No. 9900067

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Texas Agricultural Experiment Station

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, [illegible] CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE , OR USING IT IN [illegible]CING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY [illegible]CTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A C[illegible]ERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF THE [illegible] (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT, COMMON

'TAM 302'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this second day of April, in the year two thousand two.

Attest:

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secretary of Agriculture

REPRODUCE LOCALLY. *Include form number and date on all reproductions.*

FORM APPROVED - OMB NO. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE DIVISION - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a).

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) *(as it is to appear on the Certificate)*
Texas Agricultural Experiment Station

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER
TX91D6913

3. VARIETY NAME
TAM 302

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
Office of the Director
110 Administration Building
College Station, TX 77843-2147

5. TELEPHONE *(include area code)*
409/847-9325

6. FAX *(include area code)*
409/845-9938

FOR OFFICIAL USE ONLY

PVPO NUMBER 9900067

FILING DATE 11-2-1998

FILING AND EXAMINATION FEE $ 2450.00

DATE 11-2-98

CERTIFICATION FEE $ 320.00

DATE 7-16-01

7. GENUS AND SPECIES NAME
Triticum aestiuum L.

8. FAMILY NAME *(Botanical)*
Gramineae

9. CROP KIND NAME *(Common name)*
Wheat

10. IF THE APPLICANT NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.)* *(Common name)*
Official Public Agricultural Research Agency of the State of Texas

11. IF INCORPORATED, GIVE STATE OF INCORPORATION

12. DATE OF INCORPORATION

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS
Technology Licensing Manager
Agriculture/Life Sciences
310 Wisenbaker
College Station, TX 77843-3369

14. TELEPHONE *(include area code)*
409/847/8682

15. FAX *(include area code)*
409/845-1402

16. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED *(Follow instructions on reverse)*

a. [X] Exhibit A. Origin and Breeding History of the Variety
b. [X] Exhibit B. Statement of Distinctness
c. [X] Exhibit C. Objective Description of the Variety
d. [X] Exhibit D. Additional Description of the Variety
e. [X] Exhibit E. Statement of the Basis of the Applicant's Ownership
f. [X] Voucher Sample (2,500 viable untreated seeds or, for tuber propagated varieties verification that tissue culture will be deposited and maintained in a public repository)
g. [X] Filing and Examination Fee ($2,450), made payable to "Treasurer of the United States" *(Mail to PVPO)*

17. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY, AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act)*
[X] YES *(If "yes," answer items 18 and 19 below)* [ ] NO *(If "no," go to item 20)*

18. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
[X] YES [ ] NO

19. IF "YES" TO ITEM 18, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
[X] FOUNDATION [X] REGISTERED [X] CERTIFIED

20. HAS THE VARIETY OR A HYBRID PRODUCED FROM THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?
[ ] YES *(If "yes," give names of countries and dates)* [X] NO

21. The applicant(s) declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned applicant(s) is(are) the owner(s) of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Applicant(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT *(Owner(s))*		SIGNATURE OF APPLICANT *(Owner(s))*	
NAME *(Please print or type)* G. Dewey Liccioni		NAME *(Please print or type)*	
CAPACITY OR TITLE Assistant Vice Chancellor	DATE	CAPACITY OR TITLE	DATE

(See reverse for instructions and information collection burden statement)

EXHIBIT A
Origin and Breeding History of TAM 302 Wheat

The pedigree of TAM 302 is Probrand 812/Caldwell//TX86D1310. Probrand 812 (PI 486146) was developed and released by the Northrup-King Company as an improved hard red winter wheat variety in 1980, and has the pedigree Olesen's Dwarf/Bison. Caldwell (CI 17897) was developed and released by Purdue University as an improved soft red winter wheat variety in 1981, and has the pedigree P5724B3-5P-8-2*2/Siete Cerros. TX86D1310 is a sister line of TAM 300 (PI 576151), with the pedigree TAM 106/Collin. The cross Probrand 812/Caldwell (WX85D006) was made, and the F_1 plants were grown in the greenhouse at Dallas during the spring and summer of 1985. In the autumn of 1985, seedlings in the F_2 generation were screened for seedling susceptibility to several races of the leaf rust pathogen, *Puccinia recondita* Roberge ex Desmaz. Seedlings that were leaf rust susceptible were screened again with *P. recondita* at the heading stage (adult plants) for reduced infection type (smaller, fewer pustules) and longer latent period (time between inoculation and subsequent sporulation) than fully susceptible adult plants. Heads from plants having adult-plant resistance were selected and grown in the field at Dallas in 1986-87 as individual F_3 head rows. Individual tillers having adult-plant leaf rust resistance were marked in the field in the spring of 1987. Heads from these tillers were harvested and the seed was used to produce plants for crossing in the greenhouse during the fall of 1987. The cross WX85D006-2-17/TX86D1310 (WX87D037) was made in 1987 and the F_1 was grown in the spring 1988 greenhouse. The F_2 population was grown in the field during 1988-89 and several tillers were selected for leaf rust resistance and good agronomic type. The F_3 head rows were grown in the field and selected for good agronomic type and disease resistance in the spring of 1990. Observation plots from these head rows were grown in the field at Prosper, TX during the 1990-91 growing season. One of these plots, TX91D6913 was selected and grown in replicated preliminary trials at Dallas and Prosper in 1991-92. TX91D6913 was entered in the 1992-93 and 1993-94 intrastate Uniform Advanced 1 nursery. In 1994-95, TX91D6913 was entered in the statewide Uniform Wheat Elite nursery. In 1995-96 and 1996-97, TX91D6913 was entered into both the North Texas Wheat Elite and West Texas Wheat Elite nurseries. In 1994-95 and 1995-96, TX91D6913 was tested in the Southern Regional Performance Nursery (SRPN), a USDA-organized nursery with testing sites throughout the Great Plains. The line TX91D6913 was approved for release as TAM 302 by the Texas Agricultural Experiment Station. TAM 302 is uniform and stable, as observed during twelve generations of testing. No variants have been observed in TAM 302. A breeders seed block (about 0.3 acre) of TAM 302 was grown, rogued of off-types, and harvested at Prosper during the 1993-94 growing season. This seed source served for all subsequent seed increases and testing. In 1996-97, approximately 39 acres (two years out of wheat production) at TAES-Dallas were planted to TAM 302 for Foundation seed production. Approximately 2,000 bushels were produced, harvested by TAES-Foundation Seed Service (TFSS) and conditioned at the TFSS facility in Vernon, TX.

Exhibit B
Statement of Distinctness

TAM 302 is the result of a planned cross between two wheat varieties, Probrand 812 and Caldwell; followed by a planned cross with the TAES (Texas Agricultural Experiment Station) breeding line, TX86D1310. Among its parents, TAM 302 most closely resembles Probrand 812, with each variety having white chaff and awns. However, TAM 302 differs significantly from Probrand 812 in its maturity (heading date), winter hardiness and resistance to the leaf rust pathogen, *Puccinia recondita* Rob. Ex Desm. TAM 302 has the resistance genes *Lr 3a*, *Lr13*, and *Lr16*. Probrand 812 and Pioneer 2163 do not contain this three gene combination. Overall, TAM 302 most closely resembles the variety Pioneer 2163.

Comparisons of heading dates, winter hardiness and leaf rust reaction:

Variety	Heading date[1] at location and year			
	Dallas - 1996	Dallas - 1997	Prosper - 1996	Prosper - 1997
TAM 302	108 a	109 a	107 a	109 a
Probrand 812	102 c	104 b	101 b	103 b
Pioneer 2163	106 b	109 a	105 a	109 a
LSD (5%)	1.2	1.4	2.1	1.0

[1] Heading Date –Number represents days from 1 January to physiological heading date where 50% of the plants are 50% or more extended out of the boot (Large, E. C. 1954. Growth stages in cereals. Illustrations of the Feekes scale. Plant Pathology 3: 128-129). Means followed by different letters are significantly different from each other at the P=0.05 level according to least significant difference (Statistix® for Windows). Planting dates were: Dallas, TX - 26 October 95 and 5 November 96; Prosper, TX - 3 November 95 and 1 November 96.

Variety	Winter hardiness[2] at location and year			
	Dallas - 1996	Dallas - 1997	Prosper - 1996	Prosper - 1997
TAM 302	2.9 a	1.8 a	2.5 a	2.0 a
Probrand 812	6.0 c	5.2 c	5.7 c	5.0 c
Pioneer 2163	4.0 b	3.1 b	3.7 b	3.5 b
LSD (5%)	1.0	0.8	0.5	0.8

[2] Winter hardiness - Numbers assessed on a 0-to-9 scale where 0 represents no winter damage and 9 represents plants killed by winter damage. Means followed by different letters are significantly different from each other at the P=0.05 level according to least significant difference (Statistix® for Windows). Planting dates were: Dallas, TX - 26 October 95 and 5 November 96; Prosper, TX - 3 November 95 and 1 November 96. Assessments were made during the last week of February in each year.

	Leaf rust[3] reaction								
	February 1995			February 1996			February 1997		
Variety	MBRJ	TGBJ	MBBJ	MBRJ	TGBJ	MBBJ	MBRJ	TGBJ	MBBJ
TAM 302	S	R	R	S	R	R	S	R	R
Pro 812	R	S	S	R	S	S	R	S	S
Pion 2163	S	S	S	S	S	S	S	S	S

[3] Leaf Rust Reaction – Seedling leaf rust reaction to three races of *Puccina recondita* Rob. Ex Desm., where S means susceptible and R means resistant (Long, D. L. and Kolmer, J. A. 1989. A North American system of nomenclature for *Puccinia recondita* f. sp. *tritici*. Phytopathology 79:525-529). Each test was inoculated in a temperature-controlled dew chamber (15^0C for 18 hours) at the Texas Agricultural Experiment Station at Dallas. Four replicate plants of each variety were grown at each time, inoculated at the 2-leaf stage, and assessed for resistance or susceptibility 12 days after inoculation.

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(*Wheat*)

OBJECTIVE DESCRIPTION OF VARIETY

WHEAT (*Triticum* spp.)

NAME OF APPLICANT(S)

Texas Agricultural Experiment Station

FOR OFFICIAL USE ONLY

PVPO NUMBER 9900062

ADDRESS (*Street and No. or R.F.D. No., City, State, and Zip Code*)

Technology Licensing Office
Texas A&M University System
310 Wisenbaker
College Station, TX 77843-3369

VARIETY NAME

TAM 302

TEMPORARY OR EXPERIMENTAL DESIGNATION

TX91D6913

PLEASE READ ALL INSTRUCTIONS CAREFULLY: Place the appropriate number that describes the varietal character of this variety in the boxes below. Place a zero in the first box (e.g. or) when number is either 99 or less or 9 or less respectively. Data for quantitative plant characters should be based on a minimum of 100 plants. Comparative data should be determined from varieties entered in the same trial. Royal Horticultural Society or any recognized color standard may be used to determine plant colors; designated system used: **Munsell Color Charts 1977**

Please answer all questions for your variety; lack of response may delay progress of your application.

1. KIND:

[1] 1 = Common 2 = Durum 3 = Club 4 = Other (SPECIFY)_____

2. VERNALIZATION:

[2] 1 = Spring 2 = Winter 3 = Other (SPECIFY)_____

3. COLEOPTILE ANTHOCYANIN:

[1] 1 = Absent 2 = Present

4. JUVENILE PLANT GROWTH:

[2] 1 = Prostrate 2 = Semi-erect 3 = Erect

5. PLANT COLOR (boot stage):

[2] 1 = Yellow-Green 2 = Green 3 = Blue-Green

6. FLAG LEAF (boot stage):

[2] 1 = Erect 2 = Recurved [1] 1 = Not Twisted 2 = Twisted

7. EAR EMERGENCE:

[0 2] Number of Days Earlier Than ***Longhorn***

[0 3] Number of Days Later Than ***(Pioneer) 2180***

8. ANTHER COLOR:

[1] 1 = Yellow 2 = Green

9. PLANT HEIGHT (from soil to top of head, excluding awns):

[0 2] cm Taller Than ***(Pioneer) 2180***

[0 3] cm Shorter Than ***Longhorn***

10. STEM:

A. ANTHOCYANIN

[1] 1 = Absent 2 = Present

B. WAXY BLOOM

[1] 1 = Absent 2 = Present

C. HAIRINESS (last internode of rachis)

[2] 1 = Absent 2 = Present

D. INTERNODE (SPECIFY NUMBER) ***First below peduncle***

[1] 1 = Hollow 2 = Semi-solid 3 = Solid

E. PEDUNCLE

[2] 1 = Absent 2 = Present

[10] cm Length

11. HEAD (at Maturity):

A. DENSITY

[2] 1 = Lax 2 = Middense 3 = Dense

B. SHAPE

[1] 1 = Tapering 2 = Strap 3 = Clavate 4 = Other (SPECIFY)_____

C. CURVATURE

[1] 1 = Erect 2 = Inclined 3 = Recurved

D. AWNEDNESS

[4] 1 = Awnless 2 = Apically Awnletted 3 = Awnletted 4 = Awned

12. GLUMES (at Maturity):

A. COLOR

[1] 1 = White 2 = Tan 3 = Other (SPECIFY)_____

B. SHOULDER

[3] 1 = Wanting 2 = Oblique 3 = Rounded 4 = Square 5 = Elevated 6 = Apiculate

C. BEAK

[3] 1 = Obtuse 2 = Acute3 = Acuminate

D. LENGTH

[2] 1 = Short (ca. 7mm) 2 = Medium (ca. 8mm) 3 = Long (ca. 9mm)

E. WIDTH

[2] 1 = Narrow (ca. 3mm) 2 = Medium (ca. 3.5mm) 3 = Wide (ca. 4mm)

