.6	81.2	1.0
Texas 15W	41.1	7.7	6.7	8.3	2.8	79.7	81.9	1.1
United U72	38.8	9.0	11.5	8.1	2.6	81.8	80.8	1.0
Keystone 222	38.5	8.0	17.6	9.6	3.0	80.9	81.0	1.1
Funk G711	37.6	7.5	20.3	10.0	2.8	79.5	82.4	1.0
TRF 3	37.5	8.5	8.5	8.5	2.6	77.3	78.8	1.0
Surcropper	32.3	12.9	13.1	11.9	2.6	78.0	82.3	.9
Ferguson's Yellow Dent	28.8	16.8	16.9	15.3	2.7	78.8	83.1	.8
Number of tests included	101	84	84	95	96	35	34	90

[1]Refers to the relative degree of damage to the ears; 1 indicates practically no damage; 2,3,4 and 5 represent successively greater degrees of damage.

1955, below freezing temperatures during the last week in March greatly reduced or destroyed the stands of much of the corn acreage. However, weather conditions during the remainder of the season were extremely favorable, and the statewide average yield of 23.5 bushels per acre was the highest since 1908.

Table 4 emphasizes the difference among the hybrids and varieties tested in characteristics other than yield. Data are included on 14 hybrids and varieties tested at all locations during the 3-year period, 1954-56, and on 10 hybrids and varieties tested at all locations during the 6-year period, 1951-56. Funk G711 was superior to all other hybrids in freedom from root lodging for the 3 and 6-year periods, but it was the most susceptible to stalk breakage. Among the white hybrids, Asgrow 101W and Texas 15W were superior in resistance to root lodging. Texas 30 led all yellow hybrids in resistance to stalk breakage and Texas 15W was the most resistant white hybrid.

Growers who plan to harvest their fields with mechanical pickers should be especially interested in the amount of stalk breakage that occurs, since ears on broken stalks frequently are missed by a mechanical harvester. Resistance to root lodging is not as important from this standpoint, since mechanical harvesters usually recover a high percentage of root-lodged plants.

Of the hybrids tested at all locations, Texas 30 was the most resistant yellow hybrid to earworms and ear-rot organisms. Asgrow 101W was the most resistant white hybrid during the 3-year period.

Texas 32 and United U72 had the highest shelling percentage of the hybrids studied, and TRF 3 had the lowest. Using number of days from planting to silking as an index of maturity, Texas 17W and TRF 3 were the earliest hybrids. Of the yellow hybrids tested at all locations, United U72 and Texas 26 were the earliest. All hybrids included in the tests had an average of 1.0 to 1.3 ears per plant; the two open-pollinated varieties included in all tests had an average of 0.8 and 0.9 ear per plant. For the 3-year period, Asgrow 101W was the most prolific hybrid, and Texas 28, 26 and 32 were the most prolific among the yellow hybrids.

TABLE 5. COMPARATIVE VALUES OF AGRONOMIC CHARACTERS, 1954-56

Entries	Lodging, %		Unsound ears, %	Worm damage score[1]
	Root	Stalk		
Texas 28	13.0	13.3	12.8	2.8
Texas 30	9.0	10.2	9.9	2.3
Texas 34	8.2	11.8	6.8	2.0

[1]Refers to the relative degree of damage to the ears; 1 indicates practically no damage; 2,3,4 and 5 represent successively greater degrees of damage.

