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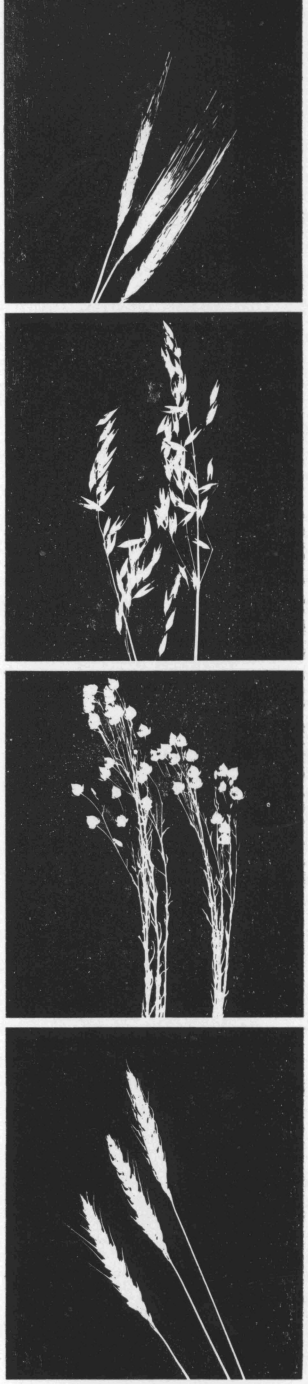
NOVEMBER 1962



Performance of Small Grain and Flax Varieties, 1958-1961

THE AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS | College Station, Texas

TEXAS AGRICULTURAL EXPERIMENT STATION | R. E. Patterson, Director

Digest

Small grains are used extensively for grain and supplemental winter pasture in Texas. The combined acreage of wheat, oats and barley frequently exceeds 6,000,000 acres. In seasons favorable for seeding small grain, frequently as many as 1,000,000 acres are seeded exclusively for forage. Small grains are grown from the 50-inch rainfall belt of Southeast Texas to the 15-inch rainfall areas of Northwest Texas. Many varieties and types are needed for this wide range of environmental conditions and uses of the crop.

Flax is fall-seeded as a cash grain crop in South Central Texas, mainly in a 10-county area between San Antonio and Corpus Christi. The first commercial fields of flax in Texas were grown in 1938, and the acreage increased to 329,000 acres in 1949. Severe drouth in the 1950's reduced the acreage, but during recent years the flax acreage has increased.

Performance trials of small grains and flax were conducted at 12 to 18 locations each year during 1958-61. These trials are the basis for recommendations of commercial varieties and for testing newly developed experimental strains. The State is divided into seven areas for performance trials. Comparable yields and agronomic data for each area are given for 1958-61, but average grain yields for 1954-61 also are given as a firmer basis for recommendations. The following varietal recommendations are made for each growing area.

Contents

	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7
				OATS			
Fall seeded Recommended	Mustang Wintok Cimarron Bronco	Mustang Bronco Cimarron	Moregrain[1] New Nortex[2] Mustang Bronco	Moregrain Suregrain New Nortex[2] Alamo-X	Suregrain Moregrain Radar I	New Nortex Moregrain Suregrain	Mustang Bronco New Nortex[1]
Acceptable		New Nortex[1,2] Moregrain[1] Wintok	Midsouth Suregrain[1] Alamo-X[1]	Alamo Mustang	Alber Camellia	Mustang	
Spring seeded	Alamo-X Alamo Mustang Moregrain	Alamo-X Alamo Mustang Moregrain	Alamo-X Alamo Suregrain Moregrain	none recommended	none recommended	Alamo-X Alamo Suregrain	Alamo-X Alamo Suregrain
				BARLEY			
Fall seeded Recommended	Kearney Rogers Cordova	Rogers Cordova Harbine	Rogers Cordova	Cordova Rogers	Goliad	Cordova Rogers	Kearney Rogers Cordova
Acceptable	Harbine Wintex Ward	Kearney Wintex Texan	Harbine Texan	Texan	Cordova Arivat	none recommended	Harbine
Spring seeded	Cordova Rogers	Cordova Rogers	Cordova	none recommended	none recommended	Cordova Rogers	Cordova Rogers
				WHEAT			
Recommended	Tascosa Bison Kaw Aztec Ponca	Tascosa Bison Kaw Ponca	Kaw Ponca Quanah Comanche Crockett	Quanah	Milam	Quanah Kaw Crockett	Tascosa Crockett Bison Kaw
Acceptable	Comanche Concho Crockett Improved Triumph	Comanche Improved Triumph Crockett Concho	Tascosa Knox[3] Frisco[3]	Milam[1] Crockett	Seabreeze	Knox[3] Frisco[3]	Quanah[1]

[1]Less winterhardy than recommended varieties.
[2]New Nortex represents the Red Rustproof type. Other strains satisfactory
[3]Soft wheat where market is available.

PERFORMANCE OF SMALL GRAIN AND FLAX VARIETIES IN TEXAS, 1958-61

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SMALL GRAINS OCCUPY A UNIQUE PLACE among Texas crops because they are adapted to so many uses and can be grown with some degree of success from the 50-inch rainfall belt and mild climate of Southeast Texas to the 15-inch rainfall belt of Northwest Texas where winter temperatures are often very severe. Semiwinter or even spring types can be grown from fall seeding in South Texas, since only very cold-tolerant varieties may be safely fall-seeded in Northwest Texas.

Wheat is a major cash crop of the High Plains, Rolling Plains and parts of North Central Texas. However, the forage value of wheat as a winter grazing crop is of major importance in all areas, both under irrigation and under dry-farming systems. Revenue from grazing of wheat or returns in beef or milk production often is equal to the value of grain. Almost all fall-sown oats and barley are used as combination grain and forage crops. When moisture conditions are favorable in the spring, oats and barley may be sown in the High Plains area for grain production alone. Flax is grown only for seed, being unsuited to forage or fiber uses.

Throughout most of East and South Texas and much of the southern part of the Rolling Plains area, small grains are sown principally and often exclusively for winter pasture. During seasons of favorable moisture conditions, these crops may provide succulent, high-protein forage from October until they are killed in the spring by grazing and the livestock transferred to permanent pasture. Large acreages are devoted to such use and, because they do not produce grain, are only partially recorded in statistics on small grain. Smaller but significant acreages are used for hay, grass silage, soiling crops or green manure.

The average annual seeded acreage devoted to wheat for grain during the 10-year period 1952-61 was 4,323,000; that to oats, 2,194,700; and that to barley, 348,600 acres. The total for the three crops is 6,866,300 acres. Large acreages are lost to drouth and other hazards each season. These losses, combined with the acreages grazed off instead of being allowed to produce grain, reduced the 10-year harvested acreage to 2,907,000 for wheat, 1,294,400 for oats and 244,200 acres for barley.

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Growing Areas and Test Locations

Statewide small grain and flax performance trials are designed to serve two purposes; first, to provide information on which to base varietal recommendations to growers for each of the several growing areas and, second, to provide adequate tests of new experimental strains developed in the breeding program. The performance data on these new experimental strains are not included in this report since seed are not available to growers. Only yields of commercial varieties are included.

Because of the wide diversity of climatic conditions in the State, seven testing areas have been established for easy reference. Within most of these areas two or more test locations are available through cooperation of substation personnel or other cooperators. Exceptions to this are Northeast Texas and Southwest Texas where small grains are grown largely for winter pasture or other forage uses. The growing areas and experimental test locations are shown in Figure 1.

Climatic Conditions and Soil Types

Information on longtime meteorological data and on the 1957-61 testing period at each of the test

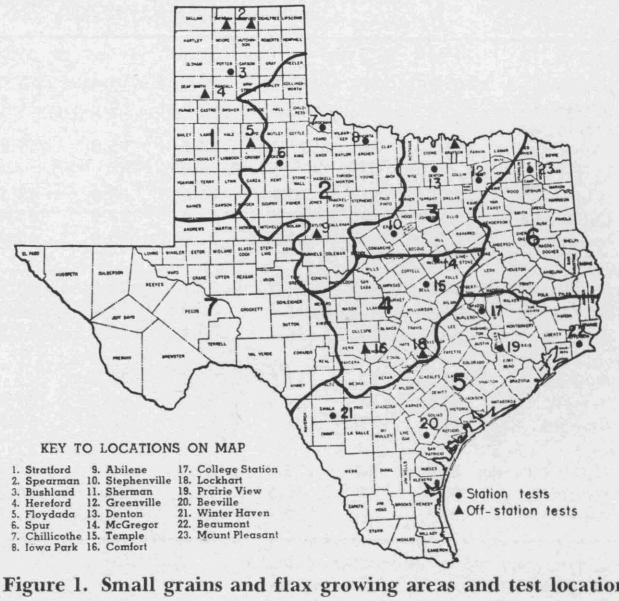

Figure 1. Small grains and flax growing areas and test locations.

locations is given in Table 1. For the most part, conditions during this period of September to June when small grain and flax are grown were favorable, resulting in record state average yields of wheat of 22.0, 22.5 and 24.0 bushels per acre in 1958, 1960 and 1961, respectively. Other small grains also produced above average yields during this period.

Field Design of Tests

All performance trials were conducted in nursery size plots arranged in randomized blocks of four replications. These nursery plots were four rows wide by 10 feet in length and only the center rows were harvested.

All varieties were not grown in all seasons at all locations in an area. In order to compare directly the varieties at a single location or in an area, it was desirable to compute comparable average yields and agronomic data. Comparable data are based on a selected set of check varieties grown uniformly at all locations and years and from these a correction factor for each year and location is computed. Comparable data for all varieties may in this way be calculated, regardless of the number of observations. Detailed annual data on yields and agronomic data are omitted but may be obtained from mimeographed data compiled each season. These are not published, but local data may be obtained from the nearest substation.

Experimental Data

Data on performance of varieties are presented by crops within this breakdown by growing areas. Tests were conducted during 1958-61, but averages for 1954-61 are shown for more accurate evaluation of varieties. Grain yields are somewhat higher than may be expected under commercial growing conditions since tests were located on the most uniform soil available and, in some instances, followed fallow instead of a crop.

Recommendations at the end of each section are based on average grain yields for the area, but agronomic and other characteristics also should be considered. These include such characteristics as winter hardiness and tolerance to sudden temperature changes, disease and insect reaction or tolerance; adaptation to winter grazing or other forage purposes; and, in the case of wheat, milling and baking characteristics. Growers should consider all these characteristics in selecting a variety to grow. To select a nonhardy variety for growing in Northwest Texas is to gamble with losing the crop from damage by low temperatures. A variety susceptible to rusts or poorly adapted for winter forage production would be undesirable for growing in South Texas.

Oats

Oats are one of the most widely grown crops in Texas, being used for grain, winter pasture, green-chop feeding, hay, silage or combinations of these. Oats are used as a cash crop only in the more concentrated production areas of North Central Texas and to a minor extent in certain other areas. The cash value of the grain is frequently so low that greater returns may be obtained by feeding the grain on the farm and marketing it through livestock or livestock products. The average seeded oat acreage for 1952-61 was 2,194,700 acres. Many fields were

TABLE 1. AVERAGE TEMPERATURE, RAINFALL, LENGTH OF GROWING SEASON AND SOIL TYPE AT TEST LOCATIONS[1]

Location	Elevation, feet	Number years of record	Rainfall, inches			Temperature, degrees F.			Length of growing season, days	Average date		Soil type
			Average									
			Annual	Crop season[2] All years	Crop season[2] 1957-61	Mean annual	Mean maximum	Mean minimum		First killing frost	Last killing frost	
Area 1												
Stratford	3699	30	17.5	9.9	14.4	55.4	71.0	40.2	177	10-16	4-22	
Bushland	3590	23	18.7	15.3	16.7	57.5	72.6	42.4	193	10-28	4-14	Pullman silty clay loam
Wellington												
Plainview	3250	30	21.3	12.6	15.8	59.8	73.7	45.7	206	11-2	4-10	
Area 2												
Spur	2274	51	20.7	16.8	18.4	62.1	77.2	47.0	215	11-5	4-4	Abilene clay loam
Chillicothe	1406	56	24.6	17.2	27.9	63.4	76.5	50.2	231	11-10	3-24	Abilene clay loam
Iowa Park	978	35	29.5	21.7	35.0	65.0	78.2	51.8	222	11-4	3-31	Miller sandy loam
Area 3												
Stephenville	1283	15	26.9	23.8	25.2	65.2	77.1	53.3	239	11-13	3-21	Denton clay
Greenville	550	41	41.3	32.1	37.3	64.0	74.9	53.1	235	11-11	3-15	Hunt clay
Denton	621	48	32.2	24.6	27.2	64.9	77.2	51.5	235	11-11	3-22	San Saba clay
Area 4												
McGregor	713	37	31.9	25.8	31.5				254	11-24	3-15	San Saba clay
Temple	675	48	34.4	28.2	27.2	67.3	79.1	55.5	251	11-21	3-16	Houston black clay
Comfort	1412	71	30.5	26.5	25.6	64.5	78.2	50.7	216	11-1	3-30	
Area 5												
College Station	314	50	38.9	30.0	33.7	68.4	79.5	57.2	263	11-25	3-6	Lufkin fine sandy loam
Prairie View	251	42	40.5	25.1	32.8	68.0	90.0	45.0	275	11-28	2-18	Hockley fine sandy loam
Beeville	240	58	29.9	23.3	27.3	71.1	83.8	60.9	290	12-4	2-19	Clareville clay

[1]No tests were conducted in areas 6 and 7.
[2]September 1 to June 1 of following year.

grazed to maturity and others were lost by hazards of drouth and winter-killing, so the average harvested for this same period was only 1,294,000 acres. The acreage harvested for grain has declined during the past 20 years owing to increased use of the crop for winter pasture. The unusual drouth of the 1950's and the several years when winterkilling occurred may have contributed to this decline in harvested acreage. The 1942-61 harvested acreage was 1,233,850 compared with 1,482,850 acres for 1922-41. During the same period, the seeded acreage increased from 1,602,000 for 1922-41 to 1,940,400 for 1942-61. The distribution of oats harvested for grain in 1959 is shown in Figure 2.