13. SEED:

A. SHAPE

[2] 1 = Ovate 2 = Oval 3 = Elliptical

B. CHEEK

[1] 1 = Rounded 2 = Angular

C. BRUSH

[3] 1 = Erect 2 = Recurved 3 = Long

[2] 1 = Not Collared 2 = Collared

D. CREASE

[2] 1 = Width 60% or less of Kernel
2 = Width 80% or less of Kernel

2 = Depth

[2] 1 = Depth 20% or less of Kernel
35% or less of Kernel

6

13. SEED: (continued)

E. COLOR

[3] 1 = White 2 = Amber 3 = Red 4 = Other (SPECIFY)_____

F. TEXTURE

[1] 1 = Hard 2 = Soft

F. PHENOL REACTION (*see instructions*) **NOT DETERMINED**

[ ] 1 = Ivory 2 = Fawn 3 = Light Brown 4 = Dark Brown 5 = Black

14. DISEASE: (0=Not Tested; 1=Susceptible; 2=Resistant; 3=Intermediate; 4=Tolerant)

PLEASE INDICATE THE SPECIFIC RACE OR STRAIN TESTED

Stem Rust (*Puccinia graminis* f. sp. *tritici*)
[2] **QFCQ and RTQQ**

Stripe Rust (*Puccinia striiformis*)
[0]

Tan Spot (*Pyrenophore tritici-repentis*)
[1]

Halo Spot (*Selenophoma donacis*)
[0]

Glume Blotch (*Septoria nodorum*)
[1]

Speckled Leaf Disease (*Septoria avenae*)
[1]

Speckled Leaf Blotch (*Septoria tritici*)
[2]

Scab (*Fusarium* spp.)
[0]

Black Point (Kernel Smudge)
[0]

Barley Yellow Dwarf Virus (BYDV)
[3]

Soilborne Mosaic Virus (SBMV)
[2]

Wheat Yellow (Spindle Streak) Mosaic Virus
[0]

Wheat Streak Mosaic Virus (WSMV)
[3]

Other (SPECIFY)
[ ]

Other (SPECIFY)

Leaf Rust (*Puccinia recondita* f. sp. *tritici*)
[2] **MBRJ, MBBJ and TGBJ**

Loose Smut (*Ustilago tritici*)
[0]

Flag Smut (*Urocystis agropyri*)
[0]

Common Bunt (*Tilletia tritici* or *T. laevis*)
[0]

Dwarf Bunt (*Tilletia controversa*)
[0]

Karnal Bunt (*Tilletia indica*)
[0]

Powdery Mildew (*Erysiphe graminis* f. sp. *tritici*)
[3]

Snow Molds
[0]

Common Root Rot (*Fusarium, Cochliobolus* and *Bipolaris* spp.)
[0]

Rhizoctonia Root Rot (*Rhizoctonia solani*)
[0]

Black Chaff (*Xanthomonas campestris* pv. *translucens*)
[0]

Bacterial Leaf Blight (*Pseudomonas syringae* pv. *syringae*)
[0]

Other (SPECIFY)
[ ]

Other (SPECIFY)
[ ]

Other (SPECIFY)

15. INSECT; (0=Not Tested; 1=Susceptible; 2=Resistant; 3=Intermediate; 4=Tolerant)
PLEASE SPECIFY BIOTYPE (where needed)

Hessian Fly (*Mayetiola destructor*)	2	Great Plains biotype	Other (*SPECIFY*)		
Stem Sawfly (*Cephus spp.*)	0		Other (*SPECIFY*)		
Cereal Leaf Beetle (*Oulema melanopa*)	0		Other (*SPECIFY*)		
Russian aphid (*Diuraphis noxia*)	0		Other (*SPECIFY*)		
Greenbug (*Schizaphis graminum*)	0		Other (*SPECIFY*)	0	
Aphids	0		Other (*SPECIFY*)	0	

16. ADDITIONAL INFORMATION ON ANY ITEM ABOVE, OR GENERAL COMMENTS:

For additional information concerning TAM 302, please see the approved release proposal from the Texas Agricultural Experiment Station given as Exhibit D.

EXHIBIT D
Additional Description of the Variety

Proposal to Release TX91D6913 as an Improved Variety of Hard Red Winter Wheat

David Marshall, R. L. Sutton, W. D. Worrall, M. D. Lazar
L. W. Rooney, M. E. McDaniel, A. K. Fritz, and L. R. Nelson

Origin and Breeding History

The pedigree of TX91D6913 is Probrand 812/Caldwell//TX86D1310. Probrand 812 (PI 486146) was developed and released by the Northrup-King Company as an improved hard red winter wheat variety in 1980, and has the pedigree Olesen's Dwarf/Bison. Caldwell (CI 17897) was developed and released by Purdue University as an improved soft red winter wheat variety in 1981, and has the pedigree P5724B3-5P-8-2*2/Siete Cerros. TX86D1310 is a sister line of TAM 300 (PI 576151), with the pedigree TAM 106/Collin. The cross Probrand 812/Caldwell (WX85D006) was made, and the F_1 plants were grown in the greenhouse at Dallas during the spring and summer of 1985. In the autumn of 1985, seedlings in the F_2 generation were screened for seedling susceptibility to several races of the leaf rust pathogen, *Puccinia recondita* Roberge ex Desmaz. Seedlings that were leaf rust susceptible were screened again with *P. recondita* at the heading stage (adult plants) for reduced infection type (smaller, fewer pustules) and longer latent period (time between inoculation and subsequent sporulation) than fully susceptible adult plants. Heads from plants having adult-plant resistance were selected and grown in the field at Dallas in 1986-87 as individual F_3 head rows. Individual tillers having adult-plant leaf rust resistance were marked in the field in the spring of 1987. Heads from these tillers were harvested and the seed was used to produce plants for crossing in the greenhouse during the fall of 1987. The cross WX85D006-2-17/TX86D1310 (WX87D037) was made in 1987 and the F_1 was grown in the spring 1988 greenhouse. The F_2 population was grown in the field during 1988-89 and several tillers were selected for leaf rust resistance and good agronomic type. The F_3 head rows were grown in the field and selected for good agronomic type and disease resistance in the spring of 1990. Observation plots from these head rows were grown in the field at Prosper, TX during the 1990-91 growing season. One of these plots, TX91D6913 was selected and grown in replicated preliminary trials at Dallas and Prosper in 1991-92. TX91D6913 was entered in the 1992-93 and 1993-94 intrastate Uniform Advanced 1 nursery. In 1994-95, TX91D6913 was entered in the statewide Uniform Wheat Elite nursery. In 1995-96 and 1996-97, TX91D6913 was entered into both the North Texas Wheat Elite and West Texas Wheat Elite nurseries. In

1994-95 and 1995-96, TX91D6913 was tested in the Southern Regional Performance Nursery (SRPN), a USDA-organized nursery with testing sites throughout the Great Plains. A breeders seed block (about 0.3 acre) of TX91D6913 was grown, rogued of off-types, and harvested at Prosper during the 1993-94 growing season. This seed source served for all subsequent seed increases and testing. In 1996-97, approximately 39 acres (two years out of wheat production) at TAES-Dallas were planted to TX91D6913 for Foundation seed production. Approximately 2,000 bushels were produced, harvested by TAES-Foundation Seed Service (TFSS) and conditioned at the TFSS facility in Vernon, TX.

TX91D6913 is an awned, semidwarf, hard red winter wheat with white chaff. It has been shown to be adapted to all of the major wheat growing areas of Texas, as well as the southern Great Plains of the USA. However, TX91D6913 is not recommended for production in south Texas because of its late maturity when tested at Uvalde and Beaumont, and incomplete vernalization in tests conducted at Beeville. The primary features and advantages of TX91D6913 are; (i) High yields; (ii) Resistance to leaf rust; (iii) Good straw, moderate height, with medium-to-late maturity; and (iv) Good, hard red winter wheat quality.

Performance data

Yield and Test Weight. Performance data from individual locations and years are in the Appendix (table of contents for appendix on page 11). Summary data are provided in the following text. In the Uniform Advanced 1 nursery in 1992-93 and 1993-94, TX91D6913 had

Table 1. Yield, agronomic, and disease data of TX91D6913 and check cultivars in the Uniform Advanced 1 nursery in 1993 and 1994 in Texas.*

Entry	Yield (bu/ac)	Test weight (lb/bu)	Heading (days from 1 Jan)	Height (in)	Winter damage (0-9)	Leaf rust (%)	Powdery mildew (0-9)
TX91D6913	50.8 a	56.3 c	111.6 b	27.6 ab	1.5 c	11.6 c	3.0 b
TAM W-101	38.6 c	57.5 b	114.6 a	27.1 ab	3.1 ab	68.6 b	7.3 a
TAM 107	43.4 b	56.6 c	106.0 c	28.5 a	2.2 bc	88.6 a	0.3 c
TAM 200	44.5 b	58.8 a	109.9 b	26.5 b	4.1 a	73.9 b	0.3 c
Mean	44.3	57.3	110.5	27.4	2.4	60.6	2.7
LSD (5%)	3.7	0.8	2.0	1.9	1.1	10.4	1.9
CV (%)	12.6	2.0	1.9	8.8	24.4	15.3	46.0
Location-years	18	18	9	13	3	7	4

** Locations were those where the yield "cv" was 15% or less and the "F" test was significant; in 1993 the locations were Dallas, Prosper, Era, Howe, and McGregor. In 1994 - Dallas, Era, Howe, McGregor, Munday, Tolbert, Wichita Falls, Lockett, Chillicothe, Stinnett, Washburn, and Bushland (dryland and irrigated).*

significantly higher yields than the check cultivars, having a 6.3 bu/ac advantage over TAM 200, 7.4 bu/ac over TAM 107, and 12.2 bu/ac over TAM W-101 (Table 1). The test weight of

TX91D6913 was significantly less than TAM W-101 and TAM 200, but the same as TAM 107 (Table 1). From 1995 to 1997, TX91D6913 was tested in statewide elite trials. In 1996, TAES small grains breeders reorganized elite nursery testing to better reflect regional differences in adaptation and performance of experimental hard wheat lines and cultivars. As a result, three hard wheat elite nurseries were established. The West Texas Elite included those genotypes primarily adapted in the High Plains and Rolling Plains; the North Texas Elite for adaptation primarily in the Blacklands and South-Central areas; and the South Texas Elite for adaptation in South Texas and the Coastal Plains (Figure 1). The testing sites for each of the Elite nurseries were focused primarily in the areas of adaptation, with a reduced amount of testing outside of the primary focus area. Therefore, the check cultivars common to the Uniform Wheat Elite (1995) and North Texas Elite (1996 and 1997) were analyzed separately from those cultivars common to the Uniform Wheat Elite (1995) and West Texas Elite (1996 and 1997). For comparison purposes, 9 of the check cultivars were common to the nurseries in all three years. In the North Texas Elite, over the three years from 1995 to 1997 (19 location-years), TX91D6913 had significantly higher yields than the check cultivars (Table 2). The next highest

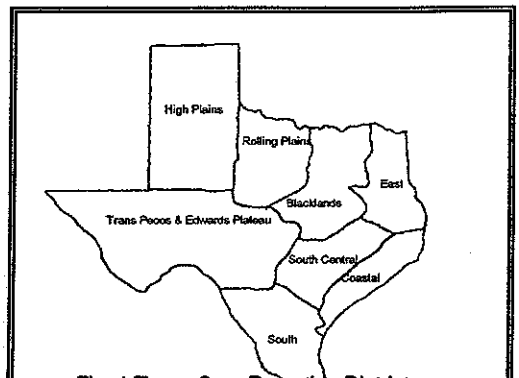

Fig. 1 Texas Crop Reporting Districts

Table 2 Yield, agronomic, and disease data for TX91D6913 and check varieties in the 1995 Uniform Wheat Elite Nursery and the 1996 and 1997 North Texas Elite Nursery.

Entry	Yield (bu/ac)		Test weight (lb/bu)		Heading (days from 1 Jan)		Height (in)		Winter damage (0-9)		Leaf rust (%)		Powdery mildew (0-9)		BYDV (0-9)	
TX91D6913	52.7	a	57.5	e	109.6	ab	29.3	ab	3.8	ef	7.4	f	0.7	d	2.2	b
2163	38.2	f	56.6	f	109.8	ab	27.6	cde	4.4	bcde	44.7	cd	0.4	d	3.4	ab
2180	44.3	cde	59.3	bc	101.5	g	25.7	f	4.8	abc	30.4	de	5.7	a	2.8	ab
Collin	42.2	def	58.4	d	99.8	g	27.4	cde	4.9	abc	66.4	ab	2.8	bc	3.1	ab
Jagger	44.8	bcd	58.1	de	100.5	g	29.1	ab	5.6	a	20.6	ef	5.1	a	3.0	ab
Ogallala	48.5	b	59.9	ab	108.6	bcd	27.1	de	4.3	cde	30.1	de	2.3	bcd	3.4	ab
Sturdy	39.9	f	58.1	de	106.9	cde	29.3	a	4.4	bcde	34.4	de	3.0	b	3.9	ab
TAM W-101	38.3	f	58.2	de	111.4	a	27.5	cde	3.3	f	52.1	bc	7.0	a	5.0	ab
TAM 107	38.6	f	57.6	e	103.7	f	28.1	bcd	3.2	f	76.4	a	1.0	cd	4.5	ab
TAM 200	40.0	f	59.9	ab	106.6	de	26.8	ef	4.7	bcd	72.7	a	0.8	d	5.5	a
TAM 202	46.8	bc	58.6	cd	105.6	ef	27.6	cde	4.4	bcde	43.4	cd	0.8	d	4.1	ab
TAM 300	40.4	ef	60.2	a	108.7	bc	28.6	abc	3.8	ef	21.0	ef	0.7	d	4.3	ab
Mean	42.9		58.8		106.1		27.8		4.4		41.6		2.5		3.8	
LSD (5%)	4.1		0.8		2.0		1.2		0.9		16.2		1.9		3.1	
CV (%)	16.0		2.0		2.3		5.4		11.8		46.0		58.5		37.5	
Location-years	19		19		11		12		3		11		5		2	

** Locations were those where the yield "cv" was 15% or less and the "F" test was significant; in 1995 the locations were Dallas, Prosper, Era, Hillsboro, McGregor, Temple, and College Station; in 1996 - Dallas, Prosper, Era, Windom, College Station, McGregor, Chillicothe, and Bushland; in 1997 - Prosper, Dallas, Temple, and College Station.*

yielding cultivar was TAM 202, with an average yield of 5.9 bu/ac less than TX91D6913. The test weight of TX91D6913 was greater than 2163; the same as Jagger, Sturdy, TAM W-101, and TAM 107; and less than 2180, Collin, Ogallala, TAM 200, TAM 202, and TAM 300 (Table 2).

