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Performance of Wheat Varieties In North Louisiana, 1980-82

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Acreage in Louisiana devoted to wheat harvested for grain increased dramatically from 15,000 acres in 1978 to 500,000 acres in 1982 (Louisiana Crop Reporting Service official estimates). Wheat's suitability for multiple cropping with soybeans, grain sorghum, rice, and sugarcane has been primarily responsible for the increase in acreage that has elevated wheat to major crop status.

Screening wheat varieties through uniform statewide tests is essential to provide seed distributors and growers with information necessary for selecting types adapted to their areas. Breakdowns in varietal pest resistance, the release of new varieties, and the inconsistency in varietal response to environmental influences across years demand that variety testing be a continuous process. Since 1966, Louisiana Agricultural Experiment Station agronomists have been comparing the performance of wheat varieties in areas of Louisiana varying in climate and soil classification. Results of these annual evaluations have been published in the LSU Agronomy Research Report Series (Nos. 1, 7, 13, 19, 25, 30, 35, 40, 50, 55, 60, 65, 69, and 73) and in branch experiment station annual progress reports.

The comparative performances of wheat varieties grown at three north Louisiana locations from 1980 to 1982 are included in this publication. The absence of data for certain years from one central and several south Louisiana locations limits the scope of this bulletin to the performance of varieties in north Louisiana.

Materials and Methods

Tests were conducted at the Red River Valley Experiment Station at Bossier City on Upper Red River Alluvium soil, the Northeast Louisiana Experiment Station at St. Joseph on Mississippi River Alluvium, and the Northeast Louisiana Experiment Station at Winnsboro on Loessial Hills.

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Information concerning soil type, fertilization, planting and harvesting dates, and plot size at each test site is shown in Table 1. Recommended cultural and pest control practices were followed. Plots were seeded at the rate of 60 to 90 pounds per acre and harvested with a combine at all locations.

Entries selected for testing were either commercially available varieties or advanced experimental lines of the Soft Red Winter Wheat market class. Each year varieties were eliminated from or added to the tests according to seed availability and past performance. Data were recorded for grain yield, test-weight per bushel, mature plant height, lodging, disease reaction, and maturity. Grain yield was based on plot weights adjusted to 13 percent moisture. Yields are reported in bushels per acre, with 60 pounds per bushel. Test-weight-per-bushel determinations were made in accordance with USDA specifications as a measure of weight per unit volume. Mature plant height was determined as the average height of culms from the ground to the tip of the spikes. Lodging was rated subjectively using a scale of 1 to 5, with 1 = no plants lodged, 5 = severe lodging. Reactions to the major wheat diseases and maturity ratings for varieties that were included in all 3 years of the evaluations are shown in Table 2. A subjective rating scale was used to determine the relative susceptibility to disease pathogens. Date when approximately 50 percent of the spikes fully emerged from the boot and grain moisture at harvest were used to estimate maturity.

A randomized complete block experimental design with either four or five replications was used in the individual tests to evaluate varietal performance. Yield data from each year-location combination were statistically analyzed. Although the number of entries included in the tests varied each year, only 15 varieties were tested in all 3 years at each location. Yield data for these 15 varieties were analyzed in a combined analysis. Tukey's Honestly Significant Difference Test was used to determine if mean yield differences were statistically meaningful or due to chance. Mean yields at a given location or for a certain year that share a letter do not differ significantly at the 5 percent level of probability. Significantly different mean yields do not have letters in common. Coefficients of variation (C.V.) are given for each year-location combination (Tables 7, 8, and 9) to facilitate the comparison of yield data among locations.

Results

Environmental influences on grain yield resulting from differences in varietal performance, climatic conditions, and soil productivity, were clearly evident. The F tests from the combined analysis for yield indicated highly significant differences among years, locations, varieties, and the interactions among these factors (Table 3). As a result of these interactions,

Table 1.—General information for wheat variety test sites for each year

Lacatian	Sail type[1]	Pounds per acre N-P_2O_5-K_2O applied	Plat size (feet)	Planting date	Harvesting date
			1980		
Bassier City	Narwood sl c lm	50-0-0	5 × 75	10/18	6/13
St. Joseph	Sharkey c	35-0-0	12.5 × 40	11/20	6/05
Winnsbara	Grenada sl lm	60-60-60	5 × 55	10/26	6/06
			1981		
Bassier City	Narwaad sl c lm	60-0-0	5 × 78	11/11	5/29
St. Joseph	Sharkey c	45-0-0	7 × 50	11/05-06	5/13-19
Winnsbara	Grenada sl lm	60-0-0	7.5 × 50	10/20	5/22
			1982		
Bassier City	Narwaad sl c lm	60-0-0	4.6 × 70	11/03	6/04
St. Joseph	Sharkey c	40-0-0	7 × 35	11/05	5/18-19
Winnsbara	Grenada sl lm	68-0-0	7.5 × 50	10/27	5/18 & 6/03

[1]c = clay; sl lm = silt laam; sl c lm = silty clay laam.

