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# TEXAS AGRICULTURAL EXPERIMENT STATION

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OF AGRICULTURE

## VARIETIES OF RICE FOR TEXAS



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†As of November 1, 1933

Rice is an important crop in the humid part of the Gulf Coast Prairie of Texas. The average annual production from 1904 to 1931, inclusive, was about  $2\frac{1}{4}$  million barrels, valued at approximately nine million dollars. Rice-growing fits in satisfactorily with cattle-raising, which was the principal agricultural industry of the region prior to the introduction of rice.

This Bulletin records the yields of eighty-eight varieties of rice grown at Beaumont from 1914 to 1932, inclusive. In addition, it includes data on grain type, time required for maturity, and milling quality of the better varieties.

Blue Rose and Supreme Blue Rose are the most desirable late-maturing varieties tested and are the principal varieties grown in this region. These varieties produce high yields and have medium-long grains of good milling quality.

Early Prolific is the most promising early-maturing variety. It is a medium-grain rice that produces large yields. The main objection to this variety is that it frequently produces grain of inferior milling quality. Storm Proof, Edith, and Lady Wright are early-maturing, long-grain varieties that can be used to advantage, but they produce somewhat lower yields than Early Prolific.

Texas Fortuna is the outstanding medium-late variety. It is a long-grain rice and is very popular in the region.

Delitus, a long-slender-grain rice of medium-late maturity, produces fair yields. Rexoro is a promising long-slender-grain rice for this region. It is very late in maturity but produces satisfactory yields when planted not later than April 30.

The short-grain rices are not planted to any great extent in this region. The planting of the short-grain types should continue to be limited to the demand for this type of rice; however, Caloro, Piniling Daniel, and Acadia are good short-grain varieties of early, medium late, and late maturity, respectively.

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## VARIETIES OF RICE FOR TEXAS

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Rice was one of the earliest plant introductions in this country. For nearly 200 years the main output, which was very limited, was from South Carolina, Georgia, and adjacent states. At the end of the Civil War, Louisiana began to make progress in growing rice. Rice was first introduced into Texas about 1863, but production was of little commercial importance previous to 1900. Since that time Texas has been an important rice-producing state and was second in production of rice in the United States from 1904 to 1931, inclusive, with an annual production of approximately  $2\frac{1}{4}$  million barrels of rough rice, valued at about nine million dollars. Previous to the introduction of rice, cattle-raising was the principal agricultural industry of this region. Rice now occupies an important place in the agriculture of this section and is admirably adapted for growing in connection with cattle-raising.

### RICE-GROWING REGION OF TEXAS

Rice-growing in Texas is limited to that part of the Gulf Coast Prairie lying between the Guadalupe and Sabine rivers. The topography of the region is generally flat, the elevation increasing about one foot to the mile inland from the Gulf of Mexico. This gentle slope allows satisfactory surface drainage and at the same time it is favorable to irrigation with a

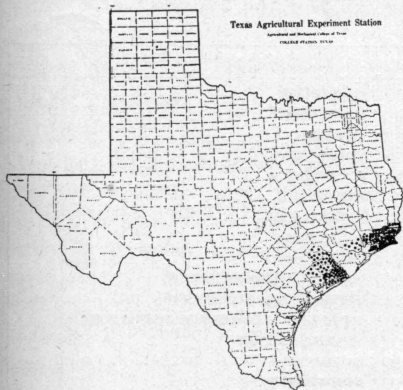


Fig. 1. Distribution of rice acreage in Texas in 1919. One dot represents 1,000 acres.

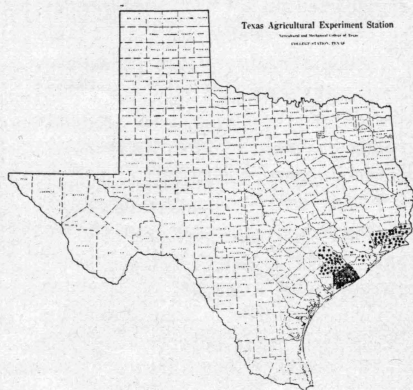


Fig. 2. Distribution of rice acreage in Texas in 1924. One dot represents 1,000 acres.

minimum number of levees. The region consists mostly of open prairies, except along the stream bottoms, which are usually heavily timbered.

The rice-growing industry in Texas was first developed around Beaumont. In 1899, there were 5859 acres of rice in Jefferson County, which constituted 62 per cent of the rice acreage in the State. The industry

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gradually spread westward and southwestward until in 1919 (Fig. 1) Matagorda and surrounding counties were producing about as much rice as Jefferson and adjacent counties. In 1924 (Fig. 2) the largest part of the rice acreage in Texas was in Matagorda and neighboring counties, but by 1929 (Fig. 3) the center of production had shifted back to Jefferson and adjacent counties. The rice acreage in Texas has varied from 303,000 acres in 1913 down to 144,000 acres in 1929, which, however, was below the normal acreage. The small acreage in rice in 1929 was caused by a noticeable decrease in acreage in Matagorda and surrounding counties. The yearly acreages and prices are shown graphically in Figs. 4 and 5.

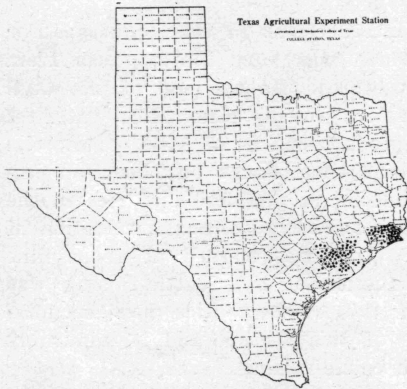


Fig. 3. Distribution of rice acreage in Texas in 1929. One dot represents 1,000 acres.