TX91D6913 and Ogallala were the highest yielding wheats in the West Texas Elite from 1995 to 1997 (Table 3). TX91D6913 yielded an average of 51.8 bu/ac over the 22 location-years of testing, and Ogallala, 49.3 bu/ac. The test weight of TX91D6913 was the same as 2163, Jagger, Longhorn, Sturdy, TAM W-101, TAM 107, TAM 109, TAM 201, and Tomahawk.

Table 3 Yield, agronomic, and disease data for TX91D6913 and check varieties in the 1995 Uniform Wheat Elite Nursery and the 1996 and 1997 West Texas Elite Nursery.

Entry	Yield (bu/ac)		Test weight (lb/bu)		Heading (days from 1 Jan)		Height (in)		Winter damage (0-9)		Leaf rust (%)		Powdery mildew (0-9)		BYDV (0-9)	
TX91D6913	51.8	a	57.3	def	111.4	cd	28.9	b	3.4	abcd	5.6	h	0.7	c	1.8	c
2163	40.6	defg	56.6	f	111.1	cd	28.0	cde	3.7	abc	40.4	bcd	0.0	c	3.8	bc
2180	44.1	cde	59.6	ab	103.9	I	25.4	g	3.9	ab	23.8	efg	5.5	a	2.3	bc
Jagger	45.7	bc	58.0	cde	103.8	I	28.9	bc	4.7	a	15.7	fgh	4.7	ab	3.1	bc
Karl 92	39.9	fg	58.7	abc	106.9	gh	27.7	de	3.0	bcde	71.1	a	0.0	c	3.5	bc
Longhorn	40.1	fg	58.1	cd	113.7	ab	31.1	a	3.7	abc	18.1	fgh	0.2	c	1.8	c
Ogallala	49.3	ab	59.7	a	110.4	de	27.1	ef	3.4	abcd	29.8	def	2.2	bc	3.2	bc
Sturdy	38.7	fg	57.9	cde	109.1	ef	28.8	bc	4.2	ab	34.0	cde	2.2	bc	2.6	bc
TAM W-101	40.4	efg	58.3	cd	112.4	bc	27.5	de	2.2	de	53.8	b	7.2	a	3.8	bc
TAM 107	39.7	fg	57.7	cde	105.8	h	28.2	bcd	2.0	e	79.2	a	0.0	c	4.8	ab
TAM 109	37.9	g	56.6	f	113.6	ab	28.3	bcd	3.9	ab	51.7	b	6.5	a	5.0	ab
TAM 200	41.8	cdef	59.6	ab	108.4	fg	26.5	f	3.7	abc	74.2	a	0.0	c	6.8	a
TAM 201	38.4	fg	57.6	def	101.6	j	25.5	g	4.1	ab	53.7	b	0.0	c	4.5	abc
TAM 202	44.9	c	58.6	bc	107.7	fg	27.5	de	3.5	abc	46.8	bc	0.0	c	3.5	bc
Tomahawk	44.5	cd	57.1	ef	114.4	a	28.4	bcd	3.0	bcde	9.1	gh	0.7	c	4.5	abc
Mean	42.5		58.1		108.9		27.9		3.3		40.5		2.0		3.7	
LSD (5%)	3.9		1.0		1.7		0.9		1.3		15.0		2.5		2.7	
CV (%)	15.4		2.8		2.3		5.5		19.2		46.1		62.3		33.6	
Location-years	22		19		16		22		2		12		4		2	

** Locations were those where the yield "cv" was 15% or less and the "F" test was significant; in 1995 the locations were Washburn, Bushland (dryland and irrigated), Dallas, Prosper, Era, Hillsboro, McGregor, Temple, and College Station; in 1996 - Lockett, Munday, Chillicothe, Prosper, and Bushland (irrigated); in 1997 - Washburn, Bushland (dryland and irrigated), Wichita Falls, Lockett, Munday, and Prosper.*

In order to better delineate the performance of TX91D6913, yield and test weight data from the 1995, 1996, and 1997 Elite nurseries were analyzed by geographic areas of adaptation in the State. Seven check cultivars that were common to all locations and years were compared to TX91D6913 at South-Central, Northern Blackland, Rolling Plains, and High Plains (dryland and irrigated) locations (Table 4). At South-Central Texas locations (Hillsboro, McGregor, Temple, and College Station), TX91D6913 and Ogallala were the highest yielding wheats at 53.2 and 48.8 bu/ac, respectively. At Northern Blackland locations (Dallas, Prosper, Era, Howe, and Windom), TX91D6913 was numerically the highest yielding wheat at 52.1

bu/ac, yet statistically the same as Jagger, Ogallala, and TAM 202 (Table 4). At locations in the Rolling Plains (Lockett, Chillicothe, Munday, Tolbert, and Wichita Falls), there was no statistical difference for yield among the eight wheats. On the High Plains, TX91D6913 was the highest yielding wheat on dryland (Bushland and Washburn), at 31.7 bu/ac (Table 4). In irrigated tests at Bushland, TX91D6913 at 79.8 bu/ac and Ogallala at 78.2 bu/ac yielded significantly higher than the other wheats tested. The test weight of TX91D6913 was generally the same as 2163, Jagger, TAM W-101, and TAM 107, with the exception in the Rolling Plains where TX91D6913 and 2163 had lower test weights of 56.9 and 57.0 lb/bu, respectively.

Table 4 Yield and test weight of TX91D6913 and check varieties in the 1995, 1996, and 1997Elite Nurseries in the South-Central, Northern Blcakland, Rolling Plains, and High Plains areas of Texas.

Entry	South-Central				Northern Blacklands				Rolling Plains				High Plains dryland				High Plains irrigated			
	Yield (bu/ac)		Test weight (lb/bu)		Yield (bu/ac)		Test weight (lb/bu)		Yield (bu/ac)		Test weight (lb/bu)		Yield (bu/ac)		Test weight (lb/bu)		Yield (bu/ac)		Test weight (lb/bu)	
TX91D6913	53.2	a	58.3	b	52.1	a	57.0	bc	47.1	a	56.9	c	31.7	a	61.0	b	79.8	a	59.6	cd
2163	32.1	c	57.4	b	39.9	c	56.1	c	41.0	a	57.0	bc	22.7	bc	58.6	b	71.7	bc	58.0	d
2180	45.9	b	60.3	a	44.0	bc	58.8	ab	42.0	a	60.0	a	19.6	c	62.3	ab	71.9	bc	61.4	abc
Jagger	44.1	b	58.6	b	47.0	ab	57.8	abc	46.6	a	58.8	ab	22.4	bc	60.6	b	71.8	bc	60.3	bc
Ogallala	48.8	ab	60.4	a	48.0	ab	59.6	a	48.9	a	60.0	a	25.9	b	62.9	ab	78.2	ab	62.4	a
TAM W-101	34.9	c	58.6	b	39.2	c	58.1	ab	42.2	a	59.2	a	18.8	c	62.9	ab	69.9	c	61.5	abc
TAM 107	32.2	c	57.5	b	40.0	c	57.5	bc	43.0	a	58.9	ab	22.6	bc	62.4	ab	69.5	c	61.1	abc
TAM 202	45.8	b	58.7	b	47.8	ab	58.3	ab	47.2	a	59.4	a	22.9	bc	63.9	a	71.2	c	61.8	ab
Mean	42.1		58.7		44.8		57.9		44.7		58.8		23.3		61.8		73.0		60.8	
LSD (5%)	7.1		1.4		5.6		1.9		8.4		1.8		4.9		1.2		7.0		2.0	
CV (%)	16.8		2.2		13.3		3.5		16.1		2.9		14.4		1.9		6.5		1.4	

In the 1994-95 and 1995-96 Southern Regional Performance Nursery, TX91D6913 was compared to three check cultivars (TAM 107, Scout 66, and Kharkof) and to 41 experimental lines and hybrids from public and private wheat breeding programs throughout the Great Plains (Table A29). TX91D6913 ranked second in yield over all 28 testing locations, just 0.9 bu/ac less than the highest yielding entry, AP7510, a hybrid wheat from Agripro Seeds Inc. In that nursery, TX91D6913 had higher yields than other experimental lines and hybrids that have since been released for commercial production (AP7501, 2174, Quantum 7406, 2137, Rowdy, Platte, Oro Blanco, and Coronado). The combined yield and ranking for the two years of testing in the SRPN for the checks and experimental lines common to both years showed that TX91D6913 ranked first in Texas, Colorado, and New Mexico; second in Oklahoma; and third in Kansas (Table 5).

Table 5 Yield and rank of TX91D6913, checks, and experimental lines and hybrids in the 1994-95 and 1995-96 Southern Regional Performance Nursery.

Entry	Texas		Oklahoma		Colorado		New Mexico		Kansas		Region	
AP7510	52.3	5	50.8	3	70.3	2	68.1	6	52.4	1	58.1	1
TX91D6913	56.0	1	51.7	2	71.0	1	71.1	1	44.3	3	56.8	2
OK91P648	55.1	3	49.2	7	68.6	7	66.6	7	47.2	2	55.4	3
HBI0531-A2	52.3	6	49.7	5	68.8	6	68.5	5	42.5	10	54.8	4
TX91D6991	55.3	2	53.3	1	69.2	4	70.1	4	40.0	13	53.4	5
T702	53.7	4	44.4	14	67.8	8	70.7	2	41.9	12	53.0	6
TX93V5919	49.5	15	47.5	8	65.0	11	62.1	10	42.6	9	52.2	7
OK93P735	51.5	9	45.0	12	67.4	9	58.6	12	44.1	4	51.9	8
T812	50.8	12	44.4	13	69.2	5	54.3	17	43.5	7	51.5	9
TX93V5922	49.8	14	45.0	11	60.5	16	56.6	15	43.6	6	50.3	10
NE92646	49.9	13	46.7	9	60.8	15	52.3	19	43.4	8	50.1	11
NE92458	52.0	7	50.2	4	62.5	13	64.2	9	35.8	17	50.0	12
T834	45.8	21	43.4	16	70.3	3	57.8	14	39.2	14	50.0	13
TX92V3108	51.0	10	45.8	10	61.1	14	50.5	20	42.3	11	49.9	14
T861	51.7	8	49.4	6	66.1	10	66.4	8	33.0	19	49.6	15
KS93U206	46.4	19	41.6	18	56.6	19	53.5	18	44.0	5	48.7	16
TX92V2519	48.4	17	39.9	21	58.7	18	55.1	16	38.1	15	47.5	17
TX93V4927	51.0	11	43.8	15	55.1	21	49.1	21	37.0	16	46.2	18
NE90476	46.8	18	41.1	19	64.5	12	70.3	3	28.7	22	45.8	19
KS91H153-2	48.8	16	40.7	20	55.8	20	60.3	11	33.2	18	45.6	20
TAM 107	46.4	20	41.9	17	59.3	17	58.3	13	32.2	20	44.9	21
Scout 66	45.5	22	34.2	22	41.9	22	47.6	22	31.1	21	39.2	22
Kharkof	32.7	23	24.4	23	37.5	23	39.0	23	26.1	23	31.5	23
Mean	49.7		44.5		62.1		59.6		39.4		49.4	
LSD (5%)	9.3		11.3		ns		ns		ns		14.8	
CV (%)	8.9		9.9		14.4		16.8		11.5		13.9	
Location-years	6		6		6		4		8		30	

Heading, Height, Winter Hardiness and other agronomic data. TX91D6913 reaches the heading stage at about the same time as 2163, Ogallala, TAM W-101, and TAM 300 (Tables 2 and 3). TX91D6913 is about 7-to-8 days latter than 2180, about 6 days later than TAM 107, and about 4 days later than TAM 202. TX91D6913 is about 2 days earlier than Longhorn and about 3 days earlier than Tomahawk. These heading dates make TX91D6913 a medium-to-late maturing cultivar. TX91D6913 averaged about 28-to-29 inches in height, which is about the same as Jagger, Sturdy, TAM 107, TAM 109, and Tomahawk (Tables 2 and 3). Lodging has not been a problem with TX91D6913. Lodging notes were taken at McGregor in 1993 (Table A2), Bushland in 1994 (Table A7), Dallas, Hillsboro, and Munday in 1995 (Table A12), SRPN locations of Farmington, NM, Hutchinson, Manhattan, and Colby, KS, and Burlington, CO (summary in Table A29), and Bushland in 1997 (Table A28). Shattering was measured on the SRPN entries in 1995 at Chillicothe, TX, and TX91D6913 had much less shattering than most of the other wheats in the test (Table A29). TX91D6913 has good winter hardiness, similar to 2163, Ogallala, TAM W-101, and TAM 202 (Tables 2 and 3). Data from the SRPN in 1995 and 1996 (provided by B. F. Carver) indicated that TX91D6913 has a good level of tolerance to acid soils (data not shown).