Table 2.—Varietal resistance to major diseases and maturity ratings

Variety	Leaf rust resistance[1]	Septoria glume blotch resistance	Powdery mildew resistance	Maturity[2]
Arthur 71	Very poor (poor)	Poor	Poor	M-L
Coker 68-15	Poor (fair)	Poor	Very poor	M-L
Coker 747	Poor (fair)	Poor	Poor	M-L
Coker 762	Excellent	Fair	Good	M-L
Coker 797	Good	Very poor	Good	E
Coker 916	Excellent	Fair	Fair	M-L
Delta Queen	Poor (fair)	Poor	Good	M-L
Double Crop	Poor (fair)	Poor	Poor	M-E
Hart	Very poor	Poor	Poor	M-L
McNair 1003	Very poor (poor)	Poor	Good	M-E
McNair 1813	Poor	Poor	Good	E
Omega 78	Fair	Poor	Good	M-E
Rosen	Very poor (poor)	Poor	Very poor	M-E
Roy	Poor (fair)	Very poor	Very poor	M-L
Southern Belle	Poor (fair)	Very poor	Poor	E

[1] Leaf rust ratings are based on the most severe reactions observed in the state during 1980-82 and indicated the potential susceptibility of the cultivars. Ratings in parentheses are given for those varieties that displayed different reactions at the three north Louisiana locations during 1980-82.

[2] E = early; M-E = medium early; M-L = medium late. Ratings based on heading date and grain moisture at harvest.

Table 3.—Combined analysis of variance for yield of 15 wheat varieties grown at three north Louisiana locations, 1980-82

Source of variation[1]	df	MS	F
Totol	582		
Yeor	2	23,477.9	74.52**
Location	2	5,751.3	18.26**
Yeor x locotion	4	6,003.2	19.06**
Error "o"	30	315.0	
Voriety	14	1,257.8	25.46**
Voriety x locotion	28	153.4	3.11**
Yeor x voriety	28	568.4	11.51**
Yeor x voriety x locotion	56	215.3	4.36**
Error "b"	418	49.4	

**Significont ot the 1% level of probobility.

statistical comparisons among mean yields involving more than one location were not made. However, this is of no consequence since state average yields are not meaningful to growers, most of whom farm in only one region of the state and are interested in variety adaptation for certain areas. More important is the relative performance of the wheat varieties at each location. For these comparisons, the average performance of the 15 varieties based on 3 years is shown for the separate locations in Tables 4, 5, and 6. Coker 916 was significantly superior to all varieties at Winnsboro and also was the highest yielding variety at Bossier City. Southern Belle had the largest mean yield at St. Joseph. Other consistently high-yielding entries

Table 4.—Agronomic performance of 15 wheat varieties grown on Norwood silty clay loam at Bossier City, 1980-82

Voriety	Yield, bushels per ocre[1]	Plont height, in.	Lodging[2]	Test-weight per bushel, pounds
Coker 916	64.5 o	37	1.7	58.0
Roy	60.7 ob	39	2.4	55.5
Southern Belle	56.2 obc	35	1.5	60.9
Coker 68-15	55.9 obc	38	2.2	59.6
Omego 78	55.3 obc	35	2.7	57.0
Coker 762	50.3 bcd	34	3.2	55.3
Coker 797	49.8 bcd	33	1.8	57.1
Rosen	48.6 cd	38	2.9	55.9
McNoir 1003	47.3 cd	39	2.3	54.3
McNoir 1813	46.1 cd	40	2.5	56.3
Coker 747	45.3 cd	36	2.5	57.6
Delta Queen	44.2 d	37	3.3	56.6
Hart	44.2 d	41	2.9	55.5
Double Crop	43.1 d	42	2.6	57.9
Arthur 71	41.0 d	40	2.9	58.1

[1]Means followed by o letter in common ore not significantly different at the 5% level of probability according to Tukey's H.S.D. Test.

[2]Roted on o scale of 1 to 5, with 1 = none, 5 = severe.