Because of the wide range in climatic conditions in Texas, selection of adapted varieties of oats for growing in a given area is extremely important. For fall seeding in area 1, varieties with a high degree of tolerance to low temperatures are essential. Even the most hardy varieties frequently are winterkilled, so the grower must be willing to take this risk in seeding fall oats. Cold tolerance is also very important in area 2, but moderately hardy varieties may be grown with more likelihood of survival than in area 1. In North Central Texas, area 3, cold tolerance is needed, but survival frequently does not reflect the known cold resistance of varieties owing to the nature of the freezing conditions. Periods of cold weather in this area are usually of short duration and occur often after periods of warm or moderate temperature conditions. Temperatures may drop 20 to 70 degrees in less than 24 hours. Injury to oat varieties may vary from minor leaf injury to winterkilling of large acreages, and the varieties known to have high cold tolerance when well hardened may not survive as well as others of lower hardiness. Some winterkilling of oats occurs on an average of about 1 year in 4 in areas 1 and 2, about 1 in 6 years in area 3 and less frequently farther south. More erect growing semiwinter types or even spring-type oats may be fall sown in area 5.

Spring seeding of oats as a practice has declined greatly in the past 30 years. Formerly the majority of oats in areas 1 and 2 and often 50 percent or more in area 3 were spring sown. The development of more winter-hardy varieties in Texas and Oklahoma has provided growers with varieties suitable for fall seeding. Since fall-sown oats usually produce better yields and quality of grain than spring-sown oats, the practice of spring seeding has declined. In seasons when winterkilling of the fall-sown crop is widespread or when rainfall is favorable for spring seeding in area 1, considerable acreages are spring sown.

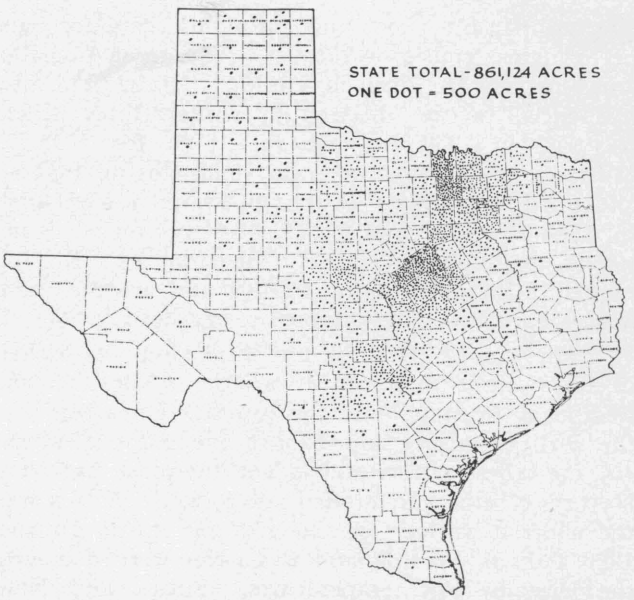

Figure 2. Distribution of oats in Texas in 1959.

Comparable yield and agronomic data are summarized by areas. All varieties were not grown at all stations in all seasons. All data are from fall seeding unless otherwise noted. A small uniform spring-sown test was grown at several northern stations. Yields were abnormally high during the past 4 years and for a more accurate evaluation of varieties, the 8-year average grain yields are given.

AREA 1

Usually less than 5 percent of the State oat acreage is sown in area 1, but the proportion is now increasing because of more extensive use of fall-sown oats as an irrigated winter pasture and grain crop.

TABLE 2. COMPARABLE GRAIN YIELDS AND AGRONOMIC DATA FOR FALL-SOWN OATS GROWN IN IRRIGATED TESTS AT STATIONS IN AREA 1, 1958-61, AND GRAIN YIELDS FOR 1954-61[1]

Variety	Yield of grain, bushels per acre						Agronomic data, 1958-61					
	Amarillo 1958-61	Floydada 1958-60	Average 1958-61	Number tests	Average 1954-61	Number tests	Test weight, pounds	Date first head	Date full ripe	Plant height, inches	Lodging, percent	Winter survival, percent
Number tests	3	2					4	2	2	5	3	1
Mustang	87.9	76.6	83.4	5	56.6	14	31.7	5-19	6-24	29	30	15
Frazier	98.4	69.8	86.9	5	56.5	14	34.0	5-16	6-21	30	10	63
Wintok	95.0	70.7	85.3	5	55.8	14	35.5	5-18	6-24	30	37	85
Cimarron	85.0	66.8	77.7	5	53.5	14	35.1	5-11	6-18	28	30	80
Bronco	87.0	71.0	80.6	5	52.0	14	33.3	5-22	6-27	33	22	35
Fultex	65.4	64.7	65.1	5	48.2	14	34.3	5-14	6-21	26	8	1
New Nortex	69.0	73.3	70.7	5	47.9	14	34.6	5-15	6-21	29	48	5
Fulwin	81.2	68.7	76.2	5	47.6	14	34.5	5-19	6-24	36	62	93

[1]Dryland tests of 1954 and 1957 at Amarillo are included in the 1954-61 averages.

Comparable yields and agronomic data for oats performance trials grown under irrigation at Amarillo and Floydada are given in Table 2. Grain yields are influenced by the differential winterkilling which occurred in 1960 and are very high for 1958-61. Mustang ranked first in grain yields during 1954-61 and third for 1958-61. Although Frazier ranked first for 1958-61 and second for 1954-61, this variety is no longer available. Wintok, Cimarron and Bronco ranked third to fifth for 1954-61 and are the most winter hardy varieties adapted to this area.

The grain of Wintok and Cimarron was higher in test weight than other varieties while the test weight of Mustang was the lowest. Cimarron was the earliest variety and Bronco the latest. Fulwin was the tallest variety and lodged the most, but New Nortex, Wintok and Bronco also lodged. Fultex was the shortest variety and lodged the least. During 1960 Fulwin, Wintok and Cimarron were damaged the least by low temperatures. Fultex and New Nortex were almost destroyed. Wintok and Cimarron are known to be the most hardy adapted varieties.

While fall seeding in area 1 is hazardous, fall-sown oats usually produce better yields than spring-sown oats and may provide winter pasture. Mustang, Wintok, Cimarron and Bronco are recommended. More erect growing and quick maturing varieties such as Alamo X, Alamo or Suregrain are preferred for spring seeding.

AREA 2

Slightly less than one-third of the State acreage of oats is grown in area 2. The crop is used extensively for both grain and winter pasture for livestock. Since a large proportion of area 2 is devoted to livestock production on large ranches, the value of oats for winter grazing is important in production practices. The amount and distribution of rainfall is of major importance in determining the utilization of oats. When spring moisture conditions are unfavorable, large acreages are grazed to maturity to maintain livestock until grass in permanent pastures is available. Under these conditions, the crop has its greatest value in such utilization. Because of the severe treatment given the crop under heavy grazing conditions, combined with limited and poorly distributed rainfall, the grain yields in area 2 are frequently low.

Performance trials were conducted at Iowa Park where supplemental irrigation is available, at Spur, Chillicothe and one season at Merkel. Because of drouth, no data were obtained at Spur in 1959 or 1961. Eleven comparisons are available for varieties grown at all stations 1958-61 and 23 comparisons for 1954-61. Since irrigation at Iowa Park was used only to insure normal growth and not to produce maximum yields, these data are included with the tests conducted at other stations.

Comparable data for the 8-year period show Mustang, Alamo-X, Victorgrain, Alamo, Suregrain and Bronco ranking first to sixth. Alamo-X, Suregrain and Moregrain were included in only a few tests and therefore have not been adequately evaluated. New Nortex, Alamo, Suregrain and Moregrain were seriously damaged by low temperatures in 1959. These varieties, as well as Alamo-X, are less hardy than Mustang, Bronco, Wintok and Cimarron. Mustang ranked first for the area during the 4-year period and was also first at Iowa Park and Merkel. Even though they are winter hardy, Fulwin, Wintok and Winter Excel have not yielded well at these stations.

The varieties Winter Excel, Moregrain and Suregrain were superior to others in test weight. The range in maturity was not great in these tests although Moregrain and Cimarron were the earliest in heading while Bronco was the latest. Mustang showed the least lodging, being much superior to Fulwin, Cimarron or New Nortex in this respect. Wintok, Bronco and Cimarron were the most cold tolerant in 1959 when most others were damaged severely.

TABLE 3. COMPARABLE GRAIN YIELDS AND AGRONOMIC DATA FOR FALL-SOWN OATS GROWN AT STATIONS IN AREA 2, 1958-61, AND GRAIN YIELDS FOR 1954-61

Variety	Yield of grain, bushels per acre				1958-61		1954-61		Agronomic data, 1958-61						
	Chillicothe 1958-61	Spur 1958-60	Iowa Park 1958-61	Merkel 1958	Average	Number tests	Average	Number tests	Test weight, pounds	Date first head	Date full ripe	Plant height, inches	Lodging percent	Forage estimate percent[1]	Winter survival percent
Number tests	4	2	4	1					11	8	8	7	5	7	1
Mustang	59.0	62.0	65.5	70.2	62.9	11	55.3	23	31.5	4-28	5-29	25	6	103	95
Alamo-X	64.5	65.9	49.9		61.2	4	54.9	4	33.7	4-24	5-25	24	14	111	
Victorgrain	59.0	62.0	54.3	56.9	57.6	6	54.4	13	33.7	4-24	5-25	24	14	109	50
Alamo	64.8	73.2	53.5	55.6	61.4	11	53.3	23	33.5	4-22	5-25	24	10	109	50
Suregrain	54.0	72.7	60.0		59.3	7	53.0	7	34.3	4-22	5-24	22	10	99	20
Bronco	59.2	46.7	63.0	60.4	58.4	11	52.5	23	31.8	5-1	6-2	28	13	88	98
New Nortex	55.2	51.0	51.5	48.6	52.5	11	50.9	23	32.1	4-26	5-26	25	29	100	20
Cimarron	57.3	58.6	61.6	46.0	58.1	11	50.6	23	33.6	4-19	5-23	23	33	109	98
Moregrain	*56.6*	*73.8*	*50.3*		*56.3*	*7*	*50.0*	*7*	*35.9*	*4-19*	*5-23*	*21*	*18*	*105*	*40*
Fulwin	53.5	57.0	54.8	71.8	56.3	11	49.1	23	32.5	4-28	5-29	29	33	101	95
Wintok	59.2	61.7	43.6	61.2	54.2	11	47.1	22	33.6	4-26	5-27	25	15	101	98
Frazier	53.6	54.2	52.7	49.7	53.0	11	46.6	23	33.4	4-21	5-24	27	23	119	25
Winter Excel	55.3		43.0		51.2	2	41.3	2	35.6	4-26	5-26	22		91	

[1]*Visual estimate of forage value, New Nortex 100 percent.*

Frazier, Alamo-X and Cimarron were rated first to third among the varieties in forage value.

Because of their cold tolerance, drouth resistance and proved adaptation over a long period, Mustang, Bronco and Cimarron are recommended for fall seeding in area 2. The Red Rustproof strains, such as New Nortex, Nortex 107 and Ferguson, are satisfactory but frequently damaged by low temperatures. Alamo-X and Moregrain have produced good yields the past two seasons but have not been adequately tested. Suregrain and Alamo are much less winter hardy.

When winterkilling occurs and reseeding in the spring is necessary then early maturing varieties such as Alamo-X, Alamo, Moregrain or Mustang should be sown.