## CONDITIONS FAVORABLE TO RICE-GROWING

### Climate

The long growing season and rather high temperatures in the region are very favorable for rice-growing. A heavy rainfall and high humidity during the growing season are favorable from the standpoint of irrigation. A summary of the meteorological records is shown in Table 1. The growing season of 269 days permits the growing of a number of late- as well as early-maturing varieties. The shorter growing season of some other rice-producing regions prevents the growing of Fortuna, Rexoro, and Blue Rose varieties, which are well adapted to this section.

The annual rainfall is rather heavy throughout the rice-growing area of Texas, being highest in Jefferson county with 52.8 inches and becoming lighter further westward and southwestward, where a minimum of around 36 inches occurs. Heavy rainfall during the harvesting season, August to No-

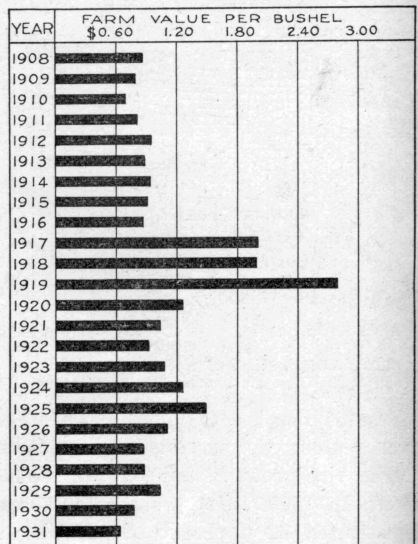


Fig. 4. Farm value of rice in Texas, 1908 to 1931, inclusive.

vember, inclusive, is not desirable, but is beneficial during the irrigating season.

### Soil

The character of soil is very important in the growing of rice. This crop can be grown on many kinds of soil, but the heavy types, with almost impervious subsoils, produce the largest yields and can be cropped more regularly than the lighter soils. Lake Charles clay, which has a dark-gray to black surface soil underlain by a dark-gray almost impervious clay subsoil, is perhaps the most important rice soil of the region. The Crowley clay, which has a brownish-gray to brown surface soil underlain by a bluish-gray, sticky clay subsoil, mottled with yellow and brown, is an important rice soil in the eastern part of the rice-growing area, but is not nearly so extensive as the Lake Charles soils. While the heavy soils are the most desirable for rice, the crop is grown to some extent on some of the lighter soils.

### Irrigation Water

The main source of water for irrigating rice in this region is the larger streams, such as the Neches, Trinity, Brazos, and Colorado rivers. Artesian water, however, is available in some localities. The water is lifted from the streams by pumps and carried by gravity to the fields by means of canals. The larger part of the acreage is irrigated from large canals operated by companies, furnishing the water at a fixed charge per acre. However, a small acreage is irrigated from small, privately-owned plants. While there are large areas of soil suitable for rice, the available sources of water are not accessible to all of them.

The amount of water required for irrigating rice depends upon several factors such as: (1) the individual user of water, (2) the type of soil, (3) the number of weeds present, and (4) the amount and distribution of rainfall. In general, however, about 24 to 30 inches of water are required in an average season in the rice-growing region of Texas.

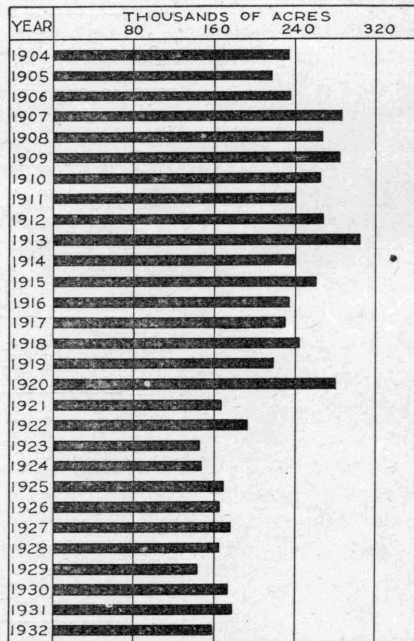


Fig. 5. Rice acreage in Texas, 1904 to 1932, inclusive.





## OBJECT OF THE RICE VARIETY EXPERIMENTS

While records show a noticeable variation in the rice acreage at different times, there are no figures available, except during recent years, to show the proportion planted to the different varieties. It is generally known, however, that long-grain varieties—Honduras, Carolina Gold, and similar varieties—were planted at first, and that later some Japanese rices were used. During recent years the trend has been to the varieties with medium-length grains. This change in varieties has resulted from the difference in yield and price.

The Rice Experiment Station was established at Beaumont in Jefferson county in 1909 for the purpose of studying problems connected with the production of rice. Rice variety experiments were included as a part of the program of the Station. The main objects of the variety experiments have been to determine yielding capacity, grain type, time required for maturity, and milling quality of the different varieties, as well as to study other plant characteristics such as stiffness of straw, plant height, shattering, and reaction to various diseases. The purpose of this Bulletin is to report the results of these experiments from 1914 to 1932, inclusive.

## METHOD OF CONDUCTING THE EXPERIMENTS

### Size and Replication of Plats

The size of plat varied from a rod-row to  $1/726$  of an acre, but was uniform throughout the experiment for any one season. There were two to four plats of each variety in the test each year. The  $1/726$ -acre plats consisted of five rows spaced 1 foot apart and 20 feet long. The rod-row plats consisted of three rows spaced 1 foot apart. Check plats were used at intervals of every fifth or tenth plat.

### Cultural Practices

The rice variety tests at Beaumont have been conducted on Lake Charles and Crowley clay soils. These soils are very difficult to work, but are representative soils of the rice-growing region of the State.