Table 5.—Agronomic performance of 15 wheat varieties grown on Sharkey clay at St. Joseph, 1980-82

Variety	Yield, bushels per acre[1]	Plant height, in.	Lodging[2]	Test-weight per bushel, pounds
Southern Belle	54.0 a	36	1.1	58.6
Coker 916	50.9 a	36	1.4	56.9
Coker 68-15	*50.4 a	39	1.1	56.3
McNair 1003	49.6 a	39	1.9	50.8
Rasen	49.6 a	33	1.4	53.2
Coker 762	49.2 a	34	1.5	51.9
Coker 797	47.6 ab	34	1.1	55.2
Omega 78	47.6 ab	33	1.1	56.4
Ray	47.1 ab	38	1.4	52.9
Coker 747	*46.9 ab	35	1.4	56.9
Delta Queen	46.3 abc	37	1.8	53.8
McNair 1813	45.8 abc	37	1.6	55.8
Double Crop	40.0 bcd	39	1.9	59.7
Arthur 71	37.7 cd	38	1.8	55.2
Hart	32.0 d	37	1.5	53.6

[1]Means followed by a letter in common are not significantly different at the 5% level of probability according to Tukey's H.S.D. Test.

[2]Rated on a scale of 1 to 5, with 1 = none, 5 = severe.

*Average reflects one missing plot.

Table 6.—Agronomic performance of 15 wheat varieties grown on Grenada silt loam at Winnsboro, 1980-82

Variety	Yield, bushels per acre[1]	Plant height, in.	Lodging[2]	Test-weight per bushel, pounds
Coker 916	54.5 a	37	1.2	56.8
Southern Belle	45.0 b	35	1.2	58.1
Coker 68-15	42.5 bc	38	1.2	57.5
Coker 762	41.6 bc	35	1.7	50.2
Coker 747	41.3 bc	36	1.9	55.1
Rasen	41.1 bc	35	1.2	53.0
McNair 1813	40.2 bc	39	2.8	54.4
Ray	39.8 bc	39	1.9	51.0
Coker 797	39.4 bc	34	1.5	54.5
Double Crop	38.6 bc	39	1.5	59.6
Omega 78	38.5 bc	36	2.4	53.9
Delta Queen	37.5 c	34	2.4	52.7
McNair 1003	37.3 c	38	1.8	48.8
Arthur 71	28.6 d	39	2.8	56.2
Hart	26.5 d	37	1.0	55.0

[1]Means followed by a letter in common are not significantly different at the 5% level of probability according to Tukey's H.S.D. Test.

[2]Rated on a scale of 1 to 5, with 1 = none, 5 = severe.

were Coker 68-15 and 762, whereas Arthur 71 and Hart consistently had the lowest yields. Although Coker 68-15 and Southern Belle were among the top four wheats in yields at all test locations and displayed fair resistance to leaf rust during 1980-82, these varieties gave susceptible reactions to leaf rust elsewhere in the state during this period (Table 2, Footnote 1). It is reasonable to assume that the yield of these susceptible varieties could be severely reduced in years of high leaf rust severity at these northern locations.

In addition to grain yield differences, the varieties differed appreciably in plant height, lodging susceptibility, and test-weight per bushel (Tables 4, 5, and 6). Generally, taller varieties tend to lodge more, but two of the wheats most susceptible to lodging, Delta Queen and Coker 762, were among the shorter-statured ones. Lodging ratings reflect the degree of lodging that occurred under conditions of these studies and can be useful in selecting varieties most resistant to lodging. Even resistant varieties may lodge, however, when environmental conditions are conducive to extensive lodging. Test-weight per bushel varied greatly among the entries with Southern Belle and Double Crop exhibiting high test-weights at all sites. Coker 762 and particularly McNair 1003 consistently exhibited low test-weights.

In addition to the 15 varieties evaluated during all years, there were another 15 varieties included in the tests for 1 or more years. These were either newly released varieties that were tested for 1 or 2 years or varieties that were dropped from the testing program because of poor performance or seed unavailability. Tables 7 through 9 contain grain yield data by location for all the entries tested each year.