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Disease and Insect Reactions. TX91D6913 was developed and selected from germplasm bred for increased adult-plant resistance to leaf rust. Leaf rust percentages were averaged

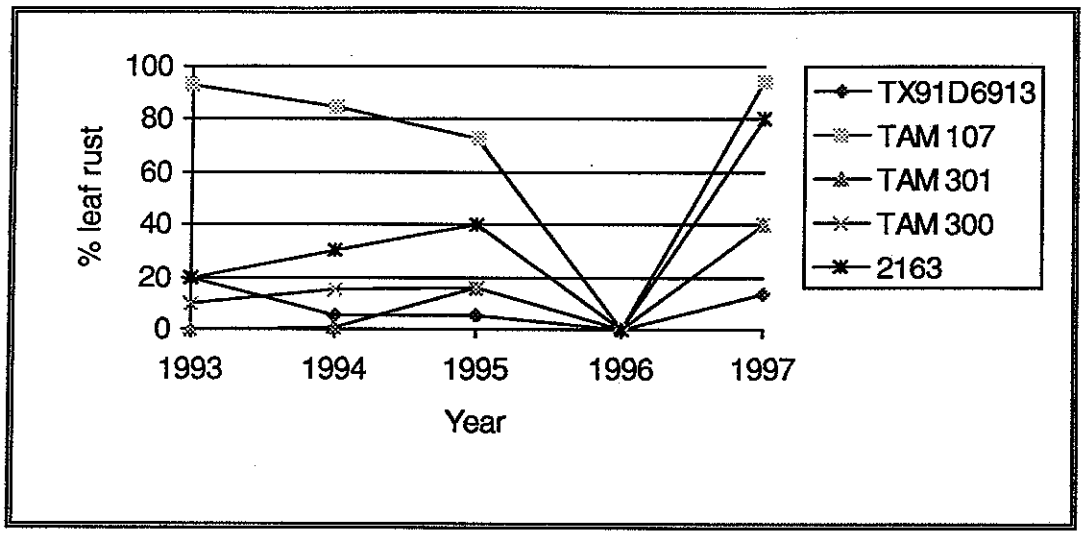

Fig. 2. Change in amount of leaf rust on five wheat cultivars in Texas from 1993 to 1997.

over several locations for the five year period from 1993 to 1997 for the cultivars TAM 107, TAM 301, TAM 300, 2163, and TX91D6913 (Figure 2). In 1996, leaf rust was virtually absent in Texas, as well as the rest of the Great Plains. In 1993 and in 1997, there were significant changes in the virulence frequency of leaf rust races. TAM 107, which is susceptible to nearly all races of leaf rust in Texas, had average leaf rust severities greater than 90% in 1993 and 1997, about 85% in 1994, and about 73% in 1995 (Figure 2). TAM 301 remained resistant to the leaf rust population after the 1993 shift, but partially succumbed to several new races in 1997, resulting in a 40% severity. TAM 300 went from 10% in 1993, to about 15% in 1994 and 1995, then to about 40% in 1997. On 2163, leaf rust severity increased from 20% in 1993, to 30% in 1994, to 40% in 1995, then to 80% in 1997. The leaf rust severity on TX91D6913 was about 20% in 1993, 5% in 1994 and 1995, then about 15% in 1997 (Figure 2). Thus, the adult-plant resistance present in TX91D6913 appears to have been effective in reducing leaf rust severity through two virulence shifts in the pathogen. The seedling resistance genes, *Lr3a* and *Lr16* may be present in TX91D6913, but other leaf rust resistance genes in TX91D6913 tend to modify the seedling reaction in controlled tests (Table A31).

The powdery mildew resistance in TX91D6913 is good, similar to 2163, Ogallala, and TAM 300 (Tables 2 and 3). TX91D6913 tends to exhibit fewer symptoms of barley yellow

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dwarf than other wheat cultivars, although BYD symptoms are difficult to quantify due to high levels of variation of the disease in a field (Tables 2 and 3). TX91D6913 appears to be susceptible-to-moderately susceptible to *Septoria tritici* (Tables A3 and A14) and moderately susceptible-to-moderately resistant to *Septoria nodorum* (Tables A8, A14, and A24). TX91D6913 appears to have a good level of resistance to stem rust, although the specific *SR* genes involved are not known (SRPN data from the USDA Cereal Rust Lab). From SRPN data provided by R. Hungar, TX91D6913 appears to be resistant to soilborne mosaic virus, moderately resistant to wheat streak mosaic virus, and susceptible to tan spot. The reaction of TX91D6913 to greenbug is unknown. From SRPN data provided by J. Hatchett, TX91D6913 is resistant to the Great Plains biotype of Hessian fly.

Milling and Baking Quality. Because TX91D6913 tends to have a somewhat reduced test weight under certain conditions, and because its immediate lineage contains a soft wheat cultivar, it was important to determine the milling and baking quality of the line. In 1993 and 1995, tests conducted at the Cereal Quality Lab, Texas A&M University indicated that TX91D6913 tended to have a high proportion of large-sized grain, and the grain classified as "hard" wheat (Table A32 and Table 6). The flour yield for TX91D6913 was 69.8% in 1993 and 60.2% in 1995, compared to the standard quality hard wheat, TAM W-101 which had 69.0% in 1993 and 65.4% in 1995 (Table 6). The dough mixing time, proof height and loaf volume were all comparable to TAM W-101 (Table 6). Further details of the 1993 and 1995 data are present in Appendix Tables A32-A37.

Table 6. Grain, flour, and baking comparison of TX91D6913 and TAM W-101 in 1993 and 1995.

	*Hardness score (SKWCS)**		*Flour yield (%)*		*Flour protein (%)*		*Dough mix time (min:sec)*		*Proof height (cm)*		*Loaf volume (cc)*	
Cultivar	*1993*	*1995*	*1993*	*1995*	*1993*	*1995*	*1993*	*1995*	*1993*	*1995*	*1993*	*1995*
TX91D6913	76	80	69.8	60.2	10.4	9.6	3:76	2:33	7.1	7.8	830	850
TAM W-101	80	77	69.0	65.4	10.3	9.1	3:87	2:33	6.9	7.9	825	835

**Hardness score by Single Kernel Wheat Classification System (SKWCS), where the higher the value, the harder the grain.*

In 1995 and 1996, the USDA Hard Winter Wheat Quality Lab in Manhattan, KS conducted extensive quality testing on all the entries in the 1995 and 1996 SRPN. These data are summarized in Tables A38-A43 for TX91D6913, the check cultivars, and the experimental lines that have since become commercially released cultivars and hybrids. Also, the data are separated into grain produced at locations in the South-Central Plains (1995 - Hays, KS, Altus and Goodwell (irr), OK, Prosper, TX; 1996 - Hays, Hutchinson, and Wichita, KS, Lahoma,

Stillwater, and Goodwell (irr), OK, Prosper, Chillicothe, and Bushland (irr), TX). Southern High Plains (1995 - Walsh, CO and Clovis, NM; 1996 - Clovis, NM and Bushland (dry), TX). North-Central Plains (1995 - Ames. IA, Manhattan, KS, Clay Center, NE, Pierre and Winner, SD; 1996 - Pierre, SD and Manhattan, KS); and Northern High Plains (1995 - Akron, Burlington, Fort Collins, CO, Colby, KS, Sidney, NE; 1996 - Akron, Burlington, Fort Collins, CO, Sidney, Hemingford, NE, Colby, KS). Kernel sizing data indicated that TX91D6913 usually produced a higher proportion of large kernels rather than middle or small sized kernels (Tables A38 and A41). Hardness scores determined by both the single kernel wheat classification system and by NIR showed that TX91D6913 has kernels as hard or harder than the checks and other hard wheat cultivars and hybrids (Tables A38 and A41). Both grain and flour protein were as good or higher than the checks, hybrids, and other cultivars (Tables A39 and A42). Flour yield ranged from about 62 to 68%, similar to other entries in the tests. The milling scores and color values of flour from TX91D6913 were indicative of a good quality hard wheat flour. Baking data (Tables A40 and A43) showed TX91D6913 to have a slightly short dough mixing time, good proof height, good crumb grain and good loaf volume.

Justification for Release. High yields and leaf rust resistance are key characteristics needed for hard wheat cultivars in the southern Great Plains of the USA. TX91D6913 has both of these characteristics, as well as having other good agronomic properties, disease and insect resistance, and good hard wheat quality. Performance data for TX91D6913 indicated that it can compete with and often have grain yields higher than the best commercially available hard wheat cultivars and hybrids from both public and private breeding programs. TX91D6913 is well adapted to all the major wheat producing areas of Texas north of the 30^0 parallel.

Proposed Name and Seed. We recommend that TX91D6913 be named "TAM 302". This cultivar would be the fourth hard red winter wheat following Collin, TAM 300, and TAM 301 developed primarily at TAES-Dallas, since 1985. If approved for release, an application for protection of TAM 302 should be sought under a Certificate of Plant Variety Protection with Title V of the USA Federal Seed Act. Approximately 90,000 pounds of foundation seed of TAM 302 is presently stored at Texas A&M Foundation Seed Service in Vernon, TX.

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TAM 302 Hard Red Winter Wheat

Merits

- High yields in Texas and the southern Great Plains
- Good protection to leaf rust
- Good protection to powdery mildew, barley yellow dwarf, soilborne mosaic virus, wheat streak mosaic virus and the Great Plains biotype of Hessian fly.
- Good hard red winter wheat quality

Limitations

- Occasional low test weight
- Not for use in south Texas (approximately at and below the 30^0 parallel)

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APPENDIX TABLE OF CONTENTS

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Table A1. Yield and test weight of TX91D6913 and check cultivars in the Uniform Advanced 1 trial in Texas in 1993.

Cultivar	Yield (bu/acre)						Test weight (lb/bu)					
	DAL	PRO	ERA	HOW	MCG	5 location average	DAL	PRO	ERA	HOW	MCG	5 location average
TX91D6913	48.3	73.6	59.9	59.4	72.9	62.8 a	50.2	54.1	53.2	53.7	55.1	53.3 bc
Siouxland 89	34.0	64.4	34.9	56.8	65.4	51.1 b	53.4	54.6	53.3	54.8	58.9	55.0 a
TAM W-101	21.0	56.2	39.9	44.9	39.6	40.3 c	50.4	55.2	53.1	54.2	56.6	53.9 ab
TAM 107	35.1	59.5	35.7	52.9	58.7	48.4 bc	47.8	53.7	52.3	52.4	54.9	52.2 c
TAM 200	22.5	68.7	45.6	52.5	46.2	47.1 bc	48.5	55.5	53.9	53.0	55.3	53.2 bc
Test Mean	42.5	65.9	45.8	55.6	64.8	49.9	50.8	55.1	53.4	54.5	56.3	53.5
LSD (5%)	14.8	6.9	7.1	10.4	12.1	8.3	--	--	--	--	--	1.4
CV (%)	13.7	6.4	7.9	9.3	11.5	12.5	--	--	--	--	--	1.9

Location abbreviations are DAL=Dallas, PRO=Prosper, ERA=Era, HOW=Howe and MCG=McGregor.

Table A2. Heading, height, and lodging of TX91D6913 and check cultivars in the Uniform Advanced 1 trial in Texas in 1993.

Cultivar	Heading (days from 1 Jan)			Height (inches)			Lodging	
	DAL	PRO	2 location average	DAL	MCG	2 location average	DAL (0-9)	MCG (%)
TX91D6913	106	108	107.5 b	36	41	38.5 ab	1.3	45
Siouxland 89	108	109	108.5 b	40	42	41.0 a	0.0	30
TAM W-101	113	116	114.5 a	34	36	35.0 c	0.0	60
TAM 107	100	103	101.5 d	38	40	39.0 ab	0.0	30
TAM 200	102	106	104.0 c	35	38	36.5 bc	1.3	95
Test Mean	103	108	107.1	38	39.4	38.0	1.2	52.0
LSD (5%)	1.6	1.9	2.2	3.0	--	2.6	2.3	--
CV (%)	0.9	1.3	0.8	5.0	--	2.4	17.4	--

Location abbreviations are DAL=Dallas, PRO=Prosper, and MCG=McGregor.

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Table A3. Leaf rust, Septoria tritici, powdery mildew, and BYDV reactions of TX91D6913 and check cultivars in the Uniform Advanced 1 trial in Texas in 1993.

	Leaf rust (percent and infection type)								Septoria tritici (0-9)	Powdery mildew (0-9)	BYDV (0-9)
Cultivar	DAL		HOW		MCG		3 location average		MCG	DAL	DAL
TX91D6913	25	MS-MR	30	MS	5	MS	20.0	b	4	4.0	1.3
Siouxland 89	100	S	80	S	70	S	83.3	a	3	0.0	3.0
TAM W-101	100	S	90	S	40	S	76.7	a	5	6.3	1.7
TAM 107	100	S	100	S	80	S	93.3	a	6	0.0	2.0
TAM 200	97	S	100	S	50	MS	82.3	a	4	0.0	3.7
Test Mean	58		80		49		71.1		4.4	2.4	2.3
LSD (5%)	18						21.0		--	1.6	2.3
CV (%)	9.4						15.7		--	7.5	62.9

Location abbreviations are DAL=Dallas, PRO=Prosper, MCG=McGregor, and HOW=Howe. Leaf rust infection types are: none = no visible reaction, F= fleck, R = resistant (very small pustules), MR = moderately resistant (small pustules), MS = moderately susceptible (medium size pustules), and S = susceptible (large pustules).

Table A4. Yield of TX91D6913 and check cultivars in the Uniform Advanced 1 nursery in Texas in 1994.

Cultivar	Yield (bu/acre)													
	DAL	ERA	HOW	MCG	STI	WAS	BUSD	BUSI	MUN	TOL	WIC	LOC	CHI	13 location average
TX91D6913	39.1	61.6	45.4	65.8	31.7	12.2	41.5	94.0	36.7	43.0	30.4	56.7	42.7	46.2 a
2163	44.6	48.3	46.8	47.5	28.5	11.7	30.0	84.1	32.9	38.2	28.8	50.4	33.8	40.4 bc
TAM W-101	26.8	44.9	41.4	43.6	29.1	11.9	35.3	91.3	27.0	38.3	32.4	40.5	30.7	37.9 c
TAM 107	35.8	45.7	40.5	48.8	29.0	12.6	31.2	96.8	48.3	36.6	27.6	47.7	39.3	41.5 bc
TAM 200	34.5	50.4	43.9	53.4	37.3	11.5	37.4	98.8	40.4	44.3	33.0	44.5	35.9	43.5 ab
Test Mean	40.6	54.0	43.8	56.8	31.1	12.0	35.1	93.0	37.1	40.1	30.4	48.0	36.5	41.9
LSD (5%)	6.1	7.9	6.5	6.9	--	--	--	--	--	--	--	--	--	3.6
CV (%)	9.2	9.1	9.1	5.4	--	--	--	--	--	--	--	--	--	10.8

Location abbreviations are DAL=Dallas, ERA=Era, HOW=Howe, MCG=McGregor, STI=Stinnett, WAS=Washburn, BUSD=Bushland (dry), BUSI=Bushland (irrigated), MUN=Munday, TOL=Tolbert, WIC=Wichita Falls, LOC=Lockett, and CHI=Chillicothe.

Table A5. Test weight of TX91D6913 and check cultivars in the Uniform Advanced 1 nursery in Texas in 1994.