TABLE 6. CORN PERFORMANCE TEST, AREA I, 1954-56

Entries	Bushels of shelled corn per acre					
	Angleton	Cleveland[1]	Prairie View	College Station[2]	Kirbyville[2]	Average
Texas 28	48.6	40.9	57.9	71.8	42.6	53.6
Texas 34	51.0	51.8	52.8	62.8	44.1	52.4
Texas 26	44.0	55.4	58.7	66.4	37.0	51.8
Texas 30	47.6	44.0	56.2	62.4	43.4	51.5
Texas 32	45.2	47.9	57.3	65.8	37.8	51.1
Texas 15W	44.5	50.7	52.0	68.0	41.2	50.8
Asgrow 101W	48.0	44.4	52.6	61.0	30.4	48.1
Texas 17W	44.4	42.8	47.3	57.3	36.9	46.0
Funk G711	39.1	37.1	53.8	60.5	33.4	45.7
Keystone 222	38.5	43.2	50.0	55.3	36.3	44.7
DeKalb 1002	39.4	32.1	47.9	63.1	26.8	43.1
United U72	42.0	37.1	48.5	51.6	30.0	42.9
TRF 3	41.6	38.2	38.9	40.5	30.6	38.4
Surcropper	37.9	35.3	32.4	50.2	27.7	36.6
Ferguson's Yellow Dent	26.8	33.7	32.1	50.4	29.0	33.6
Tuxpan	19.1	25.7	35.4	44.6	16.8	28.3
Average yield	41.1	41.3	48.4	58.2	34.0	44.9
Least significant difference, 19 to 1	8.2	12.6	11.6	11.1	8.0	4.9

[1]One-year average.
[2]Two-year average.

The locations of the various corn tests are shown on the front cover. Yields of the performance tests at the various locations are presented by test areas in Tables 6 through 10. A brief discussion of the climate, soils and recommended cultural practices is given for each area. Detailed annual results for each location are not included. The 3-year average for each location is shown, except at locations where only 1 or 2 years data are available. The average acre yields for the different areas ranged from 29 to 47 bushels. Texas 28 was the highest yielding entry for the 3-year and the 6-year periods. The highest yielding white hybrid was Texas 15W. Only those hybrids and varieties are reported on which data are available for the entire 3-year period.

Hybrids are recommended, in order of preference, for each area. A description and conditions under which the recommended hybrids generally will perform best are presented in a later section.

Area I—Southeastern

This area is that part of South Texas east of the 40-inch rainfall line. Corn production is concentrated in the bottoms of the Trinity River and other streams, and on the well-drained sandy soils of the Coastal Prairie.

Although this area has early, warm spring weather, most corn is planted in March and April because of heavy early rains. Poor stands and reduced yields often occur as a result of too much moisture early in the season. The soils used for corn production benefit from both soil-improving legumes, such as vetch and Austrian Winter peas, and summer legumes, such as cowpeas, can be used successfully. A complete fertilizer is recommended at or before planting,

TABLE 7. CORN PERFORMANCE TEST, AREA II, 1954-56

Entries	Bushels of shelled corn per acre					
	Nacogdoches	Tyler	Mount Pleasant[1]	Sulphur Springs[1]	Clarksville[1]	Average
Texas 32	45.6	34.2	38.7	18.8	72.7	42.1
Texas 26	40.9	37.7	37.7	23.3	75.3	41.3
Texas 28	36.5	35.3	32.8	21.6	78.3	38.6
Texas 30	39.7	29.9	39.9	19.7	77.7	38.4
Texas 15W	39.7	34.2	20.6	19.7	65.9	36.5
Texas 17W	35.8	29.7	42.5	25.6	60.9	36.1
Dekalb 1002	33.5	27.8	29.6	22.4	70.1	34.0
Asgrow 101W	38.0	29.0	18.0	16.0	69.8	33.8
United U72	33.2	28.9	20.4	24.2	71.1	33.5
Texas 34	34.1	27.2	32.7	13.7	71.4	33.5
Funk G711	29.6	28.4	30.8	17.3	72.9	32.7
Keystone 222	32.7	28.5	21.4	16.4	68.7	32.2
TRF 3	30.9	25.5	26.4	25.9	55.7	30.8
Surcropper	27.8	17.9	16.1	12.9	69.4	26.1
Ferguson's Yellow Dent	25.8	22.1	14.3	13.1	64.0	26.1
Average yield	34.9	29.1	28.1	19.4	69.6	34.3
Least significant difference, 19 to 1	NS[2]	NS[2]	8.5	5.2	9.5	5.5

[1]One-year average.
[2]No significant difference among entries.

and additional nitrogen should be used as a sidedressing early in the growing season.

Hybrids resistant to insects and diseases should be grown in the Gulf Coast Prairie since these organisms frequently cause severe damage to susceptible varieties. Table 5 gives the comparative values of agronomic characters of Texas 28 and 30, the hybrids previously recommended for this area, and Texas 34, a new hybrid especially adapted to the Gulf Coast. The data show the marked superiority of Texas 34 over the other hybrids in resistance to earworm and diseases.