The land was cropped to rice every second year. This is cropping the land to rice more regularly than is the common practice in this region, and probably prevented the yields from being as high as they might have on land planted to this crop less often. The land was planted to some intertilled (row) crop or was summer-fallowed during the years it was not used for rice.

The preparation of the soil was similar to that given all rice land in this locality. The soil was plowed to a depth of three to four inches, and thoroughly disked and harrowed. In addition, it was given several extra diskings and floated, if necessary, to obtain a satisfactory seed bed. Where possible, all plowing was done the previous fall.

Planting was done as nearly the optimum planting date for rice as possible, which, for the vicinity of Beaumont, is April 15 to May 15. The varieties were seeded at a uniform rate each season, which was generally about 80 pounds of seed per acre. This rate of seeding is sufficient for a satisfactory stand in 12-inch rows under normal conditions.

Irrigation was the same as used in producing commercial rice crops in this region. The first irrigation was given two to four weeks after the plants emerged, the time depending on the amount of rainfall. Generally a four-inch irrigation was given about four weeks after the rice came up to a good stand. The water was held on the land three to five days and drained off. No additional irrigation was given until the land dried sufficiently for hoeing. After hoeing, the water was applied to a depth of two to three inches and held during the remainder of the season.

The plats were rogued for weeds and red rice throughout the growing season.

### Harvesting and Threshing

The rice in these experiments was cut by hand each season. The product from each plat was tied into bundles, labeled, and placed under shelter for drying.

Threshing was done by several methods, but was uniform for any one year. Hand threshing was used during the early years of the experiments. This was done by placing the heads in a bag and pounding with a heavy stick. After a few years, a small thresher was constructed for this work and was used until the purchase of a small thresher designed especially for threshing experimental plats.

### Methods of Obtaining Data

The number of days to first head is the number of days from the time when 50 per cent of the plants have emerged to the time when 5 to 10 per cent of the panicles have emerged from the boot. The number of days required to mature is the number of days from 50 per cent emergence of the plants to the time when 85 to 90 per cent of the heads are mature.

Height of plant was measured at maturity and represents the distance from the surface of the soil to the tip of the panicle.

The determinations reported for the milling qualities of the varieties and selections grown in 1931 and 1932 were made by the Federal-State Rice Grading Laboratory located in Beaumont, which is under the supervision of the United States Department of Agriculture. These determinations were obtained with the Smith Shelling Device, which uses 50 grams of rough rice for each determination. The Smith Shelling Device is described in United States Department of Agriculture Circular No. 48 (1928).

Grain yields have been computed in pounds of rough rice per acre based on the yield of grain from the center row of the three-row plats and the three center rows of the five-row plats.

Test weight per bushel of rough rice was determined by using the standard quart-size grain tester.

### Method of Obtaining Comparable Yield

Since many of the varieties have been dropped from this experiment as soon as their comparative worth was determined and many varieties added since the test was started, the average yields are not a fair basis for comparison. In order to study the different varieties on as nearly a comparable basis as possible, the following method has been used for calculating a percentage rating and a comparable yield.

Texas Fortuna (T. S. No. 9821) and Honduras (T. S. No. 1611) were used as "standard", or check varieties. The latter was grown throughout the entire period of the experiments; the former was grown each year except in 1921. A calculated yield in proportion to the average yielding capacity of these two varieties for the years in which both were grown was given Texas Fortuna for 1921 based on the yield of Honduras for that year. The average yield of these two varieties in any one year is considered to be the yield of the "standard", or check, varieties for that year. The percentage rating of any variety was determined by dividing its average by the average of the "standard", or check, varieties for the same period of years and multiplying by 100. A yield called "comparable yield" has been computed by multiplying the average yield of the "standard" varieties for the entire period by the percentage rating of each variety. The percentage rating and comparable yield are, therefore, identical except that one is expressed in pounds per acre and the other in percentages. These calculated yields allow all of the varieties in these experiments to be compared in terms of pounds per acre and are, therefore, used as a basis of discussion of yields in this Bulletin.

## EXPERIMENTAL DATA

Grain type, yield, time of maturity, and milling quality of different rice varieties are reported in this Bulletin. These are all factors of prime importance to the rice industry of Texas. Other plant characteristics of varieties such as stiffness of straw, plant height, shattering, and resistance to various diseases are not mentioned to any large extent but have played an important part in determining the varieties to recommend for growing commercially.

### Types of Rice Varieties

Rice varieties discussed in this Bulletin are divided into short-, medium-, long-, and long-slender-grain types. Although rice is marketed on the basis of variety, the different varieties are grouped into one of the above-named classes.

Leading commercial varieties of the short-grain class are Colusa, Caloro, and Acadia. The principal medium-grain varieties grown in Texas are