Cultivar	Test weight (lb/bu)													
	DAL	ERA	HOW	MCG	STI	WAS	BUSD	BUSI	MUN	TOL	WIC	LOC	CHI	13 location average
TX91D6913	55.0	56.9	56.6	57.9	58.0	61.3	58.6	58.8	55.7	57.9	56.1	56.6	58.5	57.5 cd
2163	55.2	56.2	56.3	54.9	59.0	58.4	59.2	57.7	54.0	59.4	54.8	54.7	57.4	56.7 d
TAM W-101	56.5	56.5	56.3	56.1	61.4	61.7	60.0	61.2	58.2	59.9	59.2	57.4	60.9	58.8 b
TAM 107	56.9	56.1	56.7	55.3	60.0	60.5	60.2	60.5	57.8	58.8	59.2	57.8	58.3	58.3 bc
TAM 200	59.5	59.5	56.5	57.9	63.9	61.8	63.2	61.7	59.4	62.4	61.8	60.7	63.5	60.9 a
Test Mean	57.7	57.8	57.3	56.5	60.5	60.7	60.2	60.0	57.0	59.7	58.2	57.4	59.7	58.4
LSD (5%)	--	--	--	--	--	--	--	--	--	--	--	--	--	0.8
CV (%)	--	--	--	--	--	--	--	--	--	--	--	--	--	1.8

Location abbreviations are DAL=Dallas, ERA=Era, HOW=Howe, MCG=McGregor, STI=Stinnett, WAS=Washburn, BUSD=Bushland (dry), BUSI=Bushland (irrigated), MUN=Munday, TOL=Tolbert, WIC=Wichita Falls, LOC=Lockett, and CHI=Chillicothe.

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Table A6. Height of TX91D6913 and check cultivars in the Uniform Advanced 1 nursery in Texas in 1994.

Cultivar	Height (inches)											
	DAL	STI	WAS	BUSD	BUSI	MUN	TOL	WIC	LOC	CHI	OVR	11 location average
TX91D6913	29	20	18	26	34	21	23	20	30	27	34	26 ab
2163	29	21	16	24	33	22	27	21	33	26	32	26 ab
TAM W-101	26	24	15	25	33	22	26	21	32	22	36	26 ab
TAM 107	31	22	16	25	33	24	23	22	33	26	37	27 a
TAM 200	26	20	15	24	32	27	25	21	32	26	23	25 b
Test Mean	30	21	16	25	33	23	25	21	32	25	32	26
LSD (5%)	--	--	--	--	--	--	--	--	--	--	--	2.3
CV (%)	--	--	--	--	--	--	--	--	--	--	--	10.1

Location abbreviations are DAL=Dallas, STI=Stinnett, WAS=Washburn, BUSD=Bushland (dry), BUSI=Bushland (irrigated), MUN=Munday, TOL=Tolbert, WIC=Wichita Falls, LOC=Lockett, CHI=Chillicothe and OVR=Overton.

Table A7. Heading, lodging, and winter damage of TX91D6913 and check cultivars in the Uniform Advanced 1 nursery in Texas in 1994.

Cultivar	Heading (days from 1 Jan)								Lodging (%)	Winter damage (0-9)			
	DAL	PRO	HOW	BUSD	BUSI	LOC	CHI	7 location average	BUSI	DAL	MCG	HOW	3 location average
TX91D6913	101	107	103	130	128	111	110	112.9 b	20	2.0	0	2.5	1.5 c
2163	100	105	102	129	126	109	110	111.6 b	0	1.2	0	2.7	1.3 c
TAM W-101	107	111	105	131	124	113	111	114.6 a	30	4.7	1	3.7	3.1 ab
TAM 107	96	102	98	128	120	104	103	107.3 c	17	3.5	0	3.0	2.2 bc
TAM 200	100	105	102	130	126	109	109	111.6 b	37	5.0	2	5.2	4.1 a
Test Mean	99	104	99	130	125	109	109	111.6	21	4.2	1	4.1	2.4
LSD (5%)	1.9	1.3	0.9	--	--	--	--	1.7	--	1.3	--	1.4	1.1
CV (%)	1.2	2.0	1.1	--	--	--	--	1.4	--	19.6	--	12.4	24.4

Location abbreviations are DAL=Dallas, PRO=Prosper, HOW=HOWE, BUSD=Bushland (dry), BUSI=Bushland (irrigated), MUN=Munday, LOC=Lockett, CHI=Chillicothe and MCG=McGregor.

Table A8. Leaf rust, powdery mildew and *Septoria nodorum* blotch of TX91D6913 and check cultivars in the Uniform Advanced 1 nursery in Texas in 1994.

Cultivar	Leaf rust (percent and infection type)										Powdery mildew (0-9)				Septoria nodorum (0-9)
	DAL		MCG		BVL		LOC		4 location average		DAL	LOC	OVR	3 location average	OVR
TX91D6913	1	MR	10	R	0	F	10	MS	5.3	d	0	6	2	2.7 b	2
2163	30	MS	40	MS	40	S	10	S	30.0	c	0	1	0	0.3 c	2
TAM W-101	60	S	60	S	70	S	60	S	62.5	b	8	8	7	7.7 a	3
TAM 107	90	S	100	S	70	S	80	S	85.0	a	0	1	0	0.3 c	4
TAM 200	70	S	70	S	50	MS	80	S	67.5	b	0	1	0	0.3 c	3
Test Mean	34		56		34		48		50.0		1.8	3.4	1.4	2.3	3
LSD (5%)	--		--		--		--		17.0		--	--	--	2.3	--
CV (%)	--		--		--		--		22.0		--	--	--	53.1	--

Location abbreviations are DAL=Dallas, MCG=McGregor, BVL=Beeville, LOC=Lockett, and OVR=Overton. Leaf rust infection types are: none = no visible reaction, F= fleck, R = resistant (very small pustules), MR = moderately resistant (small pustules), MS = moderately susceptible (medium size pustules), and S = susceptible (large pustules).

Table A9. Yield of TX91D6913 and check cultivars in the Uniform Wheat Elite nursery at ten in Texas in 1995.

Cultivar	DAL	PRO	ERA	HIL	MCG	TEM	COL	North-Central Texas average		WAS	BUSD	BUSI	High Plains average		10 location average	
TX91D6913	30.3	53.9	39.1	49.0	67.7	42.6	62.1	49.2	a	11.2	31.7	93.7	45.5	a	48.1	a
2163	30.5	48.3	33.8	35.1	41.8	26.3	18.9	33.5	fghij	6.2	12.7	84.7	34.5	cdef	33.8	efgh
2180	34.8	45.9	30.9	50.1	52.6	39.3	44.7	42.6	abcd	5.3	7.1	82.9	31.8	cdef	39.4	bcde
Collin	24.7	51.2	35.6	47.7	51.0	42.2	54.5	43.8	abcd	6.2	11.9	77.1	31.7	cdef	40.2	bcd
Jagger	26.9	50.4	34.9	33.2	57.9	38.6	52.6	42.1	bcde	6.4	10.7	88.9	35.3	cdef	40.1	bcde
Karl 92	21.9	40.6	31.6	33.7	37.4	18.4	32.2	30.8	hijk	1.5	3.1	86.6	30.4	def	30.7	ghi
Larned	14.9	36.7	36.6	16.4	27.7	28.4	22.9	26.2	kl	10.8	10.9	85.5	35.7	cdef	29.1	hi
Longhorn	19.6	28.6	34.9	20.6	37.8	22.0	38.6	27.4	jkl	7.0	16.5	82.4	35.3	cdef	30.8	ghi
Ogallala	33.1	50.8	35.5	36.4	67.6	37.2	57.4	45.4	abc	11.1	17.5	86.9	38.5	abc	43.4	abc
RSI 220	22.5	37.3	35.2	35.4	53.8	38.2	52.7	39.3	cdef	--	--	--	--		--	
Siouxland 89	18.5	32.3	26.5	18.2	25.9	13.5	31.0	23.7	l	10.5	18.1	75.9	34.8	cdef	27.0	l
Sturdy	28.6	44.8	34.5	29.7	50.6	35.2	40.1	37.6	defg	4.8	11.9	72.8	29.8	ef	35.3	defgh
TAM W-101	15.3	40.1	36.1	21.9	44.5	24.9	43.6	32.3	ghijk	8.5	7.2	84.9	33.5	cdef	32.7	fghi
TAM 105	9.3	35.8	32.9	13.1	33.2	20.7	20.7	23.7	l	15.8	27.6	93.7	45.7	a	30.3	ghi
TAM 107	15.6	46.5	28.6	19.3	40.5	13.7	34.8	28.4	ijkl	6.8	13.9	78.8	33.2	cdef	29.9	ghi
TAM 109	7.2	38.2	38.3	16.4	45.6	16.0	37.8	28.5	ijkl	11.0	17.0	86.8	38.3	bc	31.4	fghi
TAM 110	--	--	--	--	--	--	--	--		9.0	13.7	89.3	37.3	bcd	--	
TAM 200	15.3	44.3	39.2	13.6	42.6	27.4	37.2	31.4	ghijk	12.8	23.6	94.9	43.8	ab	35.1	defgh
TAM 201	16.7	36.5	33.2	21.8	47.1	40.7	48.6	34.9	fghi	6.0	10.4	90.8	35.7	cdef	35.2	defgh
TAM 202	20.9	44.5	37.3	25.4	62.0	28.6	48.4	38.2	defg	8.9	12.8	83.9	35.2	cdef	37.3	cdef
TAM 300	29.0	45.2	35.5	35.5	47.5	22.5	45.8	37.3	defgh	7.1	11.4	67.4	28.6	f	34.7	defgh
TAM 301	42.6	57.1	37.7	50.2	68.5	32.8	51.3	48.6	ab	10.7	14.2	81.8	35.6	cdef	44.7	ab
Thunderbird	22.4	42.5	36.7	29.6	46.4	29.1	36.0	34.7	fghi	12.5	15.5	83.3	37.1	bcd	35.4	defg
Tomahawk	23.2	36.3	34.1	30.4	56.5	20.3	47.4	35.6	efgh	8.9	10.9	89.2	36.3	cde	35.7	defg
Test Mean	24.9	44.7	34.6	32.5	49.3	30.3	43.1	35.6		8.2	13.9	86.6	35.8		35.5	
LSD (5%)	5.8	6.1	10.0	7.5	8.5	13.0	13.3	6.8		3.5	4.7	9.0	7.2		6.3	
CV (%)	11.3	8.4	17.8	12.2	10.7	26.6	19.1	18.1		26.3	20.7	6.4	12.3		20.1	

Location abbreviations are DAL=Dallas, PRO=Prosper, ERA=Era, HIL=Hillsboro, MCG=McGregor, TEM=Temple, COL=College Station, WAS=Washburn, BUSD=Bushland (dry),and BUSI=Bushland (irrigated).

Table A10. Test weight of TX91D6913 and check cultivars in the Uniform Wheat Elite nursery in Texas in 1995.

Cultivar	DAL	PRO	ERA	HIL	MCG	TEM	COL	North-Central Texas average		BUSD	BUSI	High Plains average		9 location average	
TX91D6913	55.9	57.6	55.5	55.8	59.3	56.1	59.9	57.2	defg	56.8	58.3	57.5	bcdef	57.2	cdefg
2163	54.7	56.7	54.1	52.8	59.9	56.3	57.8	56.0	ghij	54.2	57.5	55.9	ef	56.0	ghijk
2180	56.2	59.2	57.2	58.1	61.8	59.2	61.5	59.0	ab	55.6	60.5	58.0	bcdef	58.8	ab
Collin	57.8	57.5	55.5	54.2	57.8	56.7	60.0	57.1	defg	53.8	59.4	56.6	def	57.0	efghi
Jagger	53.2	57.0	55.4	55.3	58.7	56.6	58.3	56.4	fghi	56.2	60.0	58.1	bcdef	56.7	fghij
Karl 92	53.9	58.5	57.3	56.5	60.5	57.4	60.5	57.8	bcde	51.5	59.8	55.7	f	57.3	cdef
Larned	55.8	59.3	56.7	52.6	59.6	54.8	58.1	56.7	defgh	57.2	60.8	59.0	abcd	57.2	defgh
Longhorn	53.5	57.9	55.1	52.4	59.8	56.7	60.4	56.5	efgh	57.1	60.8	58.9	abcd	57.1	efghi
Ogallala	56.4	60.3	56.8	54.7	61.9	59.1	60.9	58.6	abc	57.3	62.0	59.6	ab	58.7	ab
RSI 220	53.7	58.6	57.8	55.8	61.0	56.8	61.7	57.9	bcd	--	--	--		--	
Siouxland 89	53.9	58.4	57.8	53.2	60.5	58.4	60.8	57.6	cdef	56.4	59.4	57.9	bcdef	57.6	bcdef
Sturdy	54.8	58.5	56.2	52.5	60.2	57.4	59.2	57.0	defg	53.7	57.6	55.6	f	56.7	fghij
TAM W-101	54.1	60.3	56.3	50.9	59.5	57.8	59.0	56.8	defg	53.9	60.1	57.0	cdef	56.9	efghi
TAM 105	48.1	57.2	54.6	49.6	58.4	54.3	56.1	54.0	k	58.5	59.8	59.1	abc	55.2	k
TAM 107	51.7	56.8	55.9	49.6	59.4	55.8	57.0	55.2	ijk	57.5	59.8	58.6	abcd	55.9	hijk
TAM 109	48.9	58.0	55.0	50.3	59.2	57.5	59.5	55.5	hij	54.3	60.5	57.4	bcdef	55.9	ijk
TAM 110	--	--	--	--	--	--	--	--		57.8	59.9	58.8	abcd	--	
TAM 200	55.8	59.1	57.5	53.5	60.2	58.9	60.0	57.9	bcd	59.6	62.1	60.8	a	58.5	abc
TAM 201	51.4	54.8	53.8	50.6	59.0	56.8	58.4	55.0	jk	55.6	59.8	57.7	bcdef	55.6	jk
TAM 202	53.7	57.8	55.5	53.4	59.7	57.9	59.8	56.8	defg	56.7	59.7	58.2	bcde	57.1	efghi
TAM 300	58.3	60.2	57.8	56.7	61.4	58.5	62.9	59.4	a	56.4	61.5	58.9	abcd	59.3	a
TAM 301	59.1	58.7	56.6	56.5	61.1	57.9	60.7	58.7	abc	54.9	60.8	57.8	bcdef	58.5	abcd
Thunderbird	56.3	59.1	56.7	54.1	60.1	57.5	61.2	57.9	bcd	57.0	60.9	58.9	abcd	58.1	abcde
Tomahawk	53.0	57.4	54.5	55.0	60.2	55.9	57.5	56.2	ghij	56.1	60.2	58.1	bcde	56.6	fghij
Test Mean	54.7	58.0	56.2	53.9	59.8	57.4	59.8	57.0		56.0	60.0	58.0		57.2	
LSD (5%)	--	--	--	--	--	--	--	1.3		--	--	2.5		1.3	
CV (%)	--	--	--	--	--	--	--	2.2		--	--	2.0		2.4	

Location abbreviations are DAL=Dallas, PRO=Prosper, ERA=Era, HIL=Hillsboro, MCG=McGregor, TEM=Temple, COL=College Station, WAS=Washburn, BUSD=Bushland (dry),and BUSI=Bushland (irrigated).