Texas 28, 34, 26 and 30 had the highest average yields for this area, Table 6. Texas 15W was the highest yielding white hybrid. The test at Prairie View had the highest 3-year average in this area. The high average yield at College Station is somewhat misleading since the test was lost in 1956, the most unfavorable season during the 3-year period. Consequently, the average yields shown for this location are probably high in comparison with the other locations. The test at Kirbyville was lost in 1955, the most favorable corn year, because of a freeze in late March.

Considering both yield and other characteristics, Texas 34, 30 and 28 are the recommended yellow hybrids for this area, and Texas 15W and Asgrow 101W are the recommended white hybrids.

Area II—Northeastern

This area, which is that part of North Texas east of the 40-inch rainfall line, had extremely unfavorable corn years in 1954 and 1956. Yields were curtailed seriously by severe drouths during the growing season.

Most of the corn in this area is planted in March. However, when spring rains are excessive, much of the corn is planted as late as April and May. Most of the corn acreage is on the better-drained bottomland and the moderately-sandy uplands. These soils respond well to soil-building crops and commercial fertilizers. The use of both winter and summer legumes in a cropping system will benefit corn production. Vetch and Austrian Winter peas are used most commonly as winter legumes; lespedeza and cowpeas are the summer legumes most frequently planted. A complete fertilizer should be used at or before corn planting, and additional nitrogen should be added as a sidedressing early in the growing season.

Texas 32, 26, 28 and 30 were the highest yielding yellow hybrids in this area, Table 7. Among the white hybrids, Texas 15W and 17W had the highest average yields. As a result of the extremely unfavorable climatic conditions, results for only 1 year were obtained from the Mount Pleasant, Sulphur Springs and Clarksville locations.

Texas 30, 28 and 32 are recommended as yellow hybrids for this area. Texas 15W and 17W are recommended as white hybrids.

Area III—South-central

This area, which is the part of South Texas receiving 30 to 40 inches of rainfall annually, is important in Texas corn production. Corn is grown on a wide variety of soils, but mostly on blackland and bottomland. These "heavy" soils respond well to soil-building crops and water conservation practices. The use of legumes in the cropping system, such as the sweetclovers, will greatly benefit corn production. Commercial fertilizers are beneficial, but are not as important as in areas of higher rainfall. In many

TABLE 8. CORN PERFORMANCE TEST, AREA III, 1954-56

Entries	Bushels of shelled corn per acre				
	Lockhart[1]	Brenham	Holland[1]	Temple	Average
Texas 26	30.6	62.7	63.8	51.4	53.1
Texas 28	30.4	66.0	60.6	49.4	52.8
Texas 32	30.2	60.5	64.5	50.9	52.4
Texas 30	29.3	63.4	60.4	49.5	51.8
Texas 36	31.1	56.7	61.6	49.9	50.5
Asgrow 101W	32.0	56.8	57.2	46.3	48.8
Texas 15W	30.6	58.0	56.6	46.2	48.7
Texas 38	33.3	52.3	53.0	50.1	48.0
Keystone 222	27.8	58.6	54.7	44.9	47.5
Texas 17W	31.1	52.7	54.2	46.7	46.9
United U72	32.3	53.9	53.6	44.1	46.6
Funk G711	24.4	57.7	53.2	42.8	45.7
DeKalb 1002	26.2	53.5	52.5	44.8	45.2
TRF 3	29.8	48.7	53.6	42.2	44.0
Surcropper	22.2	48.5	48.2	38.4	40.2
Ferguson's Yellow Dent	16.6	49.5	47.9	33.3	37.7
Average yield	28.6	56.2	56.0	45.7	47.5
Least significant difference, 19 to 1	7.1	9.9	6.2	6.5	3.9

[1]Two-year average.

instances, the addition of commercial fertilizer, especially phosphorus to the soil-building legume, is more beneficial than the addition of fertilizer to the corn crop.