Table 2. Yields of rice varieties at Beaumont, 1914-32

T. S. No.	Variety	Pounds rough rice per acre																					No. years grown	Average		Comparable yield, pounds per acre
		1914	1915	1916	1917	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	Av.	Standard varieties for same period, lbs. per acre	Percentage rating				
19800	Acadia																					2	2458	126.3	2659	
5312	Agoyod									2444	2913	1986	1054	2052	1567	897	979					3	1737	1846	94.1	1981
1549	Asse Y-Pung	1833	2792			583		3702													4	2228	2001	111.3	2343	
1595	Behula	1917	4612	3136	2696			3712	2401												6	3079	2488	123.8	2606	
1550	Binabagitango	1833	1044					3402													3	2093	2201	95.1	2002	
4320	Binirgin							1731	2095	2235											3	2020	3021	66.9	1408	
4299	Blue Rose							3649	5456	2032											3	3712	3021	122.9	2587	
7183	Blue Rose											3084	3224	2448	1903	2417	1027	1025	2750	3785	2407	9	1978	121.7	2562	
1555	(Blue Rose type)					695						2747	3063	1414	1106	1654	1859	1106	1011	2315	3479	1859	11	1910	97.3	2048
8973	Blue Rose														1482	2380	1531	825	890			5	1472	96.6	2033	
1519	Blue Rose			1034	2781	822	3187															4	1956	2174	90.0	1895
19802	Blue Rose Supreme																		2583	3360	2972	2	2458	120.9	2545	
8974	Supreme Blue Rose											1899	2070	1804	926	923						5	1524	1472	103.5	2179
1627	Boeloeh Poetih	1613	2071	3051		871	2753	1676													6	2006	2401	83.5	1758	
1593	Bruinmissie	1572				249	5383	2654	2312													14	2110	2118	99.6	2097
5315	Bulao Luzon										2468	2934	2471	1757	1897	1379	914	571				8	1799	1846	97.5	2052
19799	Caloro																		3188	2699	2944	2	2458	119.8	2522	
1542	Carangiang		2782	1592	2857	800																4	2008	1824	110.1	2318
5441	Catonio										1018	2613	1577	385	1093	1700	849	556				8	1224	1846	66.3	1396
1585	Chien Yu	500	4371	2909	2904																	4	2671	1954	136.7	2878
1578	Chieng Yu	1483	1379				3960	4924														4	2937	2604	112.8	2374
19798	Colusa																					2	2323	2458	94.5	1989
8075	Delitus													2255	1567	1587	1603	1014	1019			6	1508	1643	91.8	1932
8076	Delitus													1980	1584	1638	1554	1011	1038	1699	2173	8	1585	1846	85.9	1808
5320	Dinorado													2550	2725	2631	2132	1147	1310	745	249	8	1686	1846	91.3	1922
1574	Djember	1256	1341				3093															3	1897	2201	86.2	1815
5480	Dopolit																					9	1684	1948	86.4	1819
19801	Early Prolific									2915	3015	2188	899	1760	1482	845	370	1682				2	2829	2458	113.2	2383
8972	Early Prolific													2565	2306	1387	899	1014				5	1634	1472	111.0	2387
12980	Early Prolific																1812	1083	1001			3	1299	1260	103.1	2170

Table 2. Yields of rice varieties at Beaumont, 1914-32—Continued

T. S. No.	Variety	Pounds rough rice per acre																	No. years grown	Average				
		1914	1915	1916	1917	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931		1932	Av.	Standard varieties for same period, lbs. per acre	Percentage rating	Comparable yield, pounds per acre
2198	Early Prolific				2837	895	2637	3388	1939	1851	3334	1864	1565	1716	1449	1252	997	2508	2648	2059	15	2182	94.4	1987
4297	Early Prolific						2042	2720	1772											2178	3	3021	72.1	1518
19805	Edith																	2788	2074	2431	2	2458	98.9	2082
4303	Edith						3215	2287	1502											2335	3	3021	77.3	1627
1551	Foi	751	2278	1364	2582	818	2348													1690	6	2000	84.5	1779
5321	Guininto									2670	2950	2532	1404	2214	1315	759	836	2642	2838	2016	10	2012	100.2	2109
4288	Honduras						2475	3283	2340											2699	3	3021	89.3	1880
1564	Honduras	1381		1709	2726	765	3186	2855	1669	1549	2836	1420	1973	1262	1122	788	784			1747	16	2061	84.8	1785
1611	Honduras**	1323	862	1457	2380	705	2977	3198	1740	1683	3048	2265	1774	1699	1138	967	656	1924	1979	1765	18	2105	83.8	1764
4282	Honduras						2226	3379	1816											2474	3	3021	81.9	1724
4278	Honduras						2970	2820	1571											2454	3	3021	81.2	1709
1616	Honduras		1739			996	2475	3204	1537	1157	2933	1883	1530	1788	916	832	681	1739	2198	1707	15	2132	80.1	1686
4287	Honduras						1980	3056	2221											2419	3	3021	80.1	1686
4280	Honduras						2038	1938			2581	1813	1745	2170	1461	838	1096			1742	9	2222	78.4	1650
2204	Honduras					527	3101	2296	908	1556	2948	1901	1150	1399	1011	647	454	1628	2107	1545	14	2148	71.9	1513
4284	Honduras						2475	2174	1048											1899	3	3021	62.9	1324
4277	Honduras						1608	1248	2947	1320	1431	1753								1718	6	2819	60.9	1282
4276	Honduras						1236	2584	1557											1792	3	3021	59.3	1248
6106	Inantipolo							2977		2290	2414									2560	3	3055	83.8	1764
12979	Japanese														1883	870	1084			1279	3	1260	101.5	2137
4285	Japanese						1731		1928	2742										2100	3	2523	83.2	1751
12978	Japanese														1372	693	884			983	3	1260	78.0	1642
4283	Japanese						2348	2479	1069	1834										1933	4	2846	67.9	1429
1563	Japanese	1434	1184				1485	2340												1611	4	2604	61.9	1303
5389	Kabo-Ong									2689	2870	2278	1350	1240	1930	981	726	1926	2648	1864	10	2012	92.6	1949
5364	Kinarayom								2514	1923	1947	1992	1206	1629	1382	725	487	1317	1833	1541	11	2007	76.8	1617
19803	Lady Wright																	2671	2171	2421	2	2458	98.5	2073
8077	Lady Wright											1548	1957	1925	1108	656				1439	5	1472	97.8	2059
1625	Louisiana Pearl		1523	1734	3081		4888													2794	4	2428	115.1	2423

\*\*Standard variety.