Table A11. Height of TX91D6913 and check cultivars in the Uniform Wheat Elite nursery in Texas in 1995.

Cultivar	BUSD	BUSI	MUN	OLN	STA	WIC	CHI	MCG	TEM	COL	10 location average	
TX91D6913	20	31	21	22	23	21	28	35	38	37	27.6	b
2163	17	31	24	23	21	22	25	36	30	29	25.8	cdefgh
2180	15	27	20	22	22	20	23	34	32	28	24.3	h
Collin	16	31	23	24	21	22	24	35	32	32	26.0	cdefg
Jagger	18	29	22	27	22	23	27	36	33	36	27.3	bc
Karl 92	16	28	22	25	22	21	26	36	31	34	26.1	bcdefg
Larned	18	33	23	25	23	22	33	41	39	44	30.1	a
Longhorn	18	33	24	26	25	23	27	40	42	41	29.9	a
Ogallala	15	27	20	23	22	20	25	35	31	34	25.2	fgh
Siouxland 89	20	33	24	23	25	23	29	35	38	45	29.5	a
Sturdy	18	31	24	25	24	24	25	35	34	36	27.6	b
TAM W-101	16	27	21	21	22	21	27	33	33	36	25.7	defgh
TAM 105	18	29	22	23	22	22	27	35	29	36	26.3	bcdefg
TAM 107	17	28	24	26	22	21	24	35	33	36	26.6	bcdef
TAM 109	16	29	20	23	23	23	27	37	34	36	26.8	bcde
TAM 110	18	29	23	25	23	22	25	--	--	--	--	
TAM 200	16	27	22	24	22	20	24	34	31	33	25.3	efgh
TAM 201	16	25	22	24	20	20	22	34	31	34	24.8	gh
TAM 202	16	28	22	23	25	20	24	36	34	33	26.1	bcdefg
TAM 300	16	29	22	24	24	20	26	38	31	39	26.9	bcd
TAM 301	17	28	21	23	21	19	24	37	34	35	25.9	bcd
Thunderbird	19	33	24	27	25	22	28	42	36	41	29.7	a
Tomahawk	16	30	21	24	21	20	26	37	33	35	26.3	bcdefg
Test Mean	17	29	22	24	23	21	26	36	34	37	26.8	
LSD (5%)	--	--	--	--	--	--	--	--	--	--	1.5	
CV (%)	--	--	--	--	--	--	--	--	--	--	6.5	

Location abbreviations are BUSD=Bushland (dry), BUSI=Bushland (irrigated), MUN=Munday, OLN=Olney, STA=Stamford, WIC=Wichita Falls, CHI=Chillicothe, MCG=McGregor, TEM=Temple, and COL=College Station.

Table A12. Heading and lodging of TX91D6913 and check cultivars in the Uniform Wheat Elite nursery in Texas in 1995. 9900067

Cultivar	Heading (days from 1 Jan)									Lodging		
	DAL	PRO	ERA	HIL	BUSD	BUSI	CHI	7 location average		DAL (0-9)	HIL (0-9)	MUN (%)
TX91D6913	100	105	105	105	118	125	107	109	bcd	0.0	0.0	90
2163	100	110	104	109	116	123	105	110	bcd	0.0	1.0	40
2180	90	98	99	96	108	115	98	101	hi	0.0	0.0	60
Collin	87	94	94	93	113	120	100	100	i	1.5	4.5	90
Jagger	87	95	95	93	110	119	100	100	i	1.0	5.5	100
Karl 92	95	100	99	101	112	119	102	104	g	0.0	3.5	100
Larned	110	116	109	115	118	123	108	114	a	1.0	5.5	60
Longhorn	102	114	108	111	117	123	107	112	ab	1.0	5.0	40
Ogallala	97	107	101	108	114	121	105	108	def	0.0	0.0	90
Siouxland 89	102	105	103	107	119	125	106	110	bcd	0.5	4.5	20
Sturdy	98	102	101	103	120	123	105	107	def	0.0	1.0	70
TAM W-101	104	112	107	110	112	119	106	110	bcd	0.5	0.0	80
TAM 105	109	113	108	111	114	122	106	112	ab	0.0	0.0	30
TAM 107	95	102	99	102	110	115	100	103	gh	0.5	6.0	100
TAM 109	105	113	108	110	113	121	107	111	bc	0.5	1.5	70
TAM 110	--	--	--	--	109	116	100	--		--	--	100
TAM 200	97	104	99	102	117	119	105	106	efg	1.0	6.0	100
TAM 201	85	93	94	92	109	116	100	98	i	0.5	7.5	100
TAM 202	95	102	101	103	110	117	105	105	fg	0.5	4.5	100
TAM 300	101	105	101	107	116	122	104	108	cde	0.5	4.0	100
TAM 301	98	104	101	102	119	125	106	108	cde	0.0	1.0	70
Thunderbird	100	107	103	108	118	123	106	109	bcd	0.0	2.5	50
Tomahawk	102	114	106	112	115	122	106	110	bcd	0.0	0.0	50
Test Mean	97	104	102	104	114	121	104	107		0.4	3.0	74
LSD (5%)	0.8	0.9	1.7	0.9	--	--	--	3.0		1.7	0.8	--
CV (%)	1.72	1.8	3.4	1.8	--	--	--	2.7		14.7	1.2	--

Location abbreviations are DAL=Dallas, PRO=Prosper, ERA=Era, HIL=Hillsboro, BUSD=Bushland (dry), BUSI=Bushland (irrigated), CHI=Chillicothe, and MUN=Munday.

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Table A13. Leaf rust percent and infection type of TX91D6913 and check cultivars in the Uniform Wheat Elite nursery in Texas in 1995.

Cultivar	Leaf rust (percent and infection type)																					
	DAL		PRO		HIL		BMT (%)		MCG		TEM		COL		CHI		UVL		9 location % average	
TX91D6913	1	MR	0		1	MR	30		0		0		0		5	MR	5	R	4.7	l
2163	5	S	20	S	60	S	40		70	S	60	S	30	S	30	S	20	S	37.2	efghi
2180	20	MS	5	MS	40	S	20		90	S	5	MS	1	MS	20	S	10	MS	23.4	ijk
Collin	60	MS	30	S	80	S	80		100	S	20	S	20	S	80	S	80	S	61.1	abcd
Jagger	0		1	S	1	S	60		10	MS	0		1	MS	10	S	50	S	14.8	jkl
Karl 92	63	S	80	S	100	S	90		60	S	60	S	40	S	80	S	20	S	65.9	abc
Larned	90	S	80	S	100	S	50		70	S	20	S	10	S	30	S	30	S	53.3	bcde
Longhorn	15	S	1	MS	50	MS	0		20	MS	1	MR	0	F	20	MS	10	MS	13.0	jkl
Ogallala	27	MS	15	S	40	MS	80		20	MS	5	MR	1	MR	30	S	10	MS	25.3	hijk
Siouxland 89	57	S	75	S	90	S	60		80	S	30	S	1	S	60	S	30	S	53.7	bcde
Sturdy	27	MS	15	MS	60	MS	50		5	MS	0	F	1	R	70	S	20	S	27.6	ghij
TAM W-101	70	S	65	S	90	S	30		40	S	1	MS	20	MS	70	S	30	S	46.2	def
TAM 105	85	S	70	S	100	S	70		80	S	20	S	40	S	90	S	40	S	66.1	abc
TAM 107	90	S	80	S	100	S	70		100	S	30	S	60	S	100	S	30	S	73.3	a
TAM 109	70	S	60	S	90	S	40		40	S	1	MS	10	MS	60	S	20	S	43.4	defg
TAM 110	--		--		--		--		--		--		--		90	S	40	S	--	
TAM 200	75	S	60	S	90	S	90		100	S	40	MS	30	MS	95	S	50	S	70.0	ab
TAM 201	70	MS	20	MS	60	S	20		60	S	5	MS	10	MS	100	S	40	S	42.8	efgh
TAM 202	40	S	10	S	50	S	70		30	MS	5	MS	5	MS	80	S	20	MS	34.4	fghi
TAM 300	9	MS	5	MR	10	MR	20		30	MS	0		0		60	S	10	MR	16.0	jkl
TAM 301	0		0		1	MS	10		0	F	0		0	F	0		5	MR	1.8	l
Thunderbird	45	S	40	S	90	S	70		70	S	30	S	5	MS	40	S	70	S	51.1	cdef
Tomahawk	3	S	1	S	10	MS	20		0	F	0		0	F	30	S	10	MS	8.2	kl
Test Mean	37		30		53		49		13		15		13		57		30		37.9	
LSD (5%)	12		9.6		10		--		--		--		--		--		--		17.7	
CV (%)	7.3		12		9.5		--		--		--		--		--		--		50.2	

Location abbreviations are DAL=Dallas, PRO=Prosper, HIL=Hillsboro, BMT=Beaumont, MCG=McGregor,TEM=Temple, COL=College Station, CHI=Chillicothe, and UVL=Uvalde.Leaf rust infection types are: none = no visible reaction, F= fleck, R = resistant (very small pustules), MR = moderately resistant (small pustules), MS = moderately susceptible (medium size pustules), and S = susceptible (large pustules).

Table A14. Powdery mildew, barley yellow dwarf virus and *Septoria* disease reactions of TX91D6913 and check cultivars in the Uniform Wheat Elite nursery in Texas in 1995.

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Cultivar	Powdery mildew (0-9)				BYDV (0-9)	Septoria tritici (0-9)	Septoria nodorum (0-9)
	MCG	OVR	TEM	3 location average	DAL	PRO	OVR
TX91D6913	0	0	0	0.0 e	2.7	7.0	5
2163	0	0	0	0.0 e	4.7	4.0	7
2180	4	9	4	5.7 ab	2.7	7.0	8
Collin	3	4	3	3.3 cd	4.0	5.0	7
Jagger	3	9	3	5.0 bc	3.3	4.5	7
Karl 92	0	0	0	0.0 e	5.0	4.0	7
Larned	0	0	0	0.0 e	7.0	4.0	4
Longhorn	0	1	0	0.3 e	2.7	8.0	4
Ogallala	0	5	0	1.7 de	2.5	6.5	6
Siouxland 89	0	0	0	0.0 e	7.0	3.5	5
Sturdy	2	1	2	1.7 de	3.3	5.0	6
TAM W-101	7	8	7	7.3 a	6.7	7.5	6
TAM 105	0	0	0	0.0 e	6.7	5.0	7
TAM 107	0	0	0	0.0 e	5.7	5.0	8
TAM 109	5	9	5	6.3 ab	6.0	7.5	5
TAM 200	0	0	0	0.0 e	7.7	4.0	7
TAM 201	0	0	0	0.0 e	6.0	6.5	8
TAM 202	0	0	0	0.0 e	6.0	5.0	7
TAM 300	0	0	0	0.0 e	5.0	7.5	6
TAM 301	0	0	0	0.0 e	3.1	2.0	5
Thunderbird	0	5	0	1.7 de	4.7	6.5	6
Tomahawk	0	3	0	1.0 e	5.0	7.0	3
Test Mean	1.1	2.5	1.1	1.5	4.7	5.7	6.1
LSD (5%)	--	--	--	2.1	1.9	1.3	--
CV (%)	--	--	--	81.1	29.4	8.5	--

Location abbreviations are MCG=McGregor, OVR=Overton, TEM=Temple, DAL=Dallas, and PRO=Prosper.

Table A15. Yield of TX91D6913 and check cultivars in the North Texas Wheat Elite nursery in Texas in 1996.

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Cultivar	DAL	PRO	ERA	WIN	COL	MCG	CHI	BUSI	8 location average	
TX91D6913	63.5	58.9	42.7	57.7	82.0	35.3	48.9	79.6	58.6	ab
2163	47.1	44.4	24.9	41.6	78.0	26.3	47.0	73.1	47.8	fgh
2180	63.8	42.6	28.3	45.1	79.6	32.0	45.2	70.6	50.9	cdefg
Collin	55.7	42.4	29.2	39.4	53.3	34.0	41.6	65.5	45.1	h
Jagger	65.0	50.0	37.6	38.3	63.4	37.7	37.8	65.0	49.3	defgh
NK 814	55.0	43.7	23.6	44.0	71.6	34.4	48.3	73.5	49.1	efgh
Ogallala	58.0	60.5	35.1	50.2	78.7	35.1	52.1	77.6	55.9	abc
Sturdy	52.7	41.4	30.1	42.1	61.3	30.6	41.1	64.6	45.5	gh
TAM W-101	45.3	52.7	37.4	48.9	67.0	32.0	44.3	63.8	48.9	efgh
TAM 107	64.4	44.1	39.6	47.9	75.5	36.1	64.4	67.7	54.9	abcd
TAM 200	61.2	53.6	39.9	39.1	75.3	39.0	53.6	66.0	53.5	bcdef
TAM 201	55.3	45.7	25.8	33.3	74.3	37.9	45.2	76.8	49.3	defgh
TAM 202	63.6	53.8	48.9	53.6	82.0	45.2	65.5	63.1	59.5	a
TAM 300	60.1	55.5	36.9	49.9	71.3	30.0	47.5	51.5	50.3	cdefgh
Tomahawk	50.7	50.1	37.9	47.1	81.7	33.4	57.8	77.5	54.5	abcde
Test Mean	55.9	48.7	33.7	43.9	72.7	34.5	48.3	69.1	51.6	
LSD (5%)	10.4	9.9	7.8	8.4	9.5	6.2	10.5	--	5.7	
CV (%)	11.5	12.5	14.5	11.8	8.0	11.0	13.3	--	11.2	

Location abbreviations are DAL=Dallas, PRO=Prosper, ERA=Era, WIN=Windom, COL=College Station, MCG=McGregor, CHI=Chillicothe, and BUSI=Bushland (irrigated).