Early warm temperatures in this area, accompanied by favorable planting moisture, permit early planting of corn. As a result, the corn often escapes the summer drouth, or is far enough along in its development that reduction in yield by drouths is not as serious as in other parts of the State.

The high average yield obtained, as shown in Table 8, indicates that in this area the growing conditions were more favorable than in the other areas for the 3-year period. The test at Lockhart was lost in 1955 because of a freeze and the test at Holland was lost in 1956 because of the drouth.

Texas 26, 28, 32, 30 and 36 were the highest yielding yellow hybrids. Asgrow 101W and Texas 15W had the highest yield of the white hybrids. These hybrids are recommended to growers in this area.

Area IV—North-central

This is the major corn-growing area of the State, and is that part of North Texas receiving 30 to 40 inches of rainfall annually. Most of the corn is grown on heavy blackland and bottomland soils. Shortage of moisture during the summer is the limiting factor on corn production. Practices to conserve and store moisture are important. The use of deep-rooted legumes in a cropping system is especially beneficial to corn production. Commercial fertilizers are needed on some soils of the area to produce good corn yields; however, as in area III, the greatest benefit from commercial fertilizer often comes from its use on soil-building crops.

TABLE 9. CORN PERFORMANCE TEST, AREA IV, 1954-56

Entries	Bushels of shelled corn per acre					
	Hillsboro[2]	Waxahachie[2]	Garland[2]	Greenville[2]	Denton[1]	Average
Texas 36	28.2	23.7	54.5	31.8	34.7	34.6
Texas 26	24.5	25.7	54.6	29.4	37.9	34.0
Texas 28	28.2	23.8	54.2	28.4	35.3	33.8
Texas 38	30.8	25.2	46.8	31.6	35.5	33.8
Texas 17W	25.1	24.6	47.0	29.9	36.3	32.2
Texas 32	24.6	22.2	55.2	23.6	34.3	31.7
United U72	25.2	24.2	48.8	25.8	32.1	31.1
Texas 15W	24.6	21.8	47.0	27.4	36.3	30.9
Texas 30	22.4	19.2	53.8	22.3	34.2	29.9
Asgrow 101W	25.2	21.0	44.4	25.3	35.1	29.7
TRF 3	24.3	23.4	39.0	27.4	35.7	29.3
DeKalb 1002	20.6	18.2	43.1	25.4	33.1	27.5
Funk G711	14.0	18.9	41.6	26.8	30.4	35.9
Keystone 222	17.8	17.0	39.3	25.4	29.0	25.3
Surcropper	15.5	12.4	35.3	17.8	30.3	21.4
Ferguson's Yellow Dent	12.2	12.4	39.0	18.3	20.1	20.4
Average yield	22.7	20.8	46.5	26.0	33.1	29.5
Least significant difference, 19 to 1	3.9	6.0	NS[3]	6.4	4.0	3.6

[1]One-year average.
[2]Two-year average.
[3]No significant difference among entries.

TABLE 10. CORN PERFORMANCE TEST, AREA V, 1954-56

Entries	Bushels of shelled corn per acre				
	Beeville[1]	San Antonio	Stephenville[1]	Chillicothe[1]	Average
Texas 32	10.6	55.8	32.6	23.3	39.0
Texas 38	12.2	51.5	39.4	23.3	38.2
Texas 28	12.5	52.6	28.6	22.4	36.9
Texas 36	12.2	50.8	34.5	20.1	36.5
Texas 26	13.1	49.1	32.1	20.8	35.6
Texas 17W	11.0	50.6	30.7	19.4	35.5
Asgrow 101W	11.1	50.9	32.8	15.4	35.5
Texas 30	11.6	48.4	34.8	20.1	35.3
Texas 15W	13.3	51.0	25.7	17.7	35.0
TRF 3	10.8	45.9	32.9	19.5	33.5
Funk G711	10.9	45.8	32.8	13.2	32.4
Keystone 222	11.6	45.8	27.3	17.1	32.3
United U72	11.8	46.0	26.0	17.0	32.2
DeKalb 1002	10.2	41.3	32.2	19.7	31.0
Surcropper	9.0	41.8	26.2	9.5	28.4
Ferguson's Yellow Dent	7.9	37.0	24.0	11.6	25.8
Average yield	11.2	47.8	30.8	18.1	33.9
Least significant difference, 19 to 1	2.2	7.0	7.1	4.3	4.2

[1]One-year average.