VARIETIES OF RICE FOR TEXAS

Table 2. Yields of rice varieties at Beaumont, 1914-32—Continued

T. S. No.	Variety	Pounds rough rice per acre																	Av.	No. years grown	Average			
		1914	1915	1916	1917	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931			1932	Standard varieties for same period, lbs. per acre	Percentage rating	Comparable yield, pounds per acre
2203	Louisiana Pearl			1305	2786		3647	2763												2625	4	2906	90.3	1901
5411	Naglampas							2619	2857	2694	2847	1565	2135	2021	1244	1393	2241	2462	2189	11	2007	109.1	2297	
5412	Naguyon								2737	2992	2723	1086	1301	2032	1287	988	2410	2188	1974	10	2012	98.1	2065	
7190	No. 8									3530	3364	2835	2080	2510	1757	2147	4595	4066	2987	9	1978	151.0	3179	
12981	No. 30													1534	899	658	1964	2760	1563	5	1739	89.9	1892	
12983	No. 32													1405	926	662	1873	2844	1542	5	1739	88.7	1867	
1578	Nugengwa	2000	2541	2004															2182	3	1718	127.0	2673	
1581	Pei Gya Nun	2186	2958	2425	3504														2768	4	1954	141.7	2983	
5460	Polopot								3116	2836	2461	1933	1294	2217	954	743			1944	8	1846	105.3	2217	
5459	Piniling Daniel								2972	3289	2271	711	1586	2575	1412	993	2382	2939	2113	10	2012	105.0	2210	
1619	Quinalibo Quinamalig	1167	1532			622													1107	3	1397	79.2	1667	
19806	Rexoro																2626	2799	2113	2	2458	110.4	2324	
1518	Sam Sai	2329	2764	2332															2475	2	1718	144.1	3033	
1589	Schindano	2168	3084	2391	3232														2719	4	1954	139.2	2930	
1610	Shinriki	942	1850	1153	2273														1555	4	1954	79.6	1676	
8971	Spain Jap											1825	1602	1785	369	444	1727	2080	1405	7	1754	80.1	1686	
19804	Storm Proof																3019	2642	2831	2	2458	115.2	2425	
9821	Texas Fortuna**	1487	2939	2240	2944	1065	3618	4427	2165	2955	3019	2723	1561	2126	2004	1441	1350	2721	3205	18	2105	116.1	2444	
5463	Tinuco								2654		3381	3072	1958	1148	1840	998	1076	2524	3674	2233	10	1976	113.0	2379
1546	Tolong	636	810	1811	2541	904													1340	5	1740	77.0	1621	
1592	Wanica	583	872				4083	3047	1537	1532	3127	2229	2092	1379	1094	986	750	2159	2619	15	2166	86.5	1821	
1599	Wataribune	1750	2092	1398	3178														2105	4	1954	107.7	2267	
1624	C. I. No. 1925	917	3090	1070	3259														2084	4	1954	106.7	2246	
1586	C. I. No. 1428	1333	2520	1322	3236	747													1832	5	1740	105.3	2217	
1569	C. I. No. 1258	1842	814			1120													1259	3	1397	90.1	1897	
1601	C. I. No. 1577		1683	1634	2766	417													1625	4	1824	89.1	1876	
1609	C. I. No. 1617					685		2462	1844										1664	3	2217	75.1	1581	
1541	C. I. No. 27	1500	1840				3029	1406											1944	4	2604	74.7	1572	
1571	C. I. No. 1265		893			622			1886										1134	3	1580	71.8	1511	

\*\*Standard variety.

\*Calculated.

Early Prolific, Blue Rose, and Supreme Blue Rose. Texas Fortuna, Lady Wright, and Edith are the leading long-grain varieties grown in this region. Rexoro is the only long-slender-grain variety grown to any extent in Texas. Panicles of the varieties of Caloro, Blue Rose, Texas Fortuna, and



Fig. 6. Panicles of Caloro, Blue Rose, Texas Fortuna, and Rexoro, representative of short-, medium-, long-, and long-slender-grain types, respectively (left to right).

and Rexoro, typical of the short-, medium-, long-, and long-slender-grain types of rice, respectively, are shown in Fig. 6. The hulled and unhulled grains of these varieties are shown in Fig. 7.

#### Yields of Rice Varieties

Yield is the most important consideration in selecting a variety of rice for commercial production. Many varieties that are desirable in other respects cannot be grown profitably on account of low yields.

The yields of rough rice produced by 88 of the most promising varieties grown in these experiments from 1914 to 1932, except 1918 when adverse weather conditions made impossible to secure reliable yields, are shown in Table 3. These varieties represent the various types of grain such as short, medium, long, and long-slender, as well as grain of different

textures. In comparing the percentage rating and comparable yields in Table 3, Texas Fortuna and Honduras (T. S. No. 1611), were used as the standard, or check, varieties.

The highest-yielding variety in the test, T. S. No. 7190, with a yield of 3179 pounds of rough rice per acre, produced slightly more than two and

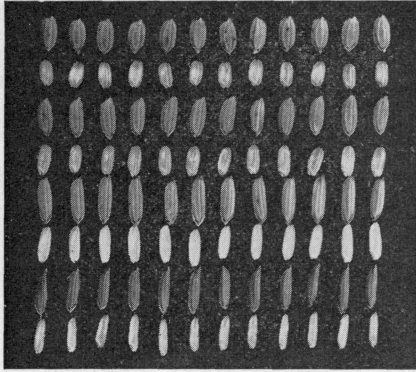


Fig. 7. Unhulled and hulled grains of short-, medium-, long-, and long-slender-grain types of rice from Caloro, Blue Rose, Texas Fortuna, and Rexoro varieties, respectively (top to bottom).

one-half times as much as the lowest-yielding variety, T. S. No. 4276, which produced only 1248 pounds to the acre. Thirty-two varieties had a percentage rating of 100 or over. Only five varieties had percentage ratings higher than Texas Fortuna, which was one of the standard varieties. Varieties having a rating lower than 90 per cent should probably not be grown commercially in this region.