Table 7.—Mean yield of wheat varieties grown on Norwood silty clay loam at Bossier City, 1980-82

Variety	Year		
	1980	1981	1982
	Bushels per acre[1]		
Caker 916	66.2 a	51.7 ab	75.6 a
Caker 68-15	57.5 ab	55.5 ab	54.7 abcdef
Ray	48.4 bc	62.0 a	71.7 a
Omega 78	45.7 bcd	56.4 ab	63.7 abc
Sauthern Belle	44.1 bcde	55.3 ab	69.1 a
Caker 747	42.8 bcdef	49.7 b	43.3 bcdefg
Caker 797	38.5 cdefg	51.4 ab	59.6 abcde
Beau	38.3 cdefg	49.5 b	—
Caker 762	36.4 cdefg	52.3 ab	62.2 abc
Hart	35.4 cdefg	61.2 ab	35.9 efg
Sullivan	32.1 cdefg	—	—
Arthur 71	31.2 defg	55.1 ab	36.8 defg
McNair 1813	31.0 defg	54.0 ab	53.2 abcdef
Rasen	28.8 efg	57.3 ab	59.7 abcde
Oasis	26.9 fg	—	—
Abe	26.3 fg	—	—
Delta Queen	22.6 g	51.2 ab	58.9 abcde
McNair 1003	22.6 g	58.8 ab	60.6 abcde
Dauble Crop	21.9 g	51.4 ab	55.9 abcde
Terral 800-22	—	55.7 ab	67.1 ab
Titan	—	52.3 ab	—
Auburn	—	—	68.8 a
Terral 81-17	—	—	67.4 ab
Florida 301	—	—	61.6 abcd
Hunter	—	—	59.9 abcde
Caldwell	—	—	55.2 abcdef
Wheeler	—	—	52.5 abcdefg
Pike	—	—	39.3 cdefg
Tyler	—	—	30.6 fg
Massey	—	—	28.2 g
C.V.(%)	19.4	9.5	18.7

[1]Means fallawed by a letter in camman are nat significantly different at the 5% level af probability according to Tukey's H.S.D. Test. Camparisans are valid only between yields in the same year.

Table 8.—Mean yield of wheat varieties grown on Sharkey clay at St. Joseph, 1980-82

Variety	Year		
	1980	1981	1982
	Bushels per acre[1]		
Ray	29.7 a	54.5 bcde	57.2 abcd
Coker 762	27.0 ab	55.1 bcde	65.4 a
Caker 68-15	26.3 ab	67.2 abc	*60.2 abc
Delta Queen	25.9 abc	51.7 cde	61.3 ab
Beau	25.8 abc	58.1 bcde	—
Southern Belle	25.3 abc	79.6 a	57.2 abcd
Caker 747	25.3 abc	60.7 abcd	*57.4 abcd
Arthur 71	25.2 abc	46.9 de	40.9 d
Sullivan	23.7 abcd	—	—
Abe	23.6 abcd	—	—
McNair 1003	22.7 abcd	69.9 abc	56.3 abcd
Caker 916	22.6 abcd	72.1 ab	57.9 abcd
McNair 1813	22.2 abcd	66.4 abcd	48.8 abcd
Rasen	20.2 abcd	68.9 abc	59.7 abc
Hart	19.3 bcd	56.5 bcde	20.2 e
Double Crop	16.8 bcd	55.7 bcde	47.5 bcd
Caker 797	15.7 cd	65.7 abcd	61.3 ab
Omega 78	15.6 cd	70.1 abc	57.0 abcd
Oasis	13.4 d	—	—
Titan	—	37.9 e	—
Hunter	—	—	62.5 ab
Terral 800-22	—	—	60.8 ab
Terral 81-17	—	—	58.1 abcd
Florida 301	—	—	57.3 abcd
Wheeler	—	—	47.6 bcd
Massey	—	—	46.2 bcd
Caldwell	—	—	45.2 bcd
Pike	—	—	42.9 cd
C.V. (%)	17.5	12.5	12.2

[1]Means followed by a letter in comman are nat significantly different at the 5% level af probability according ta Tukey's H.S.D. Test. Camparisans are valid anly between yields in the same year.

*Average reflects ane missing plat.

Table 9.—Mean yield of wheat varieties grown on Grenada silt loam at Winnsboro, 1980-82