This area had extremely unfavorable weather for corn production during this 3-year period. The low average yield for the area, shown in Table 9, reflects the adverse conditions.

None of the locations in this area have complete data for the 3-year testing period. The tests at Hillsboro, Waxahachie and Denton were lost during a freeze in 1955. The Denton and Greenville tests in 1956 failed because of the drouth. The test at Garland was not planted in 1956.

Texas 36, 26, 28 and 38 were the highest yielding yellow hybrids, and Texas 17W was the highest yielding white hybrid. These hybrids are recommended for this area.

Area V—Western

Only a small part of the State's corn crop is produced in this area of less than 30 inches of annual rainfall. Limited rainfall during the growing season and its poor distribution make corn production hazardous. Corn should not be grown in this area except on soils in good physical condition with a good soil-water relationship.

Green manure crops turned under ahead of corn are not successful in this area because of a scarcity of moisture for the growth and decomposition of the legume crop. However, legumes, such as the sweetclovers, are beneficial in a cropping system to improve the moisture intake and moisture-holding capacity of the soil. Since moisture limits corn production in this area, commercial fertilizers are not as important as in other areas of the State.

Texas 32, 38, 28 and 36 had the highest average yield among the yellow hybrids, and Texas

17W and Asgrow 101W were the highest yielding white hybrids in area V, Table 10. These hybrids are recommended for this area.

The data for this area are inadequate and, consequently, the results are not as reliable as those for the other areas. Only a single year's results were obtained at Beeville, Stephenville and Chillicothe. The results at San Antonio are the result to some extent of a supplemental irrigation in 1956 which prevented a crop failure. These crop failures reflect the hazards of corn production in this area of limited rainfall.

Lower Rio Grande Valley

Irrigated corn performance tests were conducted at three locations in the Lower Rio Grande Valley in 1956 to determine the hybrids best adapted to that area. The tests were grown on the Lower Rio Grande Experiment Station at Weslaco, the Rio Farms at Monte Alto and the H. J. Garrett farm, 6 miles south of San Benito. Soils of the test sites were Harlingen silty clay at San Benito and Willacy fine sandy loam at Weslaco and Monte Alto. The tests were conducted under high levels of fertility and the corn was well supplied with moisture throughout the growing season.

Excellent yields of corn may be obtained under irrigation in the Lower Rio Grande Valley, as shown by the results of tests at the three locations, Table 11. Some corn also is grown under dryland conditions on the eastern side of the Valley, but yields are much lower than those under irrigation. The leading hybrids at both Monte Alto and San Benito yielded more than 100 bushels per acre, while the best hybrids at Weslaco produced more than 70 bushels. Yields at Weslaco, however, were reduced considerably by a heavy infestation of sugar cane borers.

Texas 30 and 32 had the highest average yields in tests conducted at the three locations. Both hybrids were outstanding at Monte Alto and San Benito, and they also produced good yields at Weslaco. Texas 30 is recommended over Texas 32 because of its superior resistance to earworms and diseases. North Carolina 42, Dixie 82 and North Carolina 27 gave good results in the Valley tests, and may produce high yields of ensilage because of their greater vegetative growth.