AREA 3

Oats are grown more extensively in area 3 than any other part of the State, with approximately one-third of the harvested oat acreage being grown there. Considerable acreages of oats are grown for a cash grain crop although most growers utilize the crop to some degree for livestock pasture. When the oats are pastured, livestock are removed from the fields in late February to allow the oats to produce a grain crop.

Performance trials conducted at Denton, Renner, Greenville and Stephenville are reported in Table 4. Performance trials at Stephenville were discontinued after 1958, and although seeded at Greenville in 1959 and 1960, no data were obtained because of poor stands. During 1954-61, the varieties Moregrain, Victorgrain, Mustang, New Nortex and Nortex 107 ranked first to fifth in comparable average grain yields. These varieties also were the leading varieties for 1958-61. Moregrain, Suregrain and Alamo-X have been tested only a few years and need additional testing for accurate evaluation.

Moregrain, Midsouth, Victorgrain and Suregrain produced better test weight grain than other varieties. Frazier, Cimarron, Moregrain, Alamo-X and Alamo were in the earliest maturing group, all being about 10 days earlier than the Red Rustproof strains. Suregrain was the shortest variety, averaging 30 inches in height, followed closely by Moregrain and Cimarron. Fulwin averaged 39 inches and was the tallest. Cimarron and Ferguson 922 lodged more severely than other varieties and Arkwin lodged the least.

Cold hardiness is important in area 3 although it was not a factor during this testing period. Alamo was damaged in 1959, but other varieties were not seriously injured. Experience over a longer period of time proves that Mustang and Bronco are the most cold tolerant varieties adapted to this area. Somewhat less winter hardy are Victorgrain, Midsouth, New Nortex and other Red Rustproof strains, Moregrain and Alamo-X. Still less winter hardy are Alamo and Suregrain.

Another factor to be considered in selecting varieties for area 3 is disease reaction. All varieties except Moregrain and Suregrain are susceptible to the prevalent races of oat leaf rust. All varieties except Alamo and Alamo-X are susceptible to prevalent stem rust races. Alamo and Victorgrain are susceptible to Victoria blight, a rootrot of oats.

Other commercial varieties grown to a limited extent in this area are Taggart, Forkedeer and Dubois. Taggart produced only 39.3 bushels per acre for 1947-56 compared to 50.3 for New Nortex. Forkedeer is a sister strain of Fulwin, which has produced poor yields at Denton. Dubois has not been adequately tested. None of these varieties is recommended at present.

Varieties recommended for area 3 are Moregrain and New Nortex and other Red Rustproof strains as well as the more cold tolerant Mustang and Bronco

TABLE 4. COMPARABLE GRAIN YIELDS AND AGRONOMIC DATA FOR FALL-SOWN OATS GROWN AT STATIONS IN AREA 3, 1958-61, AND GRAIN YIELDS FOR 1954-61

Variety	Yield of grain, bushels per acre				1958-61		1954-61		Agronomic data, 1958-61							
	Denton 1958-61	Greenville 1958	Stephenville 1958	Renner 1958-61	Average	Number tests	Average	Number tests	Test weight, pounds	Date first head	Date full ripe	Plant height, inches	Leaf rust, percent	Lodging, percent	Survival, percent	Forage value, percent[1]
Number tests	4	1	1	3					7	4	2	5	2	3	1	2
Moregrain	77.5			62.5	71.1	7	57.1	7	35.6	4-16	5-21	32		29	96	102
Victorgrain	77.9	69.1	73.3	61.6	73.3	7	56.1	19	34.1	4-18	5-21	36	11	22	92	99
Mustang	64.8	66.2	68.3	70.3	67.2	9	55.6	21	30.3	4-22	5-27	35	18	19	100	93
New Nortex	62.9	76.4	65.3	70.8	67.3	9	55.0	21	32.3	4-24	5-28	35	4	42	100	100
Nortex 107	66.9				67.2	3	53.7	6	31.5	4-24	5-28	34	2	25	96	100
Midsouth	71.9	70.0	67.7	65.0	68.9	9	53.3	11	34.8	4-17	5-26	37	18	15	96	105
Bronco	60.5	65.0	58.7	70.8	64.3	9	51.9	21	31.0	4-25	5-28	37	20	24	100	85
Suregrain	70.3	61.4	84.4	50.8	64.4	9	50.2	9	34.0	4-18	5-22	30		33	79	95
Cimarron	65.7	60.5	56.5		60.9	3	50.1	12	32.5	4-16	5-21	32	20	54		
Ferguson 922	57.3	76.3	69.6	57.7	62.0	7	49.2	12	32.1	4-25	5-27	35	2	55	96	99
Arkwin	60.4	61.3	53.3	67.5	61.7	6	48.7	9	33.7	4-21	5-24	37	34	12	100	84
Frazier	63.3	65.4	64.5	66.0	64.6	9	47.1	21	33.4	4-15	5-19	36	6	45	89	107
Alamo	69.5	55.9	73.2	53.0	62.9	9	47.5	21	33.1	4-17	5-22	34	19	23	75	103
Alamo-X	62.4			58.2	60.3	2	46.2	2	32.2	4-16	5-21	35		30		
Fulwin	59.3	63.5	58.0	65.2	59.2	9	45.9	21	29.9	4-24	5-27	39	31	40	100	93

[1]Visual estimate of forage value, New Nortex 100 percent.

varieties. Victorgrain and Midsouth are satisfactory but susceptible to prevalent rust races. Alamo-X appears satisfactory, but more adequate testing is needed.

AREA 4

Approximately one-third of the State oat acreage is grown in area 4. Oats are grown as a combination winter pasture and feed crop. Considerable acreages are sown exclusively for livestock pasture, while a small part of the acreage is sown as a cash grain crop.

Performance trials were conducted at three stations—Temple, McGregor and on the Edwards Plateau at Comfort. Comparable agronomic and grain yields are given in Table 5 for 1958-61 along with comparable grain yields for 1954-61. Ferguson 922, New Nortex, Moregrain, Suregrain and Alamo-X rank first to fifth in grain yields for 1954-61, and these also are the highest yielding varieties for 1958-61.

Moregrain, Suregrain, Midsouth and Victorgrain produced grain with higher test weight than other varieties. Frazier was the earliest variety, followed by Moregrain, Radar I and Suregrain. Suregrain, Moregrain, Radar I and Alamo-X averaged lowest in leaf rust infection, a disease of major importance in this area. These same varieties are all intermediate winter-type in growth habit and were rated above others in forage value.

Varieties recommended for this area include Moregrain, Suregrain and Alamo-X, all intermediate winter types. These have the highest degree of resistance to crown rust of any adapted varieties. Also recommended are the Red Rustproof strains New Nortex, Nortex 107 and Ferguson 922 or Arkansas 560. The Red Rustproof strains are susceptible but rather tolerant to the rusts. A high degree of cold resistance is not essential in this area, so Mustang and Bronco should be replaced by the more disease-tolerant varieties. The varieties Forkedeer and Taggart have been recently introduced into this area. Both are very susceptible to the rusts and probably will be seriously damaged many seasons.

Spring seeding of oats is not recommended in this area, but if it becomes necessary because of winterkilling, Alamo-X, Suregrain or Moregrain may be sown.

AREA 5

Oats grown in area 5 are seeded primarily as winter pasture for livestock. When conditions are favorable with minor rust damage, some acreages may be harvested for grain and others for hay or silage. In certain localities the practice of green-chop feeding of livestock has gained some popularity. Winters are mild and broken only by short periods of cold weather so livestock are seldom confined to shelter areas. Often humidity is high, showers are frequent and the sky is cloudy, so numerous leaf diseases attack the cereal crops.

Performance trials were conducted at four locations, although the tests at Beaumont were discontinued after the 1958 season. No data were obtained at Prairie View in either 1960 or 1961. Favorable conditions were encountered at Beeville and College Station during the period. Data for four stations in area 5 are presented in Table 6.

The varieties Suregrain and Moregrain gave outstanding yields during the past 4 years, owing to their high resistance to prevalent races of crown rust. All other varieties except Alamo-X were susceptible to crown rust race 216 which became prevalent in 1957 or to race 290 which became prevalent in 1959. Alamo-X was susceptible to race 294, which became prevalent in 1961. Radar I is susceptible to race 290 and 294, but resistant to stem rust. Alber has moderate field tolerance to the rusts so it has produced fairly satisfactory yields. Florad and Floriland are resistant to prevalent races of crown rust but are very susceptible to stem rust.

TABLE 5. COMPARABLE GRAIN YIELDS AND AGRONOMIC DATA FOR FALL-SOWN OATS GROWN AT STATIONS IN AREA 4, 1958-61, AND YIELDS FOR 1954-61

Variety	Yield of grain, bushels per acre			1958-61		1954-61		Agronomic data, 1958-61						
	Comfort 1958-60	Temple 1958-61	McGregor 1958-61	Average	Number tests	Average	Number tests	Test weight, pounds	Date first head	Date full ripe	Plant height, inches	Leaf rust, percent	Stem rust, percent	Forage estimate, percent[1]
Number tests	3	4	4					11	11	10	11	6	1	9
Ferguson 922	52.0	68.6	66.2	63.2	11	55.4	13	33.6	4-20	5-21	33	9	20	100
New Nortex	57.8	63.2	70.2	64.3	11	54.6	20	32.5	4-20	5-21	34	12	Tr	100
Moregrain	56.2	64.4	55.1	58.7	11	52.7	11	36.6	4-9	5-13	30	Tr		112
Suregrain	53.0	57.0	60.4	57.1	11	51.0	11	35.2	4-11	5-14	30	Tr		109
Alamo-X	45.7	61.1	55.0	54.5	5	49.5	5	29.3	4-14	5-15	34	Tr		115
Victorgrain	54.8	55.7	61.9	57.5	9	48.0	18	34.6	4-14	5-14	34	52	5	113
Mustang	40.5	55.5	60.3	54.4	10	46.4	19	31.8	4-17	5-20	34	58		98
Bronco	45.2	52.9	52.2	51.1	10	46.4	19	33.0	4-23	5-23	34	68	80	84
Alamo	49.5	52.9	49.6	50.8	11	45.5	20	32.7	4-12	5-14	32	38		109
Midsouth	45.6	52.1	57.2	53.1	11	45.4	19	34.9	4-15	5-15	34	41	5	108
Radar I	43.0	54.9	49.2	50.2	5	44.1	5	32.1	4-10	5-14	32	Tr		112
Alber	46.4	60.8	40.0	49.1	6	43.8	15	33.8	4-18	5-19	35	18	15	106
Frazier	54.2	45.4	44.9	47.6	11	42.1	20	33.4	4-7	5-12	35	52	30	110
Fulwin	41.4	41.3	38.1	40.2	11	36.2	20	30.8	4-21	5-20	35	56		88

[1]Visual estimate of forage value, New Nortex 100 percent.

The Moregrain and Suregrain varieties have also been outstanding in test weight, partly because of their plump seed and rust resistance. Floriland, Moregrain, Radar I and Florad were earlier than other varieties in maturity and were, along with Alber, the most rust resistance. Radar I, Alamo and Alamo-X were the only varieties having stem rust resistance. Based on visual estimates only, Goodfield, Florad, Alamo, Alamo-X, Frazier and Radar I were rated the most productive in forage. The erect-growing spring-type oat varieties Minhafer, Goodfield, Florad and Floriland produced lower grain yields than the better intermediate winter-type varieties.

AREA 6

The Northeast Texas area, shown as area 6, is similar in climate to area 3 except that the rainfall is greater and minimum temperatures are not quite so severe. Most of the oats grown in this area are sown for winter pasture. No facilities for testing oats are available in this area so no data are available. On the basis of growers' experiences, limited forage tests of small grain and performance in adjoining areas, the varieties adapted to area 3 are suggested as the best available.

AREA 7

No oats performance trials are conducted in this area. Most of this area is devoted to livestock production on large ranches. Facilities for irrigation are available in certain small areas where crops of high value such as cotton or vegetables are grown. A considerable amount of oats are sown for winter pasture. Because of the higher elevation of this area, some cold tolerance is needed. The varieties Mustang, Bronco and New Nortex are suggested as the best available.

Spring-Sown Oats

Most oats are fall sown in Texas, but in seasons when spring moisture conditions are favorable, considerable acreage may be spring sown in areas 1 and 2. Also, when low temperatures damage or destroy the fall-sown crop, it may be desirable to reseed certain acreages. Before 1950, when cold tolerant varieties such as Mustang and Bronco were not available, a much larger proportion of the Texas crop was spring sown.

Diseases, particularly the rusts and Victoria blight, are more important in spring-sown oats than in the fall-sown crop because temperatures become more favorable for these diseases in later maturing oats. Spring seeding of oats also may cause shriveling of the seed because of high temperatures during the fruiting period. All these factors contribute to the lower average yield of spring-sown oats.