While T. S. No. 7190 produced the largest yield in the experiment, it is of no commercial importance, because it has a weak straw and shatters very badly; however, it may prove to be of value in hybridization work. Several compara-

tively high-yielding varieties have been dropped from the experiment from time to time for various reasons. In some cases, as with several of the Blue Rose rices, strains were dropped for the reason that other strains producing yields equally as large and superior in other respects were available. In other cases, the varieties were too late in maturing or were dropped on account of inferior grain quality.

All high-yielding varieties that were desirable in other respects, were grown through 1932. Yields produced by twelve of these varieties were very satisfactory. Omitting T. S. No. 7190, the eleven largest yields were produced by Acadia, Blue Rose (T. S. No. 7183), Blue Rose Supreme, Caloro, Texas Fortuna, Storm Proof, Early Prolific, Tinuco, Rexoro, Naglampas, and Piniling Daniel, in the order named. Acadia produced a yield of 2659 pounds of rough rice per acre, as compared with 2210 pounds, produced by Piniling Daniel. From the standpoint of yield, any of these eleven varieties are satisfactory for growing in this region.

#### Yields of the Various Types of Rice

As a rule the price paid for rough rice of the different grain types varies to some extent, depending, of course, on the supply and demand for each type, but, in general, the long- and long-slender-grain varieties



command the highest, and the short-grain rices the lowest price. The yields of varieties, grouped according to types of grain, are shown in Table 4. These results indicate that, as a rule, the long-grain varieties

Table 3. Comparable yields of the better rice varieties of short-, medium-, long-, and long-slender-grain types

T. S. No.	Variety	Comparable yield, pounds rough rice per acre
Short-grain types:		
7190	No. 8 .....	3179
19800	Acadia .....	2659
19799	Caloro .....	2522
5459	Piniling Daniel .....	2210
5412	Naguyon .....	2065
19798	Colusa .....	1989
5389	Kabo-Ong .....	1949
5364	Kinaryom .....	1617
Medium-grain types:		
7183	Blue Rose (old type) .....	2562
19802	Supreme Blue Rose .....	2545
19801	Early Prolific .....	2383
5463	Tinuco .....	2379
5321	Guininto .....	2109
1593	Bruinmissie .....	2097
1555	(Blue Rose type) .....	2048
2198	Early Prolific Sel. .....	1987
1592	Wanica .....	1821
Long-grain types:		
9821	Texas Fortuna .....	2444
19804	Storm Proof .....	2425
19805	Edith .....	2082
19803	Lady Wright .....	2073
12981	No. 30 .....	1892
12983	No. 32 .....	1867
1611	Honduras .....	1764
1616	Honduras .....	1686
2204	Honduras .....	1513
Long-slender-grain types:		
19806	Rexoro .....	2324
8076	Delitus .....	1808

will produce slightly lower yields than the short-, and medium-grain rices, and that high yield is not confined to any one type.

**Short-Grain Types:** At the present time short-grain rices are of minor importance in Texas, and it is doubtful if they will ever be planted to any great extent in this region. However, Acaria, Caloro, and Piniling Daniel produced yields of 2659, 2522, and 2210 pounds of rough rice per acre, respectively, which are very satisfactory.

**Medium-Grain Types:** The larger part of the rice acreage of Texas is planted to varieties with medium-length grain. The principal medium-grain rices grown are Blue Rose, Supreme Blue Rose, and Early Prolific. These were the heaviest-yielding varieties in this group with yields of 2562, 2545, and 2383 pounds of rough rice per acre, respectively. From the

standpoint of yield, these varieties are satisfactory for growing in Texas. Early Prolific is losing in popularity owing to the fact that it is often of poor milling quality.

Table 4. Number of days required to mature, height of plant, and test weight per bushel of different types of rice at Beaumont, 1931-32

T. S. No.	Variety	No. of days required to mature from		Height of plant, inches	Test weight pounds per bushel
		Plant emergence	First head		
<b>Short-grain types:</b>					
19798	Colusa .....	104	30	40	44.1
5364	Kinaryom .....	114	31	39	47.4
19799	Caloro .....	117	30	42	45.8
5412	Naguyon .....	123	23	46	49.7
5459	Piniling Daniel .....	123	25	44	50.0
7190	No. 8 .....	126	25	43	47.5
19800	Acadia .....	131	31	45	45.2
5389	Kabo-Ong .....	136	28	48	49.8
<b>Medium-grain types:</b>					
2198	Early Prolific Sel. ....	108	25	46	41.0
1592	Wanica .....	113	24	45	42.7
19801	Early Prolific .....	113	30	47	42.4
5321	Guininto .....	114	30	47	43.2
1593	Bruinmissie .....	134	30	48	42.2
5463	Tinuco .....	135	30	51	43.1
7183	Blue Rose (old type) .....	136	30	50	43.6
1555	(Blue Rose type) .....	136	29	49	44.3
19802	Supreme Blue Rose .....	136	29	49	44.0
<b>Long-grain types:</b>					
12983	No. 32 .....	108	27	44	41.4
12981	No. 30 .....	108	27	43	40.9
19803	Lady Wright .....	110	29	44	41.3
19804	Storm Proof .....	110	24	46	43.9
19805	Edith .....	110	28	44	40.8
1611	Honduras .....	113	24	47	41.4
1616	Honduras .....	113	25	47	42.1
2204	Honduras .....	114	26	47	40.9
9821	Texas Fortuna .....	129	26	51	44.3
<b>Long-slender-grain types:</b>					
8076	Delitus .....	123	27	50	43.8
19806	Rexoro .....	152	27	51	46.4