Variety	Year		
	1980	1981	1982
	Bushels per acre[1]		
Coker 916	64.8 a	42.0 abcd	56.8 a
Hart	46.6 b	26.1 f	6.8 h
Ray	44.4 b	38.6 bcde	36.5 bcde
Southern Belle	41.6 bc	52.7 a	40.7 bc
Rosen	41.3 bc	46.9 abc	35.0 bcdefg
Coker 747	41.1 bc	43.6 abcd	39.2 bcd
Coker 68-15	39.1 bcd	43.7 abcd	44.7 abc
Dauble Crap	39.0 bcd	37.6 cdef	39.3 bcd
Beau	36.8 bcde	29.9 ef	—
McNair 1813	35.6 bcde	50.4 ab	34.5 cdefg
Delta Queen	30.4 cdef	44.3 abcd	37.8 bcde
Caker 797	30.3 cdef	52.9 a	35.1 bcdef
Caker 762	30.1 cdef	44.8 abc	50.0 ab
Oasis	29.5 def	—	—
Sullivan	29.2 def	—	—
Arthur 71	28.8 def	32.3 def	24.8 defg
Omega 78	25.8 ef	44.8 abc	44.9 abc
McNair 1003	25.7 ef	52.4 a	33.7 cdefg
Abe	23.3 f	—	—
Titan	—	36.8 cdef	—
Hunter	—	—	46.4 abc
Flarida 301	—	—	44.1 abc
Caldwell	—	—	39.8 bcd
Wheeler	—	—	39.8 bcd
Terral 81-17	—	—	37.6 bcde
Auburn	—	—	33.9 cdefg
Massey	—	—	22.6 efg
Terral 800-22	—	—	21.0 fgh
Tyler	—	—	20.7 fgh
Pike	—	—	19.8 gh
C.V. (%)	12.2	10.9	16.0

[1]Means fallawed by a letter in camman are not significantly different at the 5% level af probability accarding to Tukey's H.S.D. Test. Camparisans are valid anly between yields in the same year.

Recommendations

The statewide variety evaluation program provides results that serve as a basis for recommending varieties. However, only varieties that have been included in the testing program for a minimum of 3 years are eligible for recommendation. A list of recommended varieties is compiled each year by the Small Grain Variety Review Committee and is made available through the Louisiana Cooperative Extension Service. Growers should exercise caution when selecting varieties that have not been adequately evaluated for their particular location. Except for Arthur 71, Double Crop, and Hart, all of the 15 varieties evaluated during all 3 years of the study were recommended for production in 1982-83 at one or more locations in the state.

Recommended Varieties

Northwest Louisiana[5]—Coker 762, Coker 797, Coker 916, Omega 78, Roy, and Southern Belle.

Northeast Louisiana (alluvial soils)[6]—Coker 68-15, Coker 747, Coker 762, Coker 797, Coker 916, Delta Queen, McNair 1003, Omega 78, Rosen, Roy, and Southern Belle.

Northeast Louisiana (ridge soils)[7]—Coker 68-15, Coker 747, Coker 762, Coker 916, McNair 1813, Rosen, Roy, and Southern Belle.

Central Louisiana[8]—Coker 747, Coker 762, Coker 797, Delta Queen, Omega 78, Rosen, and Southern Belle.

South Louisiana[9]—Coker 762, Coker 797, Delta Queen, McNair 1003, McNair 1813, Omega 78, and Southern Belle.

Coker 916 is a promising variety for central and south Louisiana, Roy is a promising variety for central Louisiana, and Terral 800-22 is a promising variety for northwest Louisiana.

[5]Data collected at Red River Valley Experiment Station, Bossier City.

[6]Data collected at Northeast Louisiana Experiment Station, St. Joseph.

[7]Data collected at Northeast Louisiana Experiment Station, Winnsboro.

[8]Data collected at Dean Lee Agricultural Center, Alexandria.

[9]Data collected at Perkins Road Agronomy Farm, Baton Rouge; Rice Experiment Station, Crowley, and Iberia Livestock Experiment Station, Jeanerette.

Table 10.—Originating agencies for the wheat varieties included in the 1980-82 performance tests

Variety	Originating agency
Abe, Auburn, Arthur 71, Beau, Caldwell, Oasis, Sullivan	Indiana Agricultural Experiment Station
Caker 68-15, 747, 762, 797, 916	Caker's Pedigreed Seed Company, South Carolina
Delta Queen, Southern Belle, Hunter	North American Plant Breeders, Indiana
Double Crop, Rosen	Arkansas Agricultural Experiment Station
Florida 301	Florida Agricultural Experiment Station
Hart, Pike	Missouri Agricultural Experiment Station
McNair 1003, 1813	Northrup King Seed Company, North Carolina
Massey, Tyler, Wheeler	Virginia Agricultural Experiment Station
Omega 78	Georgia Agricultural Experiment Station
Ray	North Carolina Agricultural Research Service
Terral 800-22, 81-17	Terral-Norris Seed Company, Inc., Louisiana
Titan	Ohio Agricultural Experiment Station