Small performance trials of spring-sown oats were conducted at the more northern stations. Practically no spring seeding of oats is practiced in areas 4, 5 and 6, so no tests were conducted in these areas. Comparable data for grain yields and agronomic data are included in Table 7.

Alamo, since its distribution in 1953, has been the best yielding spring-sown oat variety. Alamo-X, although tested only one season, appears satisfactory and will give protection from Victoria blight and from some races of rust. Frazier, because of its earliness, frequently produces good yields in spring-sown tests. Late maturing varieties, such as the Red Rust-proof strains or Bronco, are not well suited for spring seeding.

Barley

The acreage sown to barley in Texas is considerably less than that for oats or wheat. There has

TABLE 6. COMPARABLE GRAIN YIELDS AND AGRONOMIC DATA FOR FALL-SOWN OATS GROWN AT STATIONS IN AREA 5, 1958-61, AND GRAIN YIELDS FOR 1954-61

Variety	Yield of grain, bushels per acre				1958-61		1954-61		Agronomic data, 1958-61						
	College Station 1958-61	Prairie View 1958-59	Beaumont 1958	Beeville 1958-61	Average	Number tests	Average	Number tests	Test weight, pounds	Date first head	Date full ripe	Crown rust, percent	Stem rust, percent	Plant height, inches	Forage estimate, percent[1]
Number tests	4	2	1	4					9	8	6	11	4	7	8
Suregrain	48.6	63.0	64.9	67.9	59.7	11	65.7	11	33.0	4-2	5-3	1	32	36	114
Radar I	55.8	63.4		51.9	55.2	7	62.1	7	30.1	3-29	5-3	20		33	121
Moregrain	48.4	61.9	25.2	66.3	55.3	11	60.9	11	35.8	3-29	5-2	3	53	37	116
Alamo-X	44.0			49.0	46.5	4	53.4	4	30.9	4-3	5-3	22		41	124
Alber	46.2	59.1	38.2	52.4	50.5	7	51.0	17	28.4	4-4	5-9	Tr	12	39	107
Alamo	39.5	45.0	38.7	34.4	38.6	11	45.1	21	30.5	4-2	5-3	61		38	124
Victorgrain	36.8	32.3	41.8	32.0	35.0	10	44.0	20	29.6	4-4	5-5	69	39	37	108
Goodfield	*32.1*			*41.4*	*36.8*	*3*	*43.7*	*3*	*35.7*	*4-1*	*4-30*	*43*		*37*	*140*
New Nortex	37.9	31.8	41.1	34.2	35.7	11	42.6	21	26.9	4-11	5-11	42	24	36	100
Floriland	34.7				34.7	4	41.3	8	29.0	3-26	4-29	Tr	25	40	115
Midsouth	34.2	30.4	37.0	30.4	32.4	11	41.2	11	28.6	4-4	5-5	74	19	38	104
Ranger	28.4	30.4	36.8	38.1	33.0	11	40.2	21	26.5	4-10	5-10	51	33	35	100
Florad	22.1			54.4	32.8	3	39.7	3	30.3	3-29	4-30	37	48	39	141
Frazier	34.3	32.7	23.4	33.3	32.6	11	39.3	21	29.4	4-10	5-10	80	18	38	123
Mustang	21.7	26.1	23.2	21.3	23.1	3	39.0	14	25.2	4-7	5-8	60	36	35	100
Minhafer	35.6	37.8	28.0	38.4	36.0	6	36.5	7	27.5	4-13	5-15	Tr		42	119

[1]Visual estimate of forage value, New Nortex 100 percent.

Figure 3. Seeded and harvested acreage of barley in Texas, 1952-61. The solid line indicates the seeded acreage and the broken line the harvested acreage.

been a marked increase in acreage of barley, because of favorable growing seasons, development of well-adapted varieties, use of the crop for winter pasture and controlled acreage of wheat. During the very dry seasons of 1951 and 1952, barley acreage was the lowest since 1918, but during the past two seasons the harvested acreage was the highest on record. The average seeded acreage for the past 10 years was 345,300 and that harvested was 242,800. The changes in acreage during this period are illustrated in Figure 3. During recent years, the acreage seeded exclusively for forage has been partially included in statistics.

The acreage of barley is widely scattered over the State. Most of it is fall sown, but in seasons of favorable spring moisture, a large acreage is spring sown in area 1. During recent years, there has been considerable acreage grown under irrigation in this area. The distribution of barley in Texas in 1959 is shown in Figure 4.

Three types of barley are grown in Texas. True winter-type varieties such as Kearney and Ward are used for fall seeding in area 1 and to some extent in area 2. These varieties produce an obligate winter-growth habit which requires some cold weather for normal heading. They may not head normally when spring sown. Intermediate winter-type varieties have a more upright juvenile growth habit and will head from either fall or spring seeding. Varieties of this type, such as Cordova and Rogers, are widely adapted in the State and will survive most winters although they are less cold tolerant than true winter-type varieties. This type also may be used for spring sowing in areas 1 and 2. True spring-type barley varieties may be fall seeded in area 5 where winters are relatively mild.

Nearly all barley grown in Texas is used as a combination grain and winter grazing crop. The proportion harvested for grain and that grazed to maturity varies with seasonal conditions. When spring moisture conditions appear favorable, livestock are removed and the crop is allowed to produce grain. On the other hand, when moisture conditions are unfavorable, the crop will be grazed until it is killed out and the fields then used for a summer forage crop. An example of this is the 1959 season, as illustrated in Figure 3. Widespread drouth during the spring persisted until mid-April and only 295,000 acres of the 475,000 seeded were harvested. The spring-sown crop in area 1 is about the only barley grown exclusively for grain. Barley is a valuable crop for winter pasture though it is not as palatable as oats. Frequently from early fall seeding, barley will produce sufficient growth for grazing more quickly than many varieties of oats and wheat. The total yield of forage is not greatly different from other small grain.

Performance trials are summarized by areas. The complete summary includes the 4 years 1958-61, but grain yields also are given for an 8-year period. Varieties grown for short periods are less accurately evaluated than those grown the full period.

AREA 1

Both fall and spring-sown barley are sown in area 1. Fall sceding is somewhat hazardous and, until recent years when better varieties and facilities for providing better cultural conditions became possible through irrigation, the fall-sown acreage was small. Not only has fall-sown barley acreage increased, but the spring-sown acreages also have increased.

Performance trials were conducted under irrigation at Bushland (near Amarillo) and at Floydada. The Floydada tests were discontinued after 1960, and tests were initiated in cooperation with the High Plains Research Station at Plainview. The 1961 Plainview tests and the 1961 Bushland tests were

TABLE 7. COMPARABLE YIELDS AND AGRONOMIC DATA FOR SPRING-SOWN OATS GROWN AT STATIONS IN TEXAS, 1958-61, AND GRAIN YIELDS FOR 1954-61

Variety	Yield of grain, bushels per acre					1958-61		1954-61	
	Amarillo 1958-60	Chillicothe 1958-60	Denton 1958-60	Iowa Park 1958-59	Temple 1958-59	Average	Number tests	Average	Number tests
Number tests	3	3	3	2	2				
Alamo	50.7	36.4	47.6	34.8	47.8	43.4	10	36.2	26
Frazier	44.0	50.0	43.6	52.3	35.4	45.0	10	35.7	26
Alamo-X	44.2	49.3		33.6		42.4	3	35.0	3
Fulgrain			31.7			31.2	1	32.7	14
Mustang	39.5	44.0	30.6	29.4	37.8	33.6	9	30.5	25
Fultex			40.2			40.2	1	30.3	11
New Nortex	26.5	36.6	39.0	44.4				30.2	26

destroyed by hail. Comparable yields of grain and agronomic data are given in Table 8.

Rogers, a relatively new variety developed in Oklahoma, has produced outstanding yields in recent trials, ranking first in yield for both the 4-year and 8-year period. Wintex ranked second in these tests but in earlier tests yielded less than Cordova. Meimi ranked third but was included only a year. Cordova ranked fourth and Kearney, fifth.

Rogers, Meimi, Cordova and Dicktoo produced grain of higher test weight than other varieties. Meimi was the earliest variety, followed in order by Missouri Early Beardless, Cordova and Harbine. Missouri Early Beardless was the tallest variety and differences among other varieties were small. Pueblo and Wintex lodged the most while Harbine and Rogers lodged the least. Meimi, Kearney and Ward are more winter hardy than Rogers, Harbine, Cordova or Wintex, but the latter group may be spring seeded if necessary. Kearney is resistant to greenbugs.

Varieties recommended for area 1 include Kearney, because of its hardiness and greenbug tolerance, Rogers and Cordova. Wintex, Harbine and Ward are acceptable. Meimi has not been adequately tested and shattered somewhat in 1961. True winter-type varieties such as Kearney, Meimi and Ward should not be spring seeded.

AREA 2

Most barley sown in area 2 is fall sown although when winterkilling occurs, some may be spring sown. Much of the acreage is grazed to maturity by livestock; therefore, the difference between seeded and harvested acreage is often great. Amount and distribution of rainfall are the greatest hazards of production. Greenbugs and chinch bugs are frequent insect hazards.

Performance trials were conducted at three locations each season and in one season at Merkel through the cooperation of the Texas Research Foundation.

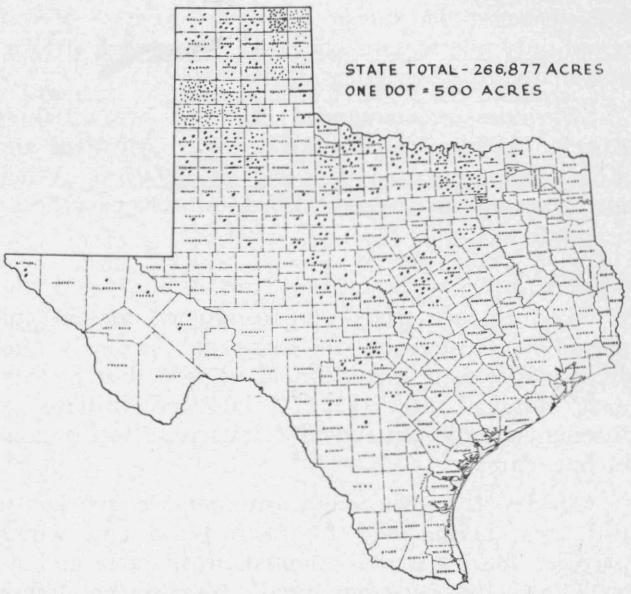

Figure 4. Distribution of barley in Texas in 1959.

The 1959 and 1961 tests at Spur were lost because of spring drouth. The Iowa Park test received supplemental irrigation when necessary but was not watered for maximum production.

Rogers barley produced outstanding yields during both the 4-year and the 8-year period. Harbine, Kearney and Cordova ranked first, second and third, respectively. The rank of varieties for the 8-year period is similar. Except for Kearney, the true winter-type barleys have made poorer records in area 2 than in area 1.

Rogers also ranked first in test weight, averaging at least 2 pounds more than most other varieties. Missouri Early Beardless and Cordova were earlier than other varieties though the spread in maturity among varieties was small. Missouri Early Beardless and Meimi were the tallest varieties and Tennessee Winter was the shortest. Meimi and Cordova were

TABLE 8. COMPARABLE GRAIN YIELDS AND AGRONOMIC DATA FOR FALL-SOWN BARLEY GROWN AT STATIONS IN AREA 1, 1958-61, AND GRAIN YIELDS FOR 1954-61

Variety	Yield of grain, bushels per acre		1958-61		1954-61[1]		Agronomic data, 1958-61					
	Bushland 1958-60	Floydada 1958-60	Average	Number tests	Average	Number tests	Test weight, pounds	Date first head	Date full ripe	Plant height, inches	Lodging percent	Winter survival, percent
Number tests	3	3					4	3	2	5	1	1
Rogers	52.4	49.5	59.2	5	45.3	12	48.4	5-16	6-24	32	20	67
Wintex	47.2	39.3	44.0	5	39.9	12	44.7	5-17	6-25	31	60	87
Cordova	46.5	39.8	44.8	5	39.8	12	46.8	5-12	6-21	30	50	77
Meimi	39.4		39.4	1	39.4	1	48.2	5-11		32		100
Kearney	42.1	34.6	39.1	5	37.2	12	45.8	5-17	6-25	31	40	92
Ward	37.2	43.1	39.5	5	36.9	12	44.6	5-15	6-23	32	50	95
Pueblo	34.6	37.4	35.5	3	36.5	10	44.6	5-17	6-24	32	60	
Dicktoo	47.6	37.9	42.8	2	36.0	9	46.4	5-14	6-22	31	40	
Tennessee Winter	31.7	35.3	33.1	5	32.9	12	44.5	5-15	6-24	30	20	73
Harbine	26.0	40.5	31.8	5	32.6	12	45.9	5-13	6-21	30	20	52
Missouri Early Beardless	2.0	33.8	15.9	2	21.2	8	41.7	5-10	6-18	37	15	

[1]Dryland tests at Bushland in 1954 and 1957 included.

judged better for forage than the others. Meimi, tested only one season, appeared to be weak strawed and shattered when ripe.

