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BRADFORD WHEAT, A NEW DUAL-PURPOSE FORAGE-GRAIN
VARIETY FOR EAST TEXAS

L. R. Nelson and S. L. Ward

SUMMARY

Bradford is a new variety of soft red winter wheat developed by the Texas Agricultural Experiment Station. Bradford (U.S.D.A. accession number PI 470925) was developed as a dual purpose forage-grain variety for East Texas. It is adapted from Dallas eastward in Texas and will produce excellent forage yields in a grazeout program or excellent grain yields in limited graze (forage plus grain) or in grain only programs. Bradford was selected at the Texas A&M Agricultural Research and Extension Center at Overton from the cross Arthur 71/Siete Cerros//Coker 70-14 made in 1973. The final selection was made from headrows in 1977 and it has been tested as Tx-73-93.

Bradford is a soft red winter wheat and is not recommended for production in the hard wheat region of Texas as its flour quality is not suitable for bread. Its quality is similar to that of Coker 68-15, and is acceptable for soft wheat uses. Bradford has rapid juvenile growth and tillers profusely in a manner similar to Coker 68-15 and McNair 1003. It is moderately tall, averaging about 42 inches in height when not grazed but less when grazed. The spikes are lax to mid-dense, averaging 3 inches in length, usually with 3 kernels per spikelet and about 18 spikelets per spike. Short awns, averaging 1 1/4 inches in length, are present on florets in the upper half of the spike. The straw and glumes normally are light yellow. Kernels are medium to large and usually larger than those of McNair 1003 or Coker 68-15. Bradford heads about the same date as Coker 68-15 and about 1 week later than McNair 1003 (Table 1). No lodging has occurred in tests at Overton during the past 6 years. Bradford has been resistant to endemic races of powdery mildew in Texas. It has been moderately resistant to leaf rust and susceptible to stem rust (usually not a problem in Texas). Bradford has some tolerance to Septoria glume blotch and exhibits a reaction similar to that of Coker 68-15 or McNair 1003. However, because of its moderately tall plant

height, it may suffer considerably less damage from Septoria than shorter varieties. In addition to being moderately resistant to leaf rust and septoria glume blotch, Bradford has been found to have resistance to powdery mildew, high grain and forage yield potentials, and good soft wheat milling quality.

OBJECTIVE

To develop a dual purpose forage-grain wheat variety for East Texas.

RESULTS

Grain Yields

Bradford has a very good grain production record at Overton (Table 1) where it has averaged 59 bu/A over a 6 year test period (1978-1983). The average yield of Bradford was seven bushels greater than that of Coker 68-15 for this period. Bradford had a higher yield than McNair 1003 in 2 out of 3 years tested at Overton. Data from Clarksville (Table 1) indicated that Bradford also had a high yield potential in that area (Blackland soil type); it exhibited a mean yield of 69 bu/A over the years when successful yield trials were conducted at this location. The yield of Bradford in 1981 was reduced by seed shattering caused by hail (estimated yield loss was 30%). In 1983, Bradford ranked 2nd in grain yield in the test (79 bu/A); where 19 varieties had a mean yield of 65 bu/A.

In 1981-82, yields of Bradford were quite low in Central Texas (Table 2) due to a severe epidemic of leaf rust and also to other unfavorable environmental conditions. Under favorable growing conditions in 1982-83 (Table 2), Bradford produced good yields at Clarksville, Dallas, Temple, McGregor and Nacogdoches.

Bradford has demonstrated high grain-yield potential in Arkansas (Table 2), especially in 1982. During that season, Bradford produced a yield of 91 bu/A at Marianna, and also had yields of 75 and 73 bu/A at Jonesboro and Keiser, respectively. In 1983, yields were lower in Arkansas; however, Bradford had yields of 50 bu/A or more at Keiser, Marianna and Stuttgart.

In a 2-year study at Overton, Bradford and other varieties were grazed from mid-November to mid-February and subsequently harvested for

grain. Bradford produced the highest grain yield among test entries for both years (Table 3), which indicated that it can withstand grazing pressure and produce acceptable yield and that it might be particularly useful when used for both forage and grain production.

Wheat Quality

Wheat quality determinations (both milling and baking) were conducted by the USDA-ARS Soft Wheat Quality Laboratory at Wooster, Ohio in 1983 (Table 4). These results compare the quality of Bradford with the released varieties Coker 68-15, Coker 762, Coker 916, McNair 1003 and Delta Queen. Coker 68-15 is a very high quality soft wheat and is often used as a standard variety for quality comparisons. Data from macro-quality samples (Table 4) indicated that Bradford does not have quality characteristics equal to either Coker 68-15 or McNair 1003. Bradford does have quality characteristics superior to Delta Queen, Coker 762 and Coker 916. The percentage protein of all varieties grown at Overton in 1981-82 was higher than expected and may have been caused by the high N rates applied (topdressed with 70 lbs N) and due to favorable seasonal conditions. In variety tests conducted in Texas, the test weight of Bradford has ranged from 58 to 60 lb/bu and averaged about 59 lb/bu. Cookie diameter spread was similar to that of Coker 68-15. The results from these tests indicated that Bradford does not have superior baking quality, but that its quality is adequate for a variety of the soft red winter wheat class. Its quality is somewhat better than that of several other recently released commercial varieties of soft red winter wheat.