TABLE 11. CORN PERFORMANCE TEST, IRRIGATED, LOWER RIO GRANDE VALLEY, 1956

Entries	Bushels of shelled corn per acre			
	Weslaco	Monte Alto	San Benito	Average
Texas 32	71.7	105.6	122.9	100.1
Texas 30	66.5	107.1	125.3	99.6
North Carolina 42	85.0	94.4	112.4	97.3
Dixie 82	75.7	98.7	116.3	96.9
North Carolina 27	83.6	93.3	112.5	96.5
Texas 15W	76.0	94.8	113.2	94.7
Tennessee 90	65.2	96.6	121.4	94.4
Coker 911	67.3	96.7	115.2	93.1
Texas 28	64.9	96.8	113.8	91.8
Texas 26	62.7	104.1	107.5	91.4
Texas 17W	73.0	84.4	115.9	91.1
Tennessee 29	67.5	95.7	110.0	91.1
Texas 9W	74.0	79.1	119.8	91.0
North Carolina 29	65.9	91.1	111.1	89.4
Georgia 101W	70.7	77.5	107.5	85.2
Dixie 18	63.0	86.7	104.7	84.8
Asgrow 101W	59.0	84.4	109.6	84.3
TRF 3	62.2	75.2	101.2	79.5
Coker 811	40.0	81.4	103.4	74.9
Surcropper	47.6	60.7	92.6	67.3
Average yield	67.8	90.2	111.8	89.7
Least significant difference, 19 to 1	11.6	13.0	11.5	11.5

RECOMMENDED HYBRIDS

During the 3-year period, 1954-56, four yellow hybrids, Texas 32, 34, 36 and 38, and a white hybrid, Texas 17W, were developed and released by the Texas Agricultural Experiment Station. These newer hybrids are better adapted for specific conditions than the older hybrids.

Considering both yield and other desirable characters, seven yellow hybrids and two white hybrids are recommended for corn production in Texas. A brief description of these hybrids, with their areas of recommendation, follows:

Texas 26

A yellow hybrid produced by combining Tx325 x Tx203 as the seed parent, with Tx127C x Tx132A as the pollinator parent. This hybrid is slightly earlier than Texas 28 and 30. It produces medium-size ears with yellow dent-type grains that are rather large and deep yellow. This hybrid has a wide range of adaptation and produces two good ears under favorable conditions. It is somewhat susceptible to earworms and ear rots and root lodging. It is recommended primarily for areas III, IV and V.

Texas 28

A yellow hybrid usually produced by combining Tx127C x Tx132A as the seed parent, with Tx325 x Tx303 as the pollinator parent. However, the reciprocal of this cross is sometimes used. Texas 28 is slightly later than Texas 26. It also produces larger ears than Texas 26 and has the same tendency to make two ears under favorable conditions. The grains produced are large and possess a good yellow color. This hybrid is somewhat resistant to earworms and ear rots, and the ears ordinarily suffer only moderate damage. It shows a moderate degree of root lodging and is fairly resistant to stalk breakage. It has a very wide range of adaptation and is recommended for all areas of the State.

Texas 30

A yellow hybrid produced by combining Tx173D x Tx203 as the seed parent, with Tx325 x Tx303 as the pollinator parent. Texas 30 is similar to Texas 28 in maturity. It produces large ears with large, yellow dent-type grain.

Although primarily a one-ear hybrid, it may produce two ears under optimum conditions. This hybrid is fairly resistant to earworms and ear rots. It also is resistant to root lodging and stalk breakage. Texas 30 is recommended for areas I, II, III and IV.

Texas 32

A yellow hybrid produced by combining Tx303 x Tx203 as the seed parent, with Tx127C x TxB18t as the pollinator parent. This hybrid may be produced without detasseling or blending since the seed parent is male sterile and the pollinator restores fertility. Texas 32 gives its best comparative performance under highly favorable environmental conditions, and does not perform as well as most of the Texas hybrids under low-yield conditions. It produces long, slender ears and has a tendency to make two ears under favorable conditions. The grain has a soft cap and a light yellow color. The tips of the ears protrude from the husks, making it susceptible to ear rots and earworms. It is recommended for areas II, III, IV and V where earworms and ear-rot organisms are not too severe.

Texas 34

A yellow hybrid produced by combining Tx303 x Tx203 as the seed parent, with Tx601 x Tx602 as the pollen parent. Texas 34 has a long husk and is more resistant to insects and diseases than any of the other Texas hybrids, Table 5. This hybrid is later in maturity and, under favorable conditions, will grow 1 to 2 feet taller than the other Texas hybrids. Texas 34 is recommended for the Gulf Coast Prairie, for fertile bottomland and irrigated land where high yields are anticipated. It also is recommended as a silage corn where high yields (10 to 20 tons per acre) are probable.