Varieties recommended for the area include Rogers, Harbine and Cordova. Kearney, Ward and other winter types may be used but yield less. When spring seeding is necessary, Cordova or Rogers should be used.

AREA 3

Performance trials were conducted for the full period at Denton only. Trials at Greenville and Stephenville were discontinued in 1960, but no data were obtained after 1958. Trials were initiated at Renner in 1959, but the 1960 tests were lost because of hail damage.

Barley is grown on a considerable acreage in this area, being used for both grain and winter pasture. Barley is well adapted in this area and fits well into the rotations used. Late-spring freezes occasionally injure the crop, but the fall-sown crop is seldom winterkilled. The intermediate winter-type varieties produce more winter pasture than true winter-type varieties. Diseases, especially mildew and leaf rust, are important in this area although the crop usually escapes serious injury because of its early maturity.

Rogers barley was outstanding in grain yields as it was in areas 1 and 2. Rogers, Cordova, Missouri B-400 and Texan produced the highest comparable yields. A number of out-of-state varieties were tested at two stations for short periods, but none appeared to be equal to Rogers or Cordova.

Rogers was outstanding in test weight as well as in grain yield, averaging 2 pounds more than other varieties. Kenbar, Hudson, Harbine and Cordova were among the better strains in test weight. The range of maturity was not great, but Missouri Early Beardless, Dayton, Pace and Missouri B-400 were earlier than other varieties. Hudson was the latest. Missouri Early Beardless and Missouri B-400 were the tallest varieties; Colonial 2 and Davie, the shortest.

Rogers, Cordova and Harbine are recommended for area 3. Texan also is satisfactory, but seed supplies are limited. The Mississippi varieties, Oma and Pace, have produced satisfactory yields but have weak straw and may lodge when grown under high fertility levels. The true winter-type barleys are not well adapted in this area.

AREA 4

Performance trials were grown at three locations in area 4, but trials at Comfort were discontinued in 1960. Cebada Capa ranked first in grain yield and forage production but has been tested only one season. Furthermore, no commercial seed is yet available. Rogers, Cordova, Pace and Texan have given satisfactory yields in this area. Cordova and Rogers are the recommended varieties for grain. Goliad may be used for winter pasture but is subject to injury by low temperatures.

Rogers ranked first in test weight followed by Kenbar and Kenate. Pace and Goliad were the earliest maturing varieties. Cebada Capa and Pace were the most resistant to leaf rust, while Rogers and Harbine were moderately resistant.

AREA 5

Performance trials were grown at College Station, Beeville and Prairie View. No data were obtained at Prairie View in 1960 or 1961 or at College Station in 1961, because of poor stands. True spring types or types approaching spring growth habit are best suited to this area. Arivat and Goliad ranked first and third in grain production and are the best for winter pasture, although Arivat is very susceptible to leaf rust. Cebada Capa, an Argentine variety, appears promising but must be given additional tests and is not yet available commercially.

TABLE 9. COMPARABLE GRAIN YIELDS AND AGRONOMIC DATA FOR FALL-SOWN BARLEY GROWN UNDER IRRIGATION AT STATIONS IN AREA 2, 1958-61, AND GRAIN YIELDS FOR 1954-61

Variety	Yield of grain, bushels per acre				1958-61		1954-61		Agronomic data, 1958-61					
	Chillicothe 1958-61	Spur 1958-60	Iowa Park 1958-61	Merkel 1958	Average	Number tests	Average	Number tests	Test weight, pounds	Date first head	Date full ripe	Plant height, inches	Leaf rust, percent	Forage value, percent[1]
Number tests	3	2	3	1					9	6	8	7	1	6
Rogers	46.0	39.0	46.1	43.7	44.5	11	37.9	23	48.5	4-24	5-24	24	2	100
Harbine	40.0	41.7	39.7	35.8	39.8	11	34.2	23	46.0	4-22	5-21	22	10	102
Cordova	43.5	38.4	33.2	34.9	38.0	11	32.2	23	45.5	4-20	5-22	25	25	112
Kearney	36.0	34.1	35.3	35.5	35.3	11	29.4	23	45.8	4-24	5-23	24	44	95
Dicktoo	25.5	22.7	26.4	36.9	27.9	4	25.9	15	44.4	4-23	5-23	22		82
Ward	29.6	27.9	24.3	32.6	27.8	9	25.7	21	43.7	4-25	5-24	22		80
Pueblo	28.1	29.7	23.8	34.2	27.9	6	25.6	17	43.0	4-25	5-24	22	25	80
Wintex	29.5	34.5	38.8	33.6	34.2	11	23.3	23	44.3	4-25	5-24	22	24	100
Tennessee Winter	30.2	29.8	25.4	33.7	28.7	11	23.3	23	43.0	4-23	5-22	21	24	94
Meimi	30.0		26.4		28.2	2	23.0	2	46.3	4-23	5-23	26	21	116
Missouri Early Beardless	21.0	0.4	23.0	32.9	19.3	11	20.7	16	40.7	4-19	5-20	26		101

[1]Visual estimate of forage value, Wintex 100 percent.

TABLE 10. COMPARABLE GRAIN YIELDS AND AGRONOMIC DATA FOR FALL-SOWN BARLEY GROWN AT STATIONS IN AREA 3, 1958-61, AND GRAIN YIELDS FOR 1954-61

Variety	Yield of grain, bushels per acre				1958-61		1954-61		Agronomic data, 1958-61				
	Denton 1958-61	Greenville 1958	Stephenville 1958	Renner 1959-61	Average	Number tests	Average	Number tests	Test weight, pounds	Date first head	Plant height, inches	Leaf rust, percent	Forage value, percent[1]
Number tests	4	1	1	2					10	6	6	4	3
Rogers	48.1	42.9	40.8	46.5	45.3	10	36.5	23	46.8	4-23	31	17	103
Cordova	44.8	37.3	41.7	43.0	42.3	10	34.4	23	44.6	4-18	30	23	102
Texan	38.8	36.0	39.2	42.6	38.7	8	33.9	21	44.1	4-19	31	20	103
Missouri B-400	43.7			28.8	40.0	4	33.6	10	42.9	4-17	35	5	
Kenbar	36.5			28.0	33.6	6	30.0	10	44.6	4-20	31	21	91
Harbine	36.6	33.1	38.2	34.6	35.9	8	30.0	21	45.5	4-22	32	9	98
Colonial 2	36.1			27.5	34.4	5	29.7	9	37.6	4-24	26	17	86
Pace	41.5			26.2	36.4	6	29.0	10	42.5	4-17	29	21	92
Dayton	41.9			26.9	36.9	6	29.6	6	43.8	4-17	31	18	96
Oma	38.0			34.8	37.2	4	28.9	8	45.1	4-20	33	12	98
Kenate	35.5			25.2	33.4	5	28.0	7	43.5	4-23	29	19	87
Hudson	33.3			31.7	33.0	5	27.5	8	44.5	4-26	31	20	85
Kearney	26.7	34.4	34.2	35.7	31.6	8	25.7	21	43.5	4-23	30	16	94
Ward	24.7	32.8	34.4	25.6	29.9	7	25.0	20	42.7	4-24	30	15	86
Tennessee Winter	30.3	32.9	32.6	21.5	30.4	9	24.9	22	42.6	4-20	29	21	95
Missouri Early Beardless	27.0	32.7	29.1		29.6	3	24.7	14	39.7	4-17	35	12	76
Davie	29.0			24.0	28.0	5	24.0	9	40.6	4-22	27	9	90
Wintex	25.9	36.1	34.0	23.2	29.7	9	23.6	22	42.5	4-24	28	23	100
Tenkow	33.2				33.2	3	23.4	9	42.1	4-23	32	6	
Reno	27.9				27.9	3	22.6	9	40.9	4-22	30	8	

[1]Visual estimate of forage value, Wintex 100 percent.

AREAS 6 AND 7

No tests have been conducted in these areas. Varieties adapted to area 3 appear satisfactory for area 6 while varieties from areas 1 and 2 may be used in area 7.

Wheat

Wheat ranks third in acreage among the cultivated crops of Texas, being exceeded in acreage by cotton and grain sorghum. Restrictions under the government crop-control program have reduced recent wheat acreage to less than that seeded in the 1940-50 period. The maximum acreage ever grown in Texas was 7,310,000 in 1947 and the lowest acreage in recent years was in 1955 when only 1,508,000 acres were harvested. The 1952-61 average seeded acreage of wheat was 4,330,000 and that harvested was 2,859,000.

Grain production for 1952-61 averaged 45,765,500 bushels or 16.0 bushels per acre. The largest crop ever produced was in 1947 when 124,270,000 bushels were harvested. The smallest crop in recent years was in 1955, when drouth and insects reduced the crop to only 14,326,000 bushels. Yields during 1958-61 have been unusually high, averaging 21.5, 17.0, 22.0 and 24.0 bushels per acre, respectively.

TABLE 11. COMPARABLE GRAIN YIELDS AND AGRONOMIC DATA FOR FALL-SOWN BARLEY GROWN AT STATIONS IN AREA 4, 1958-61, AND GRAIN YIELDS FOR 1954-61

Variety	Yield of grain, bushels per acre			1958-61		1954-61		Agronomic data, 1958-61					
	Comfort 1958-60	Temple 1958-61	McGregor 1958-61	Average	Number tests	Average	Number tests	Test weight, pounds	Date first head	Date full ripe	Plant height, inches	Leaf rust, percent	Forage value, percent[1]
Number tests	3	4	4					11	11	9	11	5	9
Rogers	40.0	41.3	44.8	42.2	11	37.3	11	49.8	4-16	5-18	31	12	83
Cebada Capa		40.3	44.7	42.6	2	37.3	2	46.0	4-13	5-18	29	2	105
Cordova	35.3	40.2	41.6	38.8	11	34.6	20	47.4	4-12	5-13	29	34	100
Pace		42.2	34.9	38.6	2	33.4	2	43.5	4-7	5-16	29	3	95
Texan	36.9	38.1	36.3	37.5	9	32.2	18	46.9	4-12	5-15	29	37	93
Kenbar	35.6	34.0	39.9	36.8	9	31.6	18	48.4	4-15	5-16	30	40	71
Kenate	34.7	38.4	34.8	36.6	6	31.4	9	48.4	4-18	5-15	31	22	72
Goliad	33.1	36.2	37.0	35.9	11	29.0	20	46.5	4-9	5-13	31	24	100
Harbine	32.2	30.5	23.6	29.2	9	26.6	18	45.9	4-17	5-16	29	12	80
Tennessee Winter	32.3	40.2	41.6	28.1	11	25.2	20	45.3	4-15	5-14	29	45	81
Missouri Early Beardless	27.5	28.1	13.4	23.6	6	24.7	15	41.1	4-11	5-13	32	32	83

[1]Visual estimate of forage value, Cordova 100 percent.

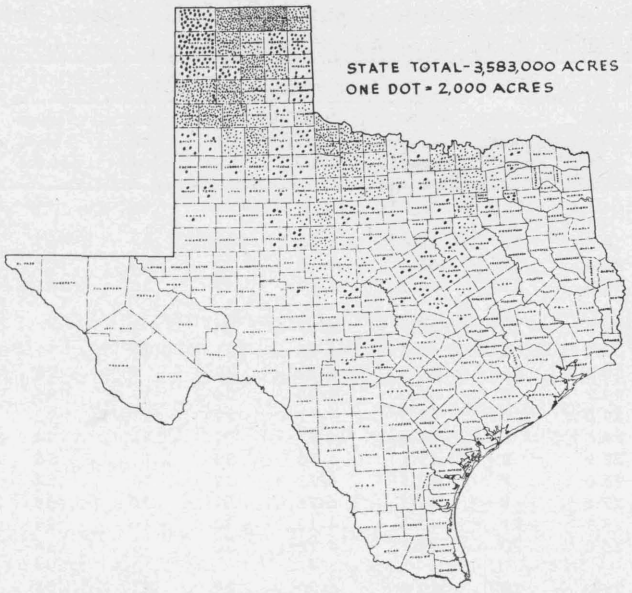

Figure 5. Distribution of wheat in Texas in 1959.

The acreage devoted to wheat for grain production is principally in the northwestern part of the State. Approximately 64 percent of the acreage is grown in area 1, about 24 percent in area 2 and the remaining 12 percent scattered through Central Texas with the heaviest concentration in Grayson and Collin counties. Distribution of wheat harvested in 1959 is shown in Figure 5.