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Table A16. Test weight of TX91D6913 and check cultivars in the North Texas Wheat Elite nursery in Texas in 1996.

Cultivar	DAL	PRO	ERA	WIN	COL	MCG	CHI	7 location average	
TX91D6913	59.8	58.1	57.2	57.9	61.5	62.4	56.0	59.0	h
2163	58.8	56.8	55.3	55.6	60.6	61.0	55.7	57.7	i
2180	60.7	59.6	58.6	58.5	62.4	63.5	60.1	60.5	de
Collin	61.5	60.8	58.9	60.1	62.1	63.6	58.2	60.7	d
Jagger	60.1	59.6	57.8	58.0	61.6	62.9	57.7	59.7	fgh
NK 814	59.8	60.2	57.6	58.7	61.4	62.7	58.2	59.8	efg
Ogallala	61.3	62.1	59.9	61.0	63.4	64.9	60.0	61.8	bc
Sturdy	59.9	60.8	59.3	59.3	61.9	63.4	58.8	60.5	de
TAM W-101	60.3	61.2	59.5	59.5	63.0	63.6	59.9	61.0	d
TAM 107	60.4	60.6	58.9	57.6	60.0	64.1	60.8	60.3	def
TAM 200	63.0	62.1	61.6	60.2	63.0	66.1	62.0	62.6	a
TAM 201	61.1	60.9	59.0	58.3	62.9	63.6	60.4	60.9	d
TAM 202	61.8	61.6	59.2	58.6	61.0	64.2	61.0	61.1	cd
TAM 300	61.5	62.1	60.7	60.6	63.0	64.4	60.7	61.9	ab
Tomahawk	59.0	58.7	58.0	58.4	60.6	62.4	58.9	59.4	gh
Test Mean	60.0	59.6	58.3	58.4	61.9	63.5	59.2	60.4	
LSD (5%)	--	--	--	--	--	--	--	0.8	
CV (%)	--	--	--	--	--	--	--	1.2	

Location abbreviations are DAL=Dallas, PRO=Prosper, ERA=Era, WIN=Windom, COL=College Station, MCG=McGregor, and CHI= Chillicothe.

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Table A17. Heading date, winter hardiness, and BYDV rating of TX91D6913 and check cultivars in the North Texas Wheat Elite nursery in Texas in 1996.

	Heading (days from 1 Jan)				Winter hardiness (0-9)					BYDV (0-9)
Cultivar	DAL	PRO	2 location average		DAL	PRO	WIN	3 location average		DAL
TX91D6913	108	107	107	cde	3.7	4.3	3.3	3.8	ef	1.7
2163	106	105	105	ef	4.0	4.0	5.3	4.4	bcde	2.0
2180	101	98	99	hi	4.0	4.3	6.0	4.8	abc	3.0
Collin	98	98	98	i	4.3	4.0	6.3	4.9	abc	2.3
Jagger	102	100	101	h	5.3	4.7	6.7	5.6	a	2.7
NK 814	103	99	101	h	5.0	4.7	6.0	5.2	ab	2.0
Ogallala	108	110	109	bc	3.7	4.3	5.0	4.3	cde	3.0
Sturdy	106	103	104	fg	3.3	4.3	5.7	4.4	bcde	3.3
TAM W-101	111	112	111	b	3.0	3.3	3.7	3.3	f	3.0
TAM 107	102	102	102	gh	2.3	3.0	4.3	3.2	f	3.3
TAM 200	106	106	106	def	4.3	4.7	5.0	4.7	bcd	4.7
TAM 201	100	99	99	hi	4.0	4.7	6.3	5.0	abc	3.3
TAM 202	106	107	106	cdef	4.0	4.3	5.0	4.4	bcde	2.3
TAM 300	107	110	108	cd	3.0	4.0	4.3	3.8	ef	2.7
Tomahawk	114	115	114	a	3.3	4.3	4.0	3.9	def	4.0
Test Mean	106	105	105		4.0	4.2	5.3	4.4		2.8
LSD (5%)	2.0	2.5	3.0		1.0	0.	1.1	0.9		1.9
CV (%)	1.2	1.5	1.3		16.2	13.2	12.3	11.8		42.4

Location abbreviations are DAL=Dallas, PRO=Prosper, and WIN=Windom.

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Table A18. Yield of TX91D6913 and check cultivars in the West Texas Wheat Elite nursery in Texas in 1996.

Cultivar	PRO	CHI	LOC	MUN	BUSI	5 location average	
TX91D6913	66.8	40.0	61.9	35.4	73.3	55.5	abcd
2137	61.5	42.6	73.3	40.8	83.7	60.4	a
2163	48.3	37.1	61.0	39.4	70.9	51.3	bcde
2180	56.8	34.5	62.6	40.6	76.3	54.2	abcde
AP7501*	56.0	44.4	44.8	25.8	83.8	51.0	bcde
AP7510*	64.7	42.2	58.2	42.7	88.7	59.3	ab
Hickok	54.9	47.1	72.7	34.3	76.5	57.1	abcd
Jagger	50.4	38.6	52.7	45.5	70.8	51.6	bcde
Karl 92	63.6	36.0	65.9	44.7	78.5	57.7	abc
Larned	55.7	44.0	32.0	26.8	72.6	46.2	e
Longhorn	54.7	36.4	42.2	38.1	73.0	48.9	de
Ogallala	59.5	40.3	59.5	44.4	86.4	58.0	abc
Pecos	40.7	38.0	62.6	40.4	77.5	53.8	abcde
Rowdy	61.6	33.0	59.7	35.5	77.0	53.4	abcde
Sturdy	51.9	26.9	53.4	30.5	66.4	45.8	e
TAM W-101	61.3	44.5	49.5	41.3	72.7	53.9	abcde
TAM 107	62.1	63.7	52.9	42.0	80.9	60.3	a
TAM 109	51.2	43.8	37.5	34.3	77.5	48.9	de
TAM 110	--	51.9	56.9	43.1	67.4	--	
TAM 200	64.6	45.9	59.6	38.0	83.4	58.3	abc
TAM 201	39.3	38.2	52.8	43.7	74.7	49.7	cde
TAM 202	57.8	50.6	47.9	45.7	75.3	55.5	abcd
TAM 300	59.7	44.7	46.7	38.9	63.1	50.6	cde
Tomahawk	64.5	48.8	60.4	32.0	78.4	56.8	abcd
Test Mean	56.8	43.1	55.2	38.3	76.7	53.8	
LSD (5%)	11.8	12.3	15.3	9.4	7.5	8.7	
CV (%)	12.8	17.6	17.1	15.0	6.0	12.8	

Location abbreviations are PRO=Prosper, CHI=Chillicothe, LOC=Lockett, MUN=Munday, and BUSI=Bushland (irrigated).
A '*' denotes a hybrid wheat variety.

Table A19. Test weight of TX91D6913 and check cultivars in the West Texas Wheat Elite nursery in Texas in 1996.

Cultivar	PRO	CHI	LOC	MUN	BUSI	5 location average	
TX91D6913	58.5	54.6	54.2	54.7	61.0	56.6	jk
2137	60.4	56.6	59.1	56.9	62.0	59.0	cdefghi
2163	57.2	54.5	55.7	54.9	58.6	56.2	k
2180	60.6	59.8	59.1	58.5	62.3	60.1	bcdef
AP7501*	60.0	59.0	50.2	57.3	63.0	57.9	ghijk
AP7510*	61.7	59.5	53.7	59.7	62.6	59.4	bcdefgh
Hickok	63.4	60.8	62.2	61.2	66.3	62.8	a
Jagger	59.4	57.9	54.9	56.5	60.6	57.9	hijk
Karl 92	61.6	58.8	58.6	61.0	60.9	60.2	bcde
Larned	60.3	57.6	54.7	58.4	62.7	58.7	defghi
Longhorn	59.7	58.3	52.4	59.1	63.3	58.6	efghi
Ogallala	61.7	59.4	53.9	60.9	62.9	59.8	bcdefg
Pecos	62.1	59.9	59.0	59.8	62.8	60.7	bc
Rowdy	61.1	59.3	55.2	58.5	63.8	59.6	bcdefgh
Sturdy	60.9	57.7	55.1	58.9	61.9	58.9	cdefghi
TAM W-101	61.5	58.9	55.2	60.2	62.9	59.7	bcdefg
TAM 107	60.4	59.7	57.4	58.0	62.4	59.6	bcdefgh
TAM 109	59.6	58.9	49.7	59.8	63.3	58.3	fghij
TAM 110	--	59.9	55.7	57.1	62.6	--	
TAM 200	62.8	60.8	58.1	--	63.8	--	
TAM 201	60.6	59.5	58.3	59.5	63.4	60.3	bcde
TAM 202	61.4	60.9	56.5	60.0	63.9	60.5	bcd
TAM 300	62.4	60.7	59.0	60.3	63.9	61.3	ab
Tomahawk	58.9	57.8	53.8	54.8	61.6	57.4	ijk
Test Mean	60.7	58.8	55.9	58.5	62.6	59.2	
LSD (5%)	--	--	--	--	--	1.9	
CV (%)	--	--	--	--	--	2.5	

Location abbreviations are PRO=Prosper, CHI=Chillicothe, LOC=Lockett, MUN=Munday, and BUSI=Bushland (irrigated).
A '*' denotes a hybrid wheat variety.

Table A20. Heading and BYDV rating of TX91D6913 and check cultivars in the West Texas Wheat Elite nursery in Texas in 1996.

Cultivar	Heading (days from 1 Jan)							BYDV (0-9)
	PRO	DAL	LOC	CHI	BUSI	5 location average		DAL
TX91D6913	109	109	118	113	127	115.2	abcde	1
2137	104	107	115	112	124	112.4	efghi	1
2163	105	106	115	111	124	112.2	fghij	3
2180	98	101	109	106	121	107.0	l	2
AP7501*	113	108	119	113	125	115.6	abcd	3
AP7510*	108	106	116	110	124	112.8	defgh	3
Hickok	101	101	112	110	124	109.6	ijkl	4
Jagger	100	102	113	108	125	109.6	ijkl	3
Karl 92	100	103	123	108	121	111.0	hijk	2
Larned	115	114	120	114	125	117.6	a	5
Longhorn	114	113	118	113	126	116.8	ab	1
Ogallala	108	109	118	111	125	114.2	bcdefg	4
Pecos	100	100	111	108	124	108.6	kl	4
Rowdy	105	104	114	109	125	111.4	ghijk	3
Sturdy	104	105	115	110	124	111.6	ghij	2
TAM W-101	112	111	117	110	125	115.0	abcdef	1
TAM 107	103	102	112	108	122	109.4	jkl	4
TAM 109	114	112	117	112	126	116.2	abc	4
TAM 110	--	--	112	107	124	--		--
TAM 200	105	104	114	111	125	111.8	ghij	6
TAM 201	99	100	108	105	124	107.2	l	3
TAM 202	106	105	114	110	125	112.0	ghij	1
TAM 300	109	109	116	109	125	113.6	cdefgh	7
Tomahawk	115	113	120	114	125	117.4	a	4
Test Mean	106	107	115	110	124	112.5		2.9
LSD (5%)	2.1	--	--	--	--	2.9		--
CV (%)	1.2	--	--	--	--	2.1		--

Location abbreviations are PRO=Prosper, DAL=Dallas, LOC=Lockett, CHI=Chillicothe, and BUSI=Bushland (irrigated). A '*' denotes a hybrid wheat variety.

Table A21. Winter hardiness and height of TX91D6913 and check cultivars in the West Texas Wheat Elite nursery in Texas in 1996.

Cultivar	Winter hardiness (0-9)				Height (inches)						
	PRO	DAL	2 location average		CHI	LOC	MUN	BUSD	BUSI	5 location average	
TX91D6913	3.7	3	3.4	abcd	22	31	24	16	29	24.4	bcde
2137	3.0	3	3.0	bcde	21	35	26	16	29	25.4	ab
2163	3.3	4	3.7	abc	21	29	24	16	26	23.2	cdefgh
2180	3.7	4	3.9	ab	18	27	21	14	23	20.6	ij
AP7501*	3.0	2	2.5	cde	19	30	24	14	27	22.8	efgh
AP7510*	3.0	1	2.0	e	21	33	23	14	28	23.8	bcdefg
Hickok	3.7	3	3.4	abcd	18	30	22	14	26	22.0	ghi
Jagger	4.3	5	4.7	a	24	29	27	16	29	25.0	abc
Karl 92	3.0	3	3.0	bcde	21	32	27	14	27	24.2	bcdef
Larned	3.3	1	2.2	de	23	33	28	16	33	26.6	a
Longhorn	3.3	4	3.7	abc	21	30	26	14	30	24.2	bcdef
Ogallala	3.7	3	3.4	abcd	18	29	22	14	27	22.0	ghi
Pecos	4.0	3	3.5	abc	19	31	22	14	26	22.4	fghi
Rowdy	3.0	3	3.0	bcde	20	28	23	14	24	21.8	hij
Sturdy	4.3	4	4.2	ab	19	33	24	14	29	23.8	bcdefg
TAM W-101	2.3	2	2.2	de	21	29	24	15	26	23.0	defgh
TAM 107	3.0	1	2.0	e	23	31	27	15	28	24.8	abcd
TAM 109	3.7	4	3.9	ab	20	31	24	15	27	23.4	cdefgh
TAM 110	--	--	--		23	32	27	15	28	25.0	abc
TAM 200	4.3	3	3.7	abc	21	28	23	14	25	22.2	ghi
TAM 201	4.3	4	4.1	ab	20	24	24	13	19	20.0	j
TAM 202	4.0	3	3.5	abc	22	29	24	14	26	23.0	defgh
TAM 300	3.3	4	3.7	abc	24	31	26	15	28	24.8	abcd
Tomahawk	3.0	3	3.0	bcde	18	34	23	14	28	23.4	cdefgh
Test Mean	3.6	3.3	3.3		21	30	24	15	27	23.4	
LSD (5%)	0.9	--	1.3		--	--	--	--	--	1.9	
CV (%)	16.6	--	19.2		--	--	--	--	--	6.5	

Location abbreviations are PRO=Prosper, DAL=Dallas, CHI=Chillicothe, LOC=Lockett, MUN=Munday, BUSD=Bushland (dryland) and BUSI=Bushland (irrigated). A '*' denotes a hybrid wheat variety.