**Long-Grain Types:** As mentioned in the discussion of varieties, the long-grain types were planted extensively during the early history of the rice industry in Texas. During later years the largest part of the acreage has been planted to the short- and medium-grain varieties. Honduras and similar types were the principal long-grain varieties used at first. As shown in Table 3, low yield was the reason for discarding these long-grain types. In order to supply the demand for long-grain rice, it is essential that a part of the acreage be planted to varieties of this type. Lady Wright was fairly popular for several years, but on account of low yield it was discarded by the growers. Texas Fortuna, which, like Fortuna, is a selection from a variety introduced from Formosa under the name of Pa Chiam, is a high-yielding, long-grain rice that has become very popular with the growers of this region. Storm Proof is fairly satisfactory from the standpoint of yield, but does not equal Texas Fortuna in this region.

**Long-Slender-Grain Types:** Recently there has been a limited demand for a long-slender-grain rice that would produce a high yield. Rexoro and Delitus, with yields of 2324 and 1808 pounds of rough rice per acre, respectively, were the highest-yielding varieties of this type in the experiment. Rexoro, a variety obtained from the Rice Experiment Station at Crowley, Louisiana, is the leading commercial long-slender-grain rice. Rexoro is used to some extent as a substitute for the imported Patna rice and is referred to on the market as American Patna.

### TIME REQUIRED FOR DIFFERENT VARIETIES TO MATURE

It is essential that the rice grower know the length of time required for the different varieties of rice to mature. Planting several varieties that mature at different dates increases the efficiency of both labor and equipment. The length of time required for the better varieties to mature after plant emergence and after the first heads appeared are shown in Table 5. Early, medium-late, late, and very late-maturing varieties are included in this table. The time required for maturity will vary to some extent according to the date of planting.

The short-grain varieties shown in Table 5 can be classed as follows: Colusa, Kinaryom, and Caloro as early; Piniling Daniel, Naguyon, and No. 8 as medium; and Kabo-Ong and Acadia as late-maturing varieties.

Early Prolific, Wanica, and Guininto are considered early varieties of the medium-grain group, and the remaining as late-maturing.

In the long-grain group, Texas Fortuna is medium late in maturing, and the remaining varieties are early.

Rexoro is a long-slender-grain variety that is very late in maturing, and Delitus is medium late.

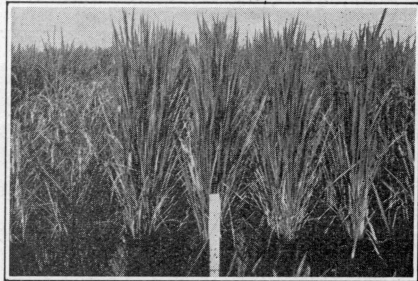


Fig. 8. Colusa (left) and Rexoro (right) varieties of rice. Note difference in stage of maturity.

### MILLING QUALITY

The rice grower sells his crop to the rice mills as rough rice, and it is sold on a basis of a barrel of 162 pounds. The buyer bases his bid on the milling quality of the rice. Milling quality is the amount of milled rice that can be obtained per barrel of rough rice. Everything else being equal, the miller will pay the highest price for the lot that will yield the highest percentage of milled rice, especially unbroken grains commonly known as head rice.

As a rule, the yield of head rice is the highest in the shortest-grain varieties. As the length of grain increases, the percentage of head rice decreases considerably and the percentage of total milled rice decreases very little. This is easily accounted for by the larger percentage of

Table 5. Milling grades of commercial rice varieties grown in Texas

Variety	Length of grain	Pounds of whole grains of clean rice per 162 pounds of rough rice					
		Prime	Good	Medium	Fair	Ordinary	Low
Honduras	long	70	65	60	55	50	under 50
Fortuna and Delitus	long	75	70	65	60	55	under 55
Edith	long	85	80	75	70	65	under 65
Lady Wright	long	90	85	80	75	70	under 70
Early Prolific	medium	90	85	80	75	70	under 70
Blue Rose	medium	95	90	85	80	75	under 75
Japanese	short	95	90	85	80	75	under 75

broken grains in the long-grain varieties. Blue Rose, a medium-grain rice, requires 95 pounds of head rice per barrel of rough rice to constitute prime milling grade, whereas in Honduras, a long-grain rice, 70 pounds are required. Official milling grades of commercial varieties of rice, as adopted by the U. S. Department of Agriculture, are shown in Table 5.



Fig. 9. View of rice variety field experiments at Beaumont in 1932.

Milling data on the more important varieties grown in 1931-32 are shown in Table 6. Caloro, Acadia, Piniling Daniel, and Colusa, with yields of 107.0, 104.3, 99.5, and 99.4 pounds of head rice per barrel, respectively, were the best milling short-grain varieties in the experiment. The milling quality of these four varieties was exceptionally good. Kinaryom and Nagupon produced rather low yields of head rice for short-grain rices.

Bruinmissie, with a yield of 99.2 pounds of head rice per barrel, was the best milling variety in the medium-grain group, Blue Rose and T. S. No. 1555 following with yields of 98.2 and 97.8 pounds, respectively. However, all of the medium-grain types produced fair yields of milled rice. Early Prolific produced fairly satisfactory yields of head rice during the two-year period, 1931-32, as shown in Table 6. The main objection to this variety is that it does not consistently produce grain of good milling

quality. In many seasons the yield of head rice will be exceptionally low, on account of a chalky texture known in the rice trade as "tombstone".