Because of the wide range of climatic conditions, several types of wheat are grown in the State. Probably more than 90 percent of the acreage is seeded to hard red winter wheat varieties. Soft red winter wheat varieties are grown in the Dallas-Fort Worth-Sherman area and to a small extent for forage in South Texas. A small acreage of durum varieties is grown from Waco southward on to the Edwards Plateau. This type of wheat was introduced soon after 1900 and has persisted because of its rust resistance. Since there is no market available for durum wheat in semolina production, the grain is used in mixed feed. A small acreage of emmer, locally called "speltz," is grown in this same general area. Varieties somewhat intermediate between winter and spring such as Seabreeze and Milam, are grown for winter pasture in South Texas. Frequently small acreages of durum and spring varieties are spring seeded in area 1, but these crops have not been very successful.

Milling and baking characteristics are very important in selecting a wheat variety. The majority of Texas wheat is used for the production of bakery-type flour. The value of the crop in both domestic and foreign markets, therefore, depends on quality. Recently the sedimentation test for evaluating wheat quality has been made a part of the market grade and is used in determining the value of the grain as it goes into storage. Growers and elevator operators may receive premiums for wheat of superior quality. The quality characteristics are determined by variety and growing conditions during the crop season. Varieties differ in quality, and growers may improve their opportunity to obtain premiums by selecting strong gluten varieties which, when grown under favorable conditions, will produce grain of high protein and high sedimentation values.

Almost all wheat grown in Texas is used to some extent for winter pasture for livestock. Most of the acreage in areas 5, 6 and 7, as well as considerable acreage in areas 2 and 4, is sown primarily for livestock pasture and grazed to maturity. When spring rainfall and stored moisture conditions are unfavorable, an increased portion of the acreage is grazed to maturity. The revenue from livestock pasture of irrigated wheat in area 1 has also become of increasing importance during the past 10 years. Frequently this return often approaches the net return from the grain crop.

Air-borne diseases, primarily leaf and stem rust but including also speckled leaf blotch, mildew and stripe rust, influence the varieties grown and value of the crop in Texas. Throughout areas 3, 4, 5 and 6, these diseases frequently are major factors in production. They are usually less important in areas 1 and 2 but may be destructive in some seasons. Soil-borne diseases, such as rootrots, influence production

TABLE 12. COMPARABLE YIELDS AND AGRONOMIC DATA FOR FALL-SOWN BARLEY GROWN AT STATIONS IN AREA 5, 1958-61, AND GRAIN YIELDS FOR 1954-61

Variety	Yield of grain, bushels per acre			1958-61		1954-61		Agronomic data, 1958-61					
	College Station 1958-60	Beeville 1958-61	Prairie View 1958-59	Average	Number tests	Average	Number tests	Test weight, pounds	Date first head	Date full ripe	Plant height, inches	Leaf rust, percent	Forage estimate percent[1]
Number tests	3	4	2					10	4	5	7	9	6
Arivat	28.7	28.3	44.3	31.1	6	44.6	6	42.0	3-7	4-26	26	61	90
Cebada Capa	29.0	33.7		31.4	2	33.9	2	43.8	3-21	5-9	32		93
Goliad	29.0	34.4	31.9	32.0	9	31.7	12	42.8	3-18	4-28	33	15	100
Ricardo		27.2		27.2	1	29.7	1	43.3	3-31	5-8	33	3	84
Kenbar	24.6	23.6	21.5	23.4	7	27.3	10	42.0	4-7	5-4	29	42	69
Pace	24.8	29.4	33.5	28.0	3	30.1	3	42.5	3-27	5-3	27	35	77
Rogers	27.7	20.8	21.3	23.2	9	26.3	12	43.0	4-6	5-7	29	42	73
Kenate	18.7			18.7	3	26.3	5	43.7	4-6	5-4	28	60	88
Cordova	20.8	22.1	24.3	22.1	9	26.4	12	41.8	4-4	5-5	27	41	74
Harbine	23.7	21.0	16.4	21.6	4	25.5	7	42.6	4-9	5-4	26	42	69

[1]Visual estimate of forage value, Goliad 100 percent.

practices in some areas. Furthermore, in some areas production practices must be altered to aid in control of insects and diseases.

AREA 1

Wheat is a major cash grain crop in area 1 and the revenue from wheat pasture also is an important source of income. Wheat performance trials were conducted at Bushland, Floydada, Stratford and Wellington in cooperation with farm cooperators. Tests were initiated at Plainview in cooperation with the High Plains Foundation in 1959 but were destroyed by hail in 1959 and 1960. Results are divided into irrigated and dryland tests and reported as comparable yields and agronomic data.

Data for nonirrigated wheat trials in area 1 are given in Table 13. For the 8-year period, Concho, Tascosa, Bison, Westar, Aztec and Crockett rank first to sixth, respectively, in comparable grain yields. For the 4-year period, Tascosa, Bison, Concho, Ponca and Aztec are the leading varieties. Tascosa ranked first in Bushland tests; Bison ranked first at Wellington, but Early Blackhull ranked first in the 1-year test at Stratford. During recent years, yields have been high with seasons favoring the midseason to later varieties. The early varieties, Triumph, Crockett, Early Blackhull, Kaw and Wichita, produced abnormally low yields during this period.

The highest test weights were produced by Red Chief, Aztec, Tascosa and Kaw. Early Blackhull, Triumph and Improved Triumph and Wichita were 2 to 4 days earlier than other varieties. Differences in height and forage estimates were relatively small among the varieties, but Tascosa was the shortest.

Data from irrigated tests are given in Table 14. Concho, Tascosa, Kaw, Improved Triumph and Bison were the five high ranking varieties in grain yield for both the 4-year and 8-year periods. Under both irrigation and dryland conditions, Kharkof, representing the old Turkey-type wheat once grown almost exclusively in the Panhandle, yielded much lower than the new improved varieties now available to growers.

The highest test weights were produced by Kaw, Tascosa, Red Chief and Early Blackhull. Early Blackhull, Triumph and Improved Triumph were the earliest in maturity. Plant heights were not greatly different, but Tascosa and Wichita were the shortest. Red Chief, Bison and Aztec lodged the least in these tests. Kaw, Ponca and Crockett were more resistant to the leaf rust; Triumph, Improved Triumph, Early Blackhull, Aztec and Red Chief were more resistant to stripe rust than other varieties.

Recommendations of varieties are based on grain yields and information on quality of grain for milling and baking purposes. Tascosa, Bison, Aztec, Kaw, Ponca and Comanche are all high quality varieties which have produced satisfactory grain yields under both dryland and irrigated conditions. Concho, Crockett, Improved Triumph and Triumph produce satisfactory yields, but they are less desirable from a quality standpoint. These varieties are classed as mellow-gluten wheats suitable for production of bakery flour only under the most favorable conditions and are usually only suitable for family-flour production.

Four new varieties recently announced by nearby states have not yet been adequately evaluated. These are Omaha, Ottawa, Warrior and Rodco. In three tests at Bushland, Ottawa averaged 38.7 bushels compared with 41.2 for Tascosa. In three other tests Omaha yielded 33.3 bushels compared with 38.3 for Tascosa. In two tests Rodco averaged 39.2 bushels

TABLE 13. COMPARABLE YIELDS AND AGRONOMIC DATA FOR WINTER WHEAT GROWN WITHOUT IRRIGATION AT STATIONS IN AREA 1, 1958-61, AND GRAIN YIELDS FOR 1954-61

Variety	Yield of grain, bushels per acre			1958-61		1954-61		Agronomic data, 1958-61				
	Bushland 1958-60	Stratford 1958	Wellington 1959-61	Average	Number tests	Average	Number tests	Test weight, pounds	Date first head	Date full ripe	Plant height, inches	Forage estimate, percent[1]
Number tests	3	1	4					8	4	3	8	1
Concho	27.7	25.2	30.8	28.7	7	24.2	13	57.6	5-12	6-23	28	105
Tascosa	30.1	26.7	31.1	30.1	7	24.0	11	59.2	5-11	6-23	26	100
Bison	26.3	23.7	34.0	29.2	7	24.0	8	58.3	5-12	6-24	29	100
Westar	27.1	21.6	27.7	26.1	5	21.9	11	57.2	5-13	6-25	29	95
Aztec	26.7	23.4	27.1	26.4	7	21.8	7	59.4	5-16	6-26	30	105
Crockett	24.8	26.3	28.3	26.5	7	21.5	13	58.4	5-10	6-22	30	100
Red Chief	25.9	27.0	26.5	26.2	7	21.3	13	59.8	5-14	6-25	31	90
Ponca	28.4	23.8	27.5	27.3	5	21.1	11	56.0	5-13	6-24	30	90
Kaw	25.9		25.8	25.8	6	21.0	12	59.7	5-10	6-22	28	100
Improved Triumph	25.5		25.5	25.5	5	20.8	6	57.5	5-7	6-20	29	90
Comanche	25.3	24.3	27.9	26.3	7	20.7	13	57.3	5-12	6-23	29	100
Early Blackhull	27.9	29.3	21.6	25.4	7	20.7	13	58.8	5-6	6-20	30	95
Tenmarq	26.4	21.9	31.4	26.5	5	20.5	11	57.2	5-15	6-26	30	90
Kharkof (Turkey)	24.9	21.1	28.4	25.8	7	20.2	13	57.0	5-16	6-27	30	90
Wichita	25.3	26.8	25.2	25.5	7	19.8	13	58.6	5-9	6-21	30	85
Triumph	24.5		23.3	24.0	5	18.8	10	57.9	5-8	5-20	30	90

[1]Visual estimate of forage value, Comanche 100 percent.

compared with 41.7 for Tascosa. These varieties are not yet recommended.

AREA 2

Wheat is grown extensively as a cash grain crop in area 2 and is also widely used as winter pasture for livestock. Performance trials were conducted at Chillicothe, Iowa Park, Spur and one season at Merkel in cooperation with the Texas Research Foundation. Trials at Iowa Park were irrigated as necessary to maintain good growth but not to produce maximum yields.

The highest average comparable yields for the area were produced by Improved Triumph, Tascosa, Concho, Crockett, Warrior, Aztec, Bison and Kaw. Warrior is a new Nebraska variety which was included in only four trials so it has not been adequately tested. Two other new varieties, Ottawa and Omaha, have not been adequately evaluated. Ottawa was tested in 1960 at three locations, averaging 32.5 compared to 37.6 bushels for Tascosa in the same trials. Omaha was tested at Chillicothe in 1958 but yielded only 24.5 compared to 35.6 bushels for Tascosa. Neither variety is recommended.

Red Chief, Early Blackhull, Kaw, Tascosa and Crockett have consistently produced seed of superior test weight. Triumph, Improved Triumph, Early Blackhull and Wichita make up the earliest group, while Kharkof, Aztec, Warrior and Red Chief are among the latest in maturity. Leaf rust and stem rust were of minor importance during this testing period, but Kaw, Crockett, Ponca and Quanah are known to be the most resistant to leaf rust. Kharkof, Ponca, Quanah, Aztec, Red Chief and Tascosa were more resistant to stripe rust than other varieties in 1958. Wichita and Improved Triumph were rated above other varieties in visual forage evaluations.

Recommended varieties for the area includ Tascosa, Bison, Kaw and Ponca. Comanche, Azte and Westar are satisfactory in quality but have pr duced lower yields. Improved Triumph, Crocket and Concho have produced excellent yields but ar considered less desirable in quality characteristic Quanah is a satisfactory variety in the southern ha of area 2 where diseases are more important.

AREA 3

Wheat is an important cash crop in Grayson Cooke, Denton, Collin and Dallas counties but o relatively minor importance in other counties o area 3. Performance trials were conducted at Denton Greenville, Stephenville, Renner and one season a Sherman. The first wheat in Texas was grown ne the Red River in Grayson county. The Red Ma and Mediterranean wheats established a favorabl reputation for family flour produced in this area Recently, as a result of the distribution of the Kno variety by the Texas Agricultural Experimen Station in 1956, this area has again become an im portant soft wheat growing area.

Comparable yields and agronomic data are give in Table 16 with varieties separated into soft an hard red winter wheat varieties. Both types are we adapted. The best yields for both the 4-year and th 8-year periods have been produced by Kaw, Crocket Ponca, Tascosa and Concho. Tascosa may be grow but is very susceptible to the rusts. Quanah an Comanche also are well adapted in this area bu during the present testing period have yielded le than the varieties already listed. The tolerance o Quanah to rusts and other foliage diseases, plus i fine milling and baking characteristics, make it a desirable variety for this area. Knox and Frisco wer the most productive varieties of soft winter whea but should be grown only where a soft wheat mark is available.