Texas 36

A moderately early yellow hybrid produced by combining Tx325 x Tx533 as the seed parent, with Tx127C x Tx203 as the pollinator parent. It will silk about a day earlier than Texas 26. Texas 36 is superior to Texas 26 and 28 in resistance to root lodging and has about the same amount of stalk breakage as the other Texas hybrids, Table 12. This hybrid appears more susceptible to earworm damage than Texas 30, but is similar to Texas 26 and 28 in its reaction to earworms and ear-rot diseases.

TABLE 12. COMPARATIVE VALUES OF AGRONOMIC CHARACTERS, 1954-56

Hybrid	Lodging, % Root	Lodging, % Stalk	Unsound ears, %	Worm damage score	Days to silk	Ears per plant
Texas 26	9.1	9.5	8.2	2.9	76.9	1.2
Texas 28	8.6	8.9	8.2	2.6	77.8	1.1
Texas 30	5.6	8.0	6.6	2.2	77.9	1.0
Texas 32	7.4	8.9	9.0	3.0	77.9	1.2
Texas 36	7.0	9.9	7.8	2.6	76.1	1.2
Texas 38	3.3	5.2	6.9	2.5	73.8	1.1
Number of tests	31	31	35	35	9	33

TABLE 13. COMPARISON OF TEXAS HYBRIDS UNDER HIGH AND LOW YIELD LEVELS, BUSHELS PER ACRE, 1954-56

Hybrid	High	Low
Texas 26	55.4	28.0
Texas 28	55.4	28.3
Texas 30	53.1	26.1
Texas 32	55.8	27.2
Texas 36	53.6	30.8
Texas 38	49.2	31.5
Number of tests	15	10

Texas 36 is more heat and drouth tolerant than the other Texas hybrids. It is recommended particularly for areas III, IV and V where earliness and drouth resistance frequently are essential factors in corn production. In the low yield range, 20 to 40 bushels per acre, Texas 36 has yielded better than the older Texas hybrids, Table 13. Texas 36 should replace Texas 26 and 28 to a large extent in the Blackland and Grand Prairie where these hybrids are commonly grown.

Texas 38

An early-maturing yellow hybrid produced by combining Tx403 x Tx401 as the seed parent, with Tx402 x Tx332 as the pollinator parent. The comparative performance of Texas 38 with the other Texas hybrids for characters other than yield is presented in Table 12. Texas 38 is the most resistant hybrid to root lodging and stalk breaking. In percentage of unsound ears, it is similar to Texas 30 and 36, and it has a lower worm damage score than any of the hybrids except Texas 30 and 34. This hybrid silks 3 to 5 days earlier than the other Texas hybrids and may be harvested 1 to 2 weeks earlier. Under similar conditions, plants of Texas 38 are usually 2 feet shorter than plants of the other Texas hybrids, and the ears are borne about 1 to 2 feet lower.

On the basis of present results, Texas 38 frequently may be expected to outyield other hybrids at the 20 to 40-bushel yield level, but it usually will yield less than these at the higher yield levels, Table 13.

Texas 38 is a special-purpose hybrid that can be grown under any conditions where quick maturity may be valuable. It is recommended particularly for the western part of the corn-growing region, for late plantings, regardless of area, and on drouthy soils.

Texas 17W

A white hybrid produced by combining Tx61M x Tx585 as the seed parent, with K55 x K64 as the pollinator parent. The ears of this hybrid are large, with fairly large Surcropper-type grain. It silks about 2 to 3 days earlier than Texas 26 or 28, and is somewhat drouth resistant. Most of the white corn in the State is produced near

San Antonio in South Texas and near Sherman in North Texas. Drouth is important in limiting corn production in both of these areas almost every year. Texas 17W is particularly recommended for these white corn-producing areas since its earliness, drouth resistance and large grain size are a distinct advantage in these areas.

Asgrow 101W

A white corn hybrid developed by the Associated Seed Growers, Inc., San Antonio, Texas. Under good conditions, Asgrow 101W characteristically produces two uniform ears. It silks about 4 days later than Texas 17W. This hybrid is slightly superior to Texas 17W in resistance to earworms and ear-rot organisms, but is more susceptible to stalk breaking. Asgrow 101W performs well under favorable moisture conditions, and is recommended for areas I, III and V.

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