Forage Yields

In forage tests at Overton (Table 5), yields of Bradford have been good in comparison to those of other wheat varieties. Bradford ranked highest for total yield and also highest for March and April harvests during three years of testing. Forage yields from the fall and winter harvests were somewhat lower than the test mean. However, it should be pointed out that all of the varieties listed on this table are very good forage producing wheats. At Temple in 1982-83, Bradford produced the 3rd highest wheat forage yield in the test with a total dry matter yield of 10,251 lbs/A for the season. Among the 13 wheat varieties tested, only Coker 916 (11,713 lbs/A) and Mit (10,607 lbs/A) produced

higher yields than Bradford. It appears that this new variety is well-adapted for forage production throughout the Central Texas Blacklands and in East Texas.

TABLE 1. GRAIN YIELDS AND AGRONOMIC DATA OF BRADFORD IN COMPARISON TO OTHER ADAPTED SOFT WHEATS GROWN AT OVERTON AND CLARKSVILLE, TEXAS

Variety	OVERTON			Agronomic data (1983)		
	1981	1982	1983	% lodging	Plant ht. (in.)	Heading date
Bradford	68	50	41	0	45	4-21
Coker 68-15	66	33	39	0	42	4-18
McNair 1003	76	42	40	0	40	4-14
Coker 762	¹ 9.16	56	47	0	37	4-12
LSD (0.05)	9.16	8.9	8.8	-	-	-
-----Yield Bu/A-----						
	68	50	41	59		
	66	33	39	52		
	76	42	40	-		
	¹ 9.16	56	47	-		
	9.16	8.9	8.8	-		

CLARKSVILLE	
	2-year mean
Bradford	69
Coker 68-15	77
McNair 1003	90
Coker 762	-
LSD (.05)	12.9

¹Variety was not available for testing.

²Hail shortly before harvest caused an estimated 30% seed shattering for Bradford and 5% for Coker 68-15 and McNair 1003.

³Test discarded due to inconsistent stands.

TABLE 3. GRAIN YIELDS OF WHEAT GRAZED FOR 3 MONTHS (MID-NOVEMBER THROUGH MID-FEBRUARY) AT OVERTON, TEXAS OVER 2 YEARS

Variety	Grain Yield Bu/A	
	1981	1982*
Bradford	57	30
Coker 68-15	32	17
McNair 1003	47	28**
Arthur 71	38**	-
TAM-W-106	-**	16
NK PRO 812	-	14

* Yields were very low due to leaf rust and Septoria nodorum in 1982.

** Variety not tested during this year.

TABLE 4. MILLING AND BAKING QUALITY DETERMINATIONS OF BRADFORD AND OTHER WHEAT VARIETIES GROWN AT OVERTON, TEXAS IN 1981-82²

Entry	Milling quality score	Baking quality score	Test wt. lb/bu	Prot. pct.	Part. size index pct.	Flour Yield pct.	Cookie Diam. cm.
Coker 68-15	100 A ¹	100 A	65	13.5	43	73	18.4
McNair 1003	93 C	92 C	59	12.9	45	69	18.0
Bradford	87 D	86 D	63	13.4	36	72	18.2
Delta Queen	85 E	84 E	61	12.8	32	73	17.8
Coker 762	83 E	90 D	60	15.0	39	71	18.1
Coker 916	86 D	80 F	62	13.2	35	71	17.9

¹Samples ranked according to combined quality score.

²These analyses were conducted by the Soft Wheat Quality Lab (USDA-ARS) in Wooster, Ohio, by Dr. Robert Clements, Research Chemist.

TABLE 5. MEAN WHEAT FORAGE YIELDS OVER 3 YEARS IN CLIPPING TESTS
AT OVERTON, TEXAS

Variety	Harvest Period				Total
	Dec.	Jan. & Feb.	March	April	
-----lbs. dry matter/acre-----					
Bradford	1096	486	1090	1464	4136
Coker 68-15	1349	485	1039	1056	3929
McNair 1003	1310	749	979	1047	4085
Delta Queen	1234	640	928	1217	4009
Southern Belle	1215	690	979	962	3846
Mean	1241	610	1003	1149	4001

TABLE 6. AGRONOMIC, TEST WEIGHT AND DISEASE RESISTANCE OF BRADFORD COMPARED TO OTHER SOFT WHEAT VARIETIES (Overton 1983)

Variety	Test wt lbs	Pl ht inches	Heading date	% lodging	Leaf ₁ rust	Stem ₂ rust	Strip ₁ rust	Powdery mildew	Septoria nodorum blotch
Bradford	58	44	4-21	0	MR	MS	MR	R	MR
Coker 68-15	61	41	4-18	0	MS	S	MR	S	MR
Coker 762	57	37	4-12	0	R	MR	MR	R	MR
McNair 1003	56	40	4-14	0	S	-	R	R	MR

¹ Leaf rust and strip rust disease resistance are from Dallas experiments in 1983: R = resistant, S = susceptible, M = moderately.

² Stem rust disease resistance reactions are from the test on the Stiles Farm in 1983.