TABLE 14. COMPARABLE YIELDS AND AGRONOMIC DATA FOR WINTER WHEAT GROWN UNDER IRRIGATION AT STATIONS IN AREA 1 1958-61, AND GRAIN YIELDS FOR 1954-61

Variety	Yield of grain, bushels per acre			1958-61		1954-61		Agronomic data, 1958-61						
	Bush-land 1958-60	Floy-dada 1958-60	Strat-ford 1958-61	Aver-age	Number tests	Aver-age	Number tests	Test weight, pounds	Date first head	Date full ripe	Plant height, inches	Lodg-ing, percent	Leaf rust, percent	Stripe rust, percent
Number tests	4	2	3					10	3	3	8	2	1	1
Concho	47.4	45.9	45.3	46.3	8	39.0	16	59.6	5-12	6-25	37	28	30	50
Tascosa	47.9	42.4	46.5	46.0	8	38.3	16	61.1	5-11	6-24	36	35	40	40
Kaw	48.9	29.1	43.8	43.9	6	36.3	11	61.7	5-10	6-24	37	15	2	50
Improved Triumph	48.0	37.1	41.7	44.5	5	38.2	5	60.2	5-7	6-21	37	40	40	Tr
Bison	44.7	43.0	41.4	43.0	8	35.4	14	59.5	5-13	6-25	37	5	50	50
Ponca	43.2	39.0	38.8	41.0	6	35.3	14	58.2	5-14	6-26	37	18	10	30
Triumph	48.3	26.8	40.0	42.4	5	35.3	8	60.2	5-8	6-22	37	22	40	Tr
Crockett	41.8	42.9	40.7	41.7	8	35.2	16	60.1	5-12	6-25	38	23	10	50
Aztec	43.3	42.5	38.0	39.9	8	34.8	8	60.7	5-17	6-29	39	10	50	Tr
Comanche	42.3	44.4	36.6	41.5	7	34.7	15	58.2	5-14	6-26	37	15	40	50
Westar	40.4	38.2	44.0	41.2	6	34.3	14	57.9	5-15	6-27	37	33	70	50
Tenmarq	41.5	37.5	39.1	40.0	6	33.0	15	58.2	5-16	6-28	37	43	50	60
Red Chief	38.4	42.1	37.1	38.8	8	32.8	16	61.1	5-15	6-27	39	3	60	0
Early Blackhull	41.0	36.9	41.4	40.0	8	32.5	16	60.5	5-6	6-21	37	60	40	Tr
Kharkof (Turkey)	35.8	40.3	37.3	37.3	8	32.3	16	57.5	5-18	6-29	37	40	60	50
Wichita	36.2	33.5	39.0	36.4	8	31.2	16	59.9	5-9	6-22	36	25	40	50

Kaw, Early Blackhull, Crockett and Tascosa all produced grain above 60 pounds in test weight. Knox, Vermillion, Early Blackhull, Improved Triumph and Triumph made up the earliest group of varieties. Kaw, Quanah and Ponca have the highest leaf rust resistance among hard wheats while Frisco, Knox and other soft wheats have considerable resistance. The estimates of forage value indicate that the soft wheats were superior to most hard wheats for winter pasture.

AREA 4

Wheat is an important commercial grain crop in only five counties in area 4. These are Bosque, McLennan, Coryell and Bell in the Central Blackland-Grand Prairie series and Gillespie county on the Edwards Plateau. The elevation of the Edwards Plateau ranges from 1200 to 1800 feet; therefore, late-spring frosts are a hazard in production and the frost-free season is almost a month shorter than the nearby Blackland area of 700 feet elevation. The majority of wheat grown in this area is the Quanah variety of hard red winter wheat, but smaller acreages of soft wheat and durum varieties are also grown.

Performance tests were conducted at Temple in the Blacklands, at McGregor in the Grand Prairie soil series and at Comfort on the Edwards Plateau. All three types of wheat were tested. Yields and agronomic data are given in Table 17. Milam, a new forage wheat developed for area 5, produced the best grain yields for the periods herein reported. However, this is an intermediate winter or near spring-type wheat and may winterkill some seasons. Since Quanah has proved well adapted over a long period of testing and is very tolerant to diseases, it is the recommended variety. The soft wheat varieties have given satisfactory yields but are more subject to rust injury. Furthermore, no market for soft wheat is readily available in this area. The durum varieties have outyielded all other types during the present testing period but must be used for feed on the farm or sold for use in mixed feed.

Diseases may cause major losses in this area in any season. Milam and Quanah are more tolerant to leaf and stem rusts than other hard winter wheats available. The durum varieties also have good rust resistance.

AREA 5

Only a small acreage of wheat is sown in area 5 and the majority of this is seeded exclusively for winter pasture for livestock. Foliage diseases are major factors in production of grain and frequently influence the value of the crop for forage. Few commercial varieties are adapted to this area. The majority of the acreage is seeded to Milam or Seabreeze, varieties developed specifically for this area.

Since winters are usually very mild, spring or intermediate winter types are best adapted to area 5. True winter types are less desirable even for forage uses. Performance trials were conducted at College Station, Prairie View and Beeville. Comparable yields and agronomic data are given in Table 18.

Milam, a new disease-resistant, intermediate winter type has produced grain yields significantly higher than those of Seabreeze, Atlas 66 or Coker 47-27. Test weights of Milam also are higher and, since it may be classed as a hard wheat, it can be used in milling although it is not a strong-gluten variety. Visual forage estimates rate Coker 47-27, Atlas 66 and

TABLE 15. COMPARABLE GRAIN YIELDS AND AGRONOMIC DATA FOR WINTER WHEAT GROWN AT STATIONS IN AREA 2, 1958-61, AND GRAIN YIELDS FOR 1954-61

Variety	Yield of grain, bushels per acre				1958-61		1954-61		Agronomic data, 1958-61							Forage estimate, percent[1]
	Chillicothe 1958-61	Spur 1958-60	Iowa Park 1959-61	Merkel 1958	Average	Number tests	Average	Number tests	Test weight, pounds	Date first head	Date full ripe	Plant height, inches	Percent: Leaf rust	Percent: Stem rust	Percent: Stripe rust	
Number tests	4	2	4	1					10	7	7	8	2	1	1	7
Improved Triumph	36.0	41.2	36.7	35.7	37.2	10	30.9	10	61.5	4-16	5-22	30	9	Tr	10	114
Tascosa	34.8	35.3	37.1	32.8	35.3	10	30.2	19	62.3	4-23	5-29	29	5	5	15	104
Concho	33.6	33.2	38.1	34.9	35.0	10	29.7	21	61.0	4-24	5-28	30	6	5	60	99
Crockett	32.5	38.0	35.9	35.7	34.9	10	29.4	21	62.0	4-23	5-27	32	5	Tr	45	104
Warrior	34.8	31.2			33.9	4	29.1	4	59.6	4-27	5-29	28		Tr		91
Aztec	33.6	34.1	31.0		32.9	7	28.8	15	62.2	4-28	6-1	32	2	25	Tr	101
Bison	33.0	34.2	36.5	38.5	33.8	10	28.7	15	61.3	4-24	5-29	31	10	Tr	65	100
Kaw	32.9	33.5	34.7		33.6	9	28.3	18	62.9	4-20	5-26	31	Tr	Tr	55	107
Ponca	32.5	31.9	32.9	35.4	32.8	10	28.0	21	60.6	4-24	5-29	30	3	Tr	10	93
Triumph	35.0	37.1	31.0	28.3	33.5	10	27.5	19	61.8	4-17	5-23	31	16	Tr	35	110
Comanche	33.0	32.2	31.6	31.6	32.3	10	27.2	21	60.4	4-24	5-29	31	3	Tr	25	100
Early Blackhull	30.1	34.6	32.6		31.9	9	26.7	20	62.6	4-17	5-24	32	13	Tr	40	110
Wichita	30.7	34.6	32.0	31.9	32.1	8	26.5	19	61.6	4-19	5-26	31	13	Tr	70	116
Tenmarq	31.4	31.2	30.0	29.3	30.6	5	25.5	16	59.9	4-23	5-31	31	15	Tr	45	105
Westar	29.0	28.8	34.8	30.4	29.8	8	25.5	19	59.9	4-24	5-30	30	28	10	85	97
Kharkof (Turkey)	31.0	29.0	27.1	26.9	29.0	10	24.9	21	60.1	4-29	6-3	31	5	5	5	88
Red Chief	29.5	27.7	26.5	27.5	28.0	10	24.5	21	62.7	4-27	6-1	32	13	30	15	100

[1]Visual estimate of forage value, Comanche 100 percent.

Seabreeze as superior to other varieties. Milam is rated above Austin, the standard, and in clipping tests at Beeville has produced forage yields equal to those of the better oat and barley varieties. Milam has the greatest degree of resistance to foliage diseases of the varieties tested. Quanah and other winter wheats are poorly adapted in this mild climate.

AREAS 6 AND 7

Only small acreages of wheat are grown in areas 6 and 7 and these are used principally to provide green winter forage for livestock. No performance trials have been conducted in either area in recent years.

Climatic conditions in area 6 are not greatly different from those in area 3 and the varieties adapted to that area may be used satisfactorily. These varieties are Kaw, Quanah, Crockett and Ponca hard wheat and Knox and Frisco soft wheat.

Climatic conditions in area 7 are similar to those in area 2. Varieties of hard wheat such as Tascosa, Bison, Ponca, Crockett and Quanah should prove satisfactory for winter pasture and grain production.

NEW VARIETIES

Several new varieties of wheat recently released by nearby states have not been adequately tested to date, so no firm recommendations can be made on these. These include Warrior and Omaha from Nebraska, Ottawa from Kansas, Rodco distributed by a private milling company and Super Triumph.

Flax

Flax is grown in Texas from fall seeding with th acreage concentrated in the Coastal area just nort of Corpus Christi. Distribution of the crop in 194 the year of greatest production, is shown in Figure A few attempts to grow flax commercially in Nort Texas and the Panhandle have been made, but th crop has not become established. The growing o flax as a fall-sown crop was started in South Texa in 1938, when approximately 1,000 acres were seeded Acreage of the crop expanded almost continuousl until 1949, when 329,000 acres were grown. Th severe drouth of the 1950's in this part of the Stat combined with low prices for flax seed, caused rapid decline of acreage until 1957. Since that dat the acreage has again increased, Figure 7. The acr age in 1961 was estimated at 140,000 acres with pr duction of 1,610,000 bushels or 11.5 bushels per acr

Performance trials of flax in recent years hav been grown only at College Station, Temple an Beeville. Tests were conducted at several other st tions in earlier years. Varieties included in trials ar the more common commercial varieties grown in th spring flax area of the United States and the tw winter-type varieties developed for fall seeding i Texas. Comparable yield and agronomic data ar given in Table 19.

The last three seasons have been very favorabl and yields are higher than might be expected unde normal weather conditions. Average yields in th

TABLE 16. COMPARABLE GRAIN YIELDS AND AGRONOMIC DATA FOR WINTER WHEAT AT STATIONS IN AREA 3, 1958-61, AND GRA YIELDS FOR 1954-61

Variety	Yield of grain, bushels per acre					1958-61		1954-61		Agronomic data, 1958-61							
	Denton 1958-61	Sherman 1958	Greenville 1958-59	Stephenville 1958-59	Renner 1959-61	Average	Number tests	Average	Number tests	Test weight, pounds	Date first head	Date full ripe	Plant height, inches	Percent Leaf rust	Percent Stem rust	Percent Lodging	Forage estimate percent[2]
Number tests	4	1	2	2	3					10	5	3	5	6	2	3	3
Hard red winter wheat varieties																	
Kaw	36.0	34.1	34.1	31.7	31.4	34.1	8	29.0	11	63.0	4-25	5-27	38	7	25	15	107
Crockett	33.1	31.0	32.4	30.9	33.5	32.5	12	28.0	24	61.9	4-27	5-28	30	24	35	25	96
Ponca	32.2	26.3	30.1	26.5	30.7	30.0	11	26.1	25	60.0	4-29	5-30	40	6	44	45	99
Tascosa	29.5	31.9	30.2	26.9	30.1	29.5	12	26.0	23	61.1	4-28	5-30	38	44	20	4	101
Concho	26.7	29.2	36.0	31.5	34.9	31.0	11	25.9	26	59.0	4-29	5-30	39	59	45	0	102
Improved Triumph	31.3		31.0	31.5	28.4	30.3	9	25.9	9	60.2	4-20	5-24	37	64	5	3	101
Early Blackhull	28.5	29.8	30.7	33.9	27.7	29.7	12	25.1	25	62.5	4-22	5-26	39	53	5	34	102
Comanche	29.7	29.7	28.0	29.8	30.4	29.6	12	25.0	27	59.6	4-29	5-29	41	41	40	8	100
Triumph	26.7	27.8	27.3	39.7	29.3	28.0	11	25.1	26	60.8	4-21	5-25	39	57	3	24	92
Quanah	29.5	29.6	29.7	30.2	26.7	28.8	11	24.1	26	59.9	4-29	5-29	41	6	30	13	101
Kharkof (Turkey)	27.6				24.5	27.0	5	23.1	8	58.4	5-3	6-4	41	52	40	45	92
Tenmarq	21.0	24.5	24.9	25.7	23.5	23.9	8	22.0	22	58.9	5-2	6-4	41	66	30	5	
Soft red winter wheat varieties																	
Knox	31.4	30.6	29.0	28.7	26.9	29.3	12	25.4	27	59.8	4-22	5-24	39	11	60	5	109
Frisco	34.2	29.6	29.8	28.7	35.0	31.6	9	25.0	24	58.6	4-26	5-29	35	6	45	14	115
Red May	29.6	28.3	26.7	21.8		26.7	8	22.8	23	58.0	4-27	5-29	37	15	50	35	119
Vermillion	27.8				22.4	25.1	4	22.7	9	60.1	4-22	5-26	41	2		9	115
Denton[1]	27.3	25.0	26.3	24.7	27.2	26.5	12	21.7	26	58.5	5-1	6-1	44	11	55	64	107

[1]Mediterranean strain.
[2]Visual estimate of forage value, Comanche 100 percent.