Table 6. Milling data on short-, medium-, long-, and long-slender-grain types of rice varieties grown at Beaumont, 1931 and 1932

T. S. No.	Variety	Pounds milled rice per barrel (162 pounds) rough rice					
		Head rice			Total rice		
		1931	1932	Average	1931	1932	Average
<b>Short-grain types:</b>							
19799	Caloro	105.9	108.0	107.0	119.0	118.9	119.0
19800	Acadia	105.3	103.2	104.3	118.1	114.5	116.3
5459	Piniling Daniel	95.8	103.2	99.5	116.0	117.6	116.8
19798	Colusa	96.5	103.2	99.4	111.6	116.0	113.8
7190	No. 8	91.8	99.2	95.5	108.7	111.6	110.2
5389	Kabo-Ong	85.7	98.5	92.1	114.5	114.5	114.5
5364	Kinaryom	89.1	94.5	91.8	113.1	116.0	114.6
5412	Naguyon	79.3	95.8	87.6	111.6	113.1	112.4
<b>Medium-grain types:</b>							
1593	Bruinmissie	95.1	103.2	99.2	111.6	113.1	112.4
7183	Blue Rose	95.8	100.5	98.2	113.1	114.5	113.8
1555	(Blue Rose type)	94.5	101.2	97.8	110.2	114.5	112.4
5463	Tinuco	94.5	99.9	97.2	113.1	113.1	113.1
2198	Early Prolific Sel.	89.7	101.2	95.5	113.1	114.5	113.8
19801	Early Prolific	90.0	100.5	95.3	113.1	113.1	113.1
5321	Guininto	85.1	100.5	92.6	113.1	113.1	113.1
1592	Wanica	87.0	97.2	92.1	111.6	113.1	112.4
19802	Supreme Blue Rose	84.3	99.2	91.8	110.2	114.5	112.4
<b>Long-grain types:</b>							
12983	No. 32	93.8	101.9	97.9	114.5	116.0	115.3
19803	Lady Wright	88.5	101.2	94.9	114.5	114.5	114.5
12981	No. 30	86.4	101.2	93.6	113.1	114.5	113.8
19804	Storm Proof	86.4	97.8	92.1	111.6	113.1	112.4
1611	Honduras	85.0	93.8	89.4	111.6	111.6	111.6
19805	Edith	77.7	99.9	88.8	113.1	113.1	113.1
1616	Honduras	79.3	91.8	85.6	113.1	113.1	113.1
2204	Honduras	78.5	87.7	83.1	111.6	113.1	112.4
9821	Texas Fortuna	78.5	84.6	81.6	112.2	112.3	112.3
<b>Long-slender-grain types:</b>							
8076	Delitus	88.4	87.0	87.7	110.2	110.2	110.2
19806	Rexoro	81.0	68.2	74.6	108.0	111.6	109.8

The long-grain varieties produced lower average yields of head rice than either the short- or medium-grain groups. This was to be expected, however, because the longer grains are more likely to be broken in the milling process. Lady Wright, No. 32, and No. 30, with yields of 94.9, 97.9, and 93.6 pounds of head rice per barrel, respectively, were the best milling varieties of this type. The lowest milling yield (81.6 pounds) was produced by Texas Fortuna. This is not seriously low for a long-grain rice as productive as Texas Fortuna.

Delitus produced a larger yield of head rice than Rexoro, the other slender-grain variety.

## SUMMARY AND CONCLUSIONS

Yields of 88 varieties of rice tested at Beaumont during the 19-year period, 1914-32, inclusive, are presented in this Bulletin. Many of these varieties including short-, medium-, long-, and long-slender-grain types of early, medium, and late maturity, can be successfully grown in Texas. Though the short-grain varieties, in general, are more productive than the medium- or long-grain types, large yields are not confined to varieties of any one grain type. Seven of the nine medium-grain varieties produced yields of 2000 pounds or more of rough rice per acre, as compared with five of the eight short-grain and four of the nine long-grain varieties.

The time required for the varieties to mature after plant emergence varied from 104 to 152 days. The short-grain group includes varieties of early, medium, and late maturity, while the medium-grain types include early- and late- maturing varieties. All of the long-grain rices are early in maturity except one, which is medium late. Of the two slender-grain varieties tested, one is medium late and the other very late in maturing.

The milling data on varieties show that the short-grain types produced the largest yields of head rice, and that as the length of grain increased the yield of head rice decreased. The yield of total milled rice did not vary to any extent between varieties of the different grain types.

The marked variations in yield, grain type, date of maturity, and milling quality of the rice varieties show that these characteristics are very important in the selection of varieties for commercial production in Texas. The rice acreage on each individual farm should be planted to at least two and preferably three varieties that mature at different dates. Early Prolific is the most desirable medium-grain rice of early maturity even though it frequently produces grain of inferior milling quality. Storm Proof, Edith, and Lady Wright are the most desirable long-grain varieties of early maturity, but they produce lower yields of grain than Early Prolific.

Texas Fortuna is the best variety of medium-late maturity. It is a very desirable long-grain rice and is popular in the region.

Blue Rose, including Supreme Blue Rose, is the most valuable medium-grain variety of late maturity. This variety produces high yields of grain of good milling quality.

Rexoro is a desirable long-slender-grain rice and matures very late.

The planting of short-grain varieties in Texas should be limited to the demand for rice of this type. Caloro, Piniling Daniel, and Acadia are good short-grain varieties of early, medium, and late maturity, respectively.