TABLE 17. COMPARABLE GRAIN YIELDS AND AGRONOMIC DATA FOR WINTER WHEAT AT STATIONS IN AREA 4, 1958-61, AND GRAIN YIELDS FOR 1954-61

Variety	Yield of grain, bushels per acre			1958-61		1954-61		Agronomic data, 1958-61						
	Comfort 1958-60	Temple 1958-61	McGregor 1958-61	Average	Number tests	Average	Number tests	Test weight, pounds	Date first head	Date full ripe	Plant height, inches	Percent: Leaf rust	Percent: Stem rust	Forage estimate, percent[2]
Number tests	3	4	4					11	11	7	11	7	2	9
Hard red winter wheat varieties														
Milam	25.7	26.4	32.0	28.2	11	24.5	10	61.1	4-18	5-22	35	15	10	105
Quanah	27.7	25.8	28.0	27.1	11	23.0	20	60.2	4-24	5-28	37	11	33	98
Early Blackhull	24.9	22.6	25.2	26.7	11	20.5	20	62.0	4-21	5-24	36	53	48	82
Crockett	27.4	24.8	26.8	26.2	11	22.1	20	62.7	4-25	5-26	37	25	40	86
Tascosa	24.7	20.3	26.0	23.5	6	21.8	13	63.0	4-24	5-28	35	62	60	87
Tenmarq	23.8	20.3	26.0	23.3	6	19.3	15	59.0	4-26	5-30	37	56	58	87
Soft red winter wheat varieties														
Knox	26.9	25.8	33.0	28.6	9	23.7	18	60.5	4-18	5-21	35	20	50	92
Austin	25.3	26.6	27.6	26.6	11	22.8	20	58.0	4-23	5-25	38	14	20	100
Atlas 66	27.2	23.1	24.6	24.9	6	21.5	15	58.3	4-22	5-26	36	19	20	99
Denton[1]	21.8	26.1	21.7	23.3	11	19.0	20	58.7	4-28	5-31	38	13	53	85
Durum wheat varieties														
Langdon	29.4	27.6	31.1	29.3	11	26.4	14	61.4	4-19	5-24	41	14	18	103
Sentry	31.8	29.1	36.5	32.5	6	26.2	15	63.0	4-16	5-22	41	10	20	98
Lakota	28.6	29.1	30.7	29.7	5	25.6	5	58.5	4-16	5-22	40	14		115
Stewart	28.2	29.5	27.9	28.6	11	24.1	20	62.7	4-22	5-27	43	4	10	100

[1]Mediterranean strain.

[2]Visual estimate of forage value, Austin 100 percent.

State have ranged from a low of 3.0 bushels per acre in 1955 to 12.0 bushels in 1958 with a 24-year average of 7.5 bushels. Low temperatures have not been severe in recent years and there has been no extensive damage to the crop since 1948. Differential killing occurred in the Temple nursery in 1959 and the survival data rather accurately reflected the known winter hardiness of varieties. Diseases have not caused important damage in recent years. Curly top caused damage to the 1955, 1956 and 1957 crops but has not been important since that time.

Varieties are ranked in order of comparable yield for 1954-61. Caldwell, B5128, Norland and Deoro are the four high-ranking varieties for both periods of testing. Deoro and B5128 are the most popular commercial varieties at present, but the acreage of Caldwell, distributed in 1960, is increasing rapidly. Norland is a late-maturing, tall spring-type variety which has not been grown extensively but may warrant consideration. The very early spring-type varieties, such as Bolley, Arny and the Punjab strains, are too early for the main flax production area of Texas.

No great differences in test weight were evident among varieties although Redwood and Caldwell average highest. Bolley, Arny and Linda were the earliest in maturity. Norland, B5128 and Viking were the tallest varieties and Marine was the shortest. Caldwell and Newturk were the most cold tolerant; Bolley, Linda and Norland, the least. Recommended varieties are Caldwell, Deoro and B5128.

TABLE 18. COMPARABLE GRAIN YIELDS AND AGRONOMIC DATA FOR WINTER WHEAT GROWN AT STATIONS IN AREA 5, 1958-61, AND GRAIN YIELDS FOR 1954-61

Variety	Yield of grain, bushels per acre			1958-61		1954-61		Agronomic data, 1958-61							
	College Station 1958-61	Prairie View 1958-61	Beeville 1958-61	Average	Number tests	Average	Number tests	Test weight, pounds	Date first head	Date full ripe	Plant height, inches	Percent: Leaf rust	Percent: Stem rust	Percent: Mildew	Forage estimate, percent[1]
Number tests	4	4	4					10	7	6	7	8	4	1	4
Milam	27.6	24.3	24.5	25.4	10	23.4	15	59.1	4-3	5-13	37	17	Tr	15	110
Supremo	19.5	20.9	24.8	21.8	8	20.3	17	58.1	4-1	5-7	46	21	7	75	124
Lee	24.9	22.4	22.1	23.0	10	20.7	19	57.2	4-2	5-12	40	16	23	Tr	115
Coker 47-27	21.1	24.3	18.6	21.3	3	20.0	12	57.8	4-5	5-12	45	16	20	30	139
Atlas 66	21.9	21.0	20.9	21.2	10	18.4	19	55.4	4-6	5-14	40	22	13	30	120
Seabreeze	17.6	27.8	20.1	21.6	10	17.9	19	58.8	3-16	4-30	39	33	18	50	136
Bowie	21.0	23.1	23.9	22.8	7	17.4	16	58.3	4-4	5-14	41	8	39	60	111
Quanah	18.5	13.6	20.0	17.6	10	16.9	19	57.5	4-9	5-18	40	12	14	60	95
Austin	19.2	16.8	19.0	18.4	10	14.7	19	55.7	4-8	5-16	40	17	12	60	100

[1]Visual estimate of forage value, Austin 100 percent.

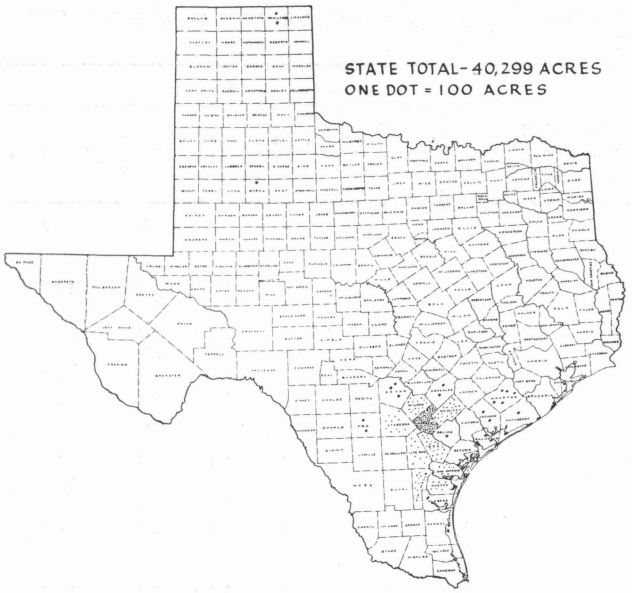

Figure 6. Distribution of flax in Texas in 1959.

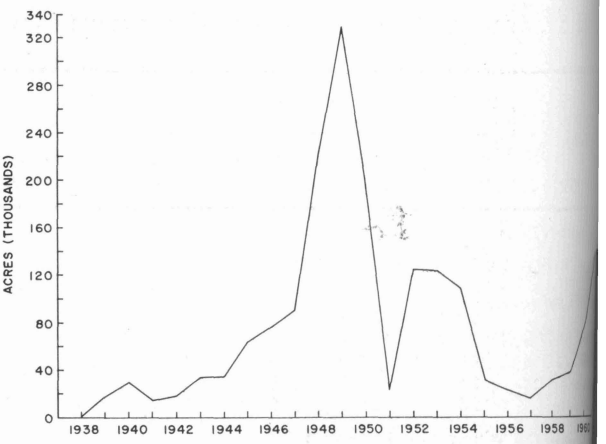

Figure 7. Flax acreages in Texas, 1938-61.

Acknowledgments

These investigations were conducted cooperatively by the Texas Agricultural Experiment Station and the Cereal Crops, Oilseed and Industrial Crops Research Branches, Crops Research Division, U. S. Department of Agriculture.

Acknowledgment is made of the cooperation of the many people and agencies taking part in these statewide small grain variety tests: Lucas Reyes and Edward M. Neal, Substation No. 1, Beeville; L. E. Clark, Alva L. Cox and R. M. Smith, Substation No. 5, Temple; D. I. Dudley and Eugene C. Wilkerson, Substation No. 6, Denton; William P. Hatchett and Paul T. Marion, Substation No. 7, Spur; J. R. Quinby, Substation No. 12, Chillicothe; L. E. Brooks, Substation No. 16, Iowa Park; O. E. Smith and John C. Williams, Substation No. 18, Prairie View; B. C. Langley, Substation No. 20, Stephenville; M. J. Norris and H. O. Hill, Substation No. 23, McGregor; Dow D. Porter, U. S. Cotton Field Station, Greenvill C. E. Van Doren, U. S. Southwestern Great Plai Field Station, Bushland.

Cooperative tests were conducted at the follo ing farm locations: Floydada—J. C. Lewis, cou agent and Roy Hale, grower; Stratford—Ernest Gou county agent, Kenneth Elder and Horace Sne growers; Wellington—Robert F. Lynch, county ag and D. L. Scott, farm demonstration assistant a David Baumgardner, grower.

Cooperative tests at Renner were conducted E. O. Gangstad, Texas Research Foundation, a those at Plainview, by Delbert R. Langford and T. Longnecker, High Plains Research Foundation.

Assistance in disease observations and identifi tion was given by M. C. Futrell and Lee J. Ashwor Department of Plant Sciences, A&M College of Tex

Assistance in insect observation was made Norris E. Daniels, Southwestern Great Plains Fi Station, Bushland, and Harvey L. Chada, Entomolo Research Division, ARS, USDA, formerly at Dento

Special thanks are due Dennis Peier, gradua assistant, Department of Soil and Crop Sciences, f summarizing the performance data.

TABLE 19. COMPARABLE YIELD AND AGRONOMIC DATA FOR FALL-SOWN FLAX, 1958-61, AND GRAIN YIELDS FOR 1954-61

Variety	Yield of grain, bushels per acre			1958-61		1954-61		Agronomic data, 1958-61				
	College Station 1958-61	Beeville 1958-61	Temple 1958-59	Aver-age	Number tests	Aver-age	Number tests	Test weight, pounds	Date first head	Date full ripe	Plant height, inches	Winter survival percent
Number tests	4	4	2					8	7	4	6	1
Caldwell	18.8	18.4	17.5	18.3	9	15.9	17	54.1	3-23	5-19	25	100
B5128	19.5	18.1	18.5	18.7	9	15.9	17	53.5	3-17	5-22	28	41
Norland	19.2	16.6	19.2	18.3	6	15.4	9	53.6	3-20	5-19	31	15
Deoro	18.6	18.2	15.9	17.8	9	14.7	18	53.6	3-15	5-16	26	16
Redwood	19.0	18.4	14.3	17.7	9	14.6	17	54.2	3-13	5-17	24	15
Linda	19.5	16.4	16.3	17.4	9	14.4	16	52.6	3-11	5-17	26	11
Rio	17.4	16.6	16.2	16.8	9	13.8	18	53.7	3-13	5-19	26	42
Marine	15.8	14.3		15.1	2	12.6	5	53.5	2-23	5-7	21	
Arny	18.7	15.2	13.1	15.6	7	13.1	7	53.5	3-11	5-15	26	27
Viking	16.9	16.5	18.1	17.0	9	12.7	16	52.7	3-16	5-18	27	31
Newturk	13.7	16.4	18.9	16.0	9	11.8	18	53.4	3-25	5-22	25	95
Bolley	16.8	14.2	7.5	13.9	5	10.3	6	53.2	2-27	5-4	23	0