Table A22. Yield of TX91D6913 and check cultivars in the North Texas Wheat Elite nursery in Texas in 1997.

Cultivar	PRO	DAL	TEM	COL	4 location average
TX91D6913	72.6	49.8	47.9	39.0	52.3 ab
2163	59.7	28.6	17.4	13.0	29.7 ef
2180	63.2	41.3	41.4	27.7	43.4 c
Collin	51.4	39.3	44.4	29.1	41.0 cd
Custer	76.1	61.9	43.6	35.0	54.1 a
Jagger	70.0	50.0	44.6	24.5	47.3 abc
Ogallala	71.7	37.4	45.6	32.3	46.7 abc
Sturdy	62.4	40.3	37.1	20.9	40.2 cd
TAM W-101	53.0	24.4	19.2	26.5	30.8 ef
TAM 107	49.0	24.2	19.0	19.0	27.8 ef
TAM 200	45.5	20.4	15.8	19.3	25.2 f
TAM 202	69.1	38.2	40.2	34.4	45.5 bc
TAM 300	53.5	36.6	20.9	28.2	34.8 de
TAM 301	63.6	48.5	26.0	20.9	39.7 cd
Test Mean	65.5	45.6	33.1	26.4	39.9
LSD (5%)	8.6	7.7	7.7	7.6	8.5
CV (%)	8.1	10.5	11.4	15.9	14.9

Location abbreviations are PRO=Prosper, DAL=Dallas, TEM=Temple, and COL=College Station.

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Table A23. Test weight, heading, and height of TX91D6913 and check cultivars in the North Texas Wheat Elite nursery in Texas in 1997.

Cultivar	Test weight (lb/bu)					Heading (days from 1 Jan)				Height (inches)			
	PRO	DAL	TEM	3 location average		PRO	DAL	2 location average		PRO	DAL	2 location average	
TX91D6913	55.6	55.4	53.1	54.7	e	117	109	113	abc	37	38	37.5	abc
2163	56.2	56.9	53.5	55.5	de	119	111	115	ab	36	37	36.5	abcde
2180	59.6	59.6	55.6	58.3	ab	108	106	107	ef	33	33	33.0	f
Collin	59.1	57.8	55.1	57.3	abcd	103	98	100	g	34	35	34.5	def
Custer	60.5	59.8	57.7	59.3	a	107	106	106	f	37	40	38.5	a
Jagger	60.4	58.7	56.6	58.6	a	104	100	102	g	38	38	38.0	ab
Ogallala	60.6	58.0	57.7	58.8	a	114	110	112	abcd	36	37	36.5	abcde
Sturdy	59.5	57.3	54.6	57.1	abcd	107	108	107	ef	38	38	38.0	ab
TAM W-101	59.4	52.0	56.3	55.9	cde	119	113	116	a	36	37	36.5	abcde
TAM 107	58.3	57.1	53.2	56.2	bcde	107	107	107	ef	36	35	35.5	bcdef
TAM 200	59.5	58.5	55.6	57.9	abc	110	108	109	cdef	35	33	34.0	ef
TAM 202	59.2	57.4	55.0	57.2	abcd	110	106	108	def	37	33	35.0	cdef
TAM 300	58.6	59.6	58.2	58.8	a	113	110	111	bcde	37	37	37.0	abcd
TAM 301	58.4	59.8	55.4	57.9	abc	110	108	109	cdef	35	33	34.0	ef
Test Mean	57.6	57.1	55.5	57.4		111	107	109		37	37	36.0	
LSD (5%)	--	--	--	2.2		2.1	1.2	4.1		2.1	2.9	2.6	
CV (%)	--	--	--	2.3		1.2	0.7	1.8		3.6	4.9	3.4	

Location abbreviations are DAL=Dallas, PRO=Prosper, ERA=Era, WIN=Windom, COL=College Station, MCG=McGregor, and CHI=Chillicothe.

Table A24. Leaf rust, powdery mildew, *Septoria nodorum*, and winter hardiness reactions of TX91D6913 and check cultivars in the North Texas Wheat Elite nursery in Texas in 1997.

Cultivar	Leaf rust (% and infection type)						Powdery mildew (0-9)				Septoria nodorum (0-9)	Winter hardiness (0-5)
	DAL		TEM		2 location % average		DAL	OVR	2 location average		OVR	DAL
TX91D6913	20	MR	20	MS	20.0	b	1.7	2	1.8	cd	2	1.2
2163	97	S	60	S	78.5	a	0.0	2	1.0	d	4	1.0
2180	43	MS	80	S	61.5	ab	4.7	7	5.8	ab	5	1.5
Collin	100	S	80	S	90.0	a	2.0	2	2.0	cd	7	1.5
Custer	37	MS	80	S	58.5	ab	1.0	4	2.5	bcd	3	1.7
Jagger	33	MS	60	S	46.5	ab	3.7	7	5.4	abc	6	1.5
Ogallala	63	MS	40	MS	51.5	ab	4.3	2	3.1	abcd	3	1.3
Sturdy	70	MS	60	S	65.0	ab	5.0	5	5.0	abc	4	1.7
TAM W-101	97	S	60	S	78.5	a	7.0	6	6.5	a	2	1.5
TAM 107	100	S	80	S	90.0	a	0.0	5	2.5	bcd	5	1.0
TAM 200	100	S	70	S	85.0	a	0.0	4	2.0	cd	6	1.5
TAM 202	87	MS	80	S	83.5	a	0.0	4	2.0	cd	4	1.5
TAM 300	17	MR	70	S	43.5	ab	1.7	2	1.8	cd	2	1.5
TAM 301	37	MS	70	S	53.5	ab	0.0	5	2.5	bcd	5	1.5
Test Mean	42.1		42		64.7		1.4	4.1	3.1		4.1	1.5
LSD (5%)	23.3				48.2		1.2	--	3.5		--	0.5
CV (%)	33.9				34.5		52.9	--	52.0		--	18.9

Location abbreviations are DAL=Dallas, TEM=Temple and OVR=Overton.

Table A25. Yield of TX91D6913 and check cultivars in the West Texas Wheat Elite nursery in Texas in 1997.

Cultivar	PRO	WAS	BUSD	BUSI	WIC	LOC	MUN	7 location average	
TX91D6913	79.1	38.8	45.4	72.8	33.2	63.2	49.0	54.5	ab
2137	66.1	41.3	46.2	71.3	27.3	68.3	45.3	52.3	abc
2163	60.2	34.2	37.5	58.1	29.8	47.7	30.8	42.6	efg
2180	68.6	26.4	39.4	57.8	24.4	47.1	42.9	43.8	defg
AP7501*	59.3	30.3	34.2	68.3	41.7	58.1	40.2	47.4	cdef
AP7510*	75.7	38.6	40.5	75.8	40.7	69.4	53.5	56.3	a
AP7601*	65.6	34.4	36.5	72.1	43.5	55.1	45.3	50.4	bc
Big Dawg	66.5	31.1	32.9	67.1	45.0	53.8	51.5	49.7	bc
Hickok	71.5	41.6	50.3	67.3	25.0	47.2	43.4	49.5	bcd
Jagger	68.9	36.0	36.3	62.4	32.7	57.6	52.6	49.5	bcd
Karl 92	55.7	32.3	30.8	59.8	30.5	39.1	33.6	40.3	gh
Longhorn	58.9	34.8	37.5	56.9	46.1	52.3	44.2	47.2	cdef
Ogallala	74.7	36.3	38.8	62.0	43.0	58.8	47.5	51.6	abc
Pecos	57.4	31.9	42.1	65.7	28.1	43.4	33.7	43.2	efg
Quantum 579*	76.0	36.0	38.9	73.9	28.6	48.0	44.2	49.4	bcd
Rowdy	76.6	41.2	36.8	67.5	31.4	54.8	44.2	50.4	bc
Sturdy	61.8	27.2	33.9	46.2	24.5	36.2	38.6	38.3	gh
TAM W-101	56.7	26.8	32.6	58.1	34.3	47.3	36.5	41.8	fg
TAM 107	54.2	33.2	36.5	50.7	28.1	42.2	28.9	39.1	gh
TAM 109	47.3	29.7	34.4	51.5	40.3	40.9	30.5	39.2	gh
TAM 110	58.5	36.1	34.6	57.8	29.5	47.5	29.8	42.0	fg
TAM 200	49.6	32.1	44.3	51.9	26.6	49.9	23.3	39.7	gh
TAM 201	48.9	24.8	26.9	57.1	20.4	37.6	28.5	34.9	h
TAM 202	66.5	33.3	36.7	62.5	35.2	55.2	48.4	48.3	cde
TAM 301	63.6	31.7	37.8	60.4	29.7	56.0	46.4	46.5	cdef
Tomahawk	61.8	28.5	33.9	61.8	48.5	59.7	42.6	48.1	cde
Test Mean	63.0	34.0	38.2	62.4	33.6	51.6	40.9	46.0	
LSD (5%)	8.7	5.3	6.5	8.3	8.6	8.1	8.2	5.8	
CV (%)	8.5	9.6	10.4	8.2	15.7	9.7	12.5	12.0	

Location abbreviations are PRO=Prosper, WAS=Washburn, BUSD=Bushland (dryland), BUSI=Bushland (irrigated), LOC=Lockett, and MUN=Munday. A '*' denotes a hybrid wheat variety.

Table A26. Test weight and heading date of TX91D6913 and check cultivars in the West Texas Wheat Elite nursery in Texas in 1997.

Cultivar	Test weight (lb/bu)							Heading (days from 1 Jan)					
	PRO	CHI	LOC	MUN	WIC	5 location average		PRO	DAL	CHI	LOC	4 location average	
TX91D6913	56.1	58.1	59.9	54.4	62.1	58.1	fghi	113	108	111	110	110.5	defg
2137	56.7	60.2	62.2	57.1	61.7	59.6	abcdef	117	110	111	111	112.3	bcde
2163	56.4	58.4	58.0	54.6	62.9	58.1	fghi	117	110	111	111	112.3	bcde
2180	58.9	55.1	62.7	61.6	63.5	60.4	abcd	110	105	103	105	105.8	jkl
AP7501*	54.5	57.6	56.7	55.7	61.7	57.2	hi	116	111	111	112	112.5	bcd
AP7510*	57.3	59.3	59.0	56.9	61.7	58.8	cdefgh	112	110	108	108	109.5	fgh
AP7601*	55.6	60.2	57.5	56.8	62.3	58.5	defgh	114	112	110	111	111.8	cdef
Big Dawg	58.2	60.5	62.3	60.0	63.0	60.8	ab	114	110	111	114	112.3	bcde
Hickok	61.9	57.3	63.4	61.0	62.8	61.3	a	105	100	103	106	103.5	l
Jagger	59.7	58.1	61.8	60.9	61.5	60.4	abc	104	100	103	107	103.5	l
Karl 92	56.9	57.4	61.9	60.6	61.0	59.6	abcdef	108	105	106	108	106.8	ijk
Longhorn	56.3	60.2	60.3	57.9	63.2	59.6	abcdef	118	111	111	113	113.3	bc
Ogallala	59.9	61.0	62.3	58.5	64.2	61.2	a	112	110	111	110	110.8	cdefg
Pecos	59.2	58.2	62.5	61.1	62.1	60.6	abc	100	95	96	105	99.0	m
Quantum 579*	57.9	56.9	63.1	60.4	62.4	60.1	abcde	107	104	100	105	104.0	l
Rowdy	59.2	59.2	58.4	59.9	62.6	59.9	abcdef	109	104	105	109	106.8	ijk
Sturdy	59.3	57.6	58.8	58.9	60.8	59.1	bcdefgh	110	107	110	109	109.0	ghi
TAM W-101	57.5	58.9	62.1	56.5	62.5	59.5	abcdef	118	113	110	112	113.3	bc
TAM 107	58.0	58.9	59.9	56.3	61.8	59.0	bcdefgh	108	105	105	105	105.8	jkl
TAM 109	52.7	58.0	56.8	53.7	60.2	56.3	l	120	114	111	114	114.8	ab
TAM 110	57.4	57.8	60.9	57.1	61.9	59.0	bcdefgh	108	105	101	105	104.8	kl
TAM 200	58.5	60.7	60.5	57.4	63.6	60.1	abcde	108	109	107	109	108.3	ghij
TAM 201	56.6	56.6	61.4	56.7	60.9	58.4	efgh	101	100	95	105	100.3	m
TAM 202	59.1	58.8	60.4	55.5	63.5	59.5	abcdefg	111	108	103	108	107.5	hij
TAM 301	58.7	58.8	61.6	59.8	62.5	60.3	abcde	110	108	110	111	109.8	efgh
Tomahawk	53.9	58.4	58.5	54.4	62.8	57.6	ghi	122	115	112	118	116.8	a
Test Mean	57.1	58.5	60.5	57.8	62.3	59.3		112	108	107	109	108.6	
LSD (5%)	--	--	--	--	--	1.9		1.8	--	--	--	2.7	
CV (%)	--	--	--	--	--	2.5		3.1	--	--	--	1.8	

Location abbreviations are PRO=Prosper, CHI=Chillicothe, LOC=Lockett, MUN=Munday, WIC=Wichita Falls, and DAL=Dallas.
A '*' denotes a hybrid wheat variety.

Table A27. Height of TX91D6913 and check cultivars in the West Texas Wheat Elite nursery in Texas in 1997.

Cultivar	PRO	DAL	CHI	LOC	MUN	WIC	WAS	BUSI	8 location average	
TX91D6913	37	36	31	35	28	32	25	35	32.4	cde
2137	38	37	35	36	29	33	28	35	33.9	b
2163	36	35	30	33	24	30	26	33	30.9	fgh
2180	33	33	29	29	24	29	22	28	28.4	k
AP7501*	35	35	30	33	28	31	23	32	30.9	fgh
AP7510*	35	38	33	33	27	29	24	33	31.5	defg
AP7601*	36	35	33	35	28	30	22	34	31.6	defg
Big Dawg	37	37	33	36	29	33	24	37	33.3	bc
Hickok	34	35	27	31	24	29	24	32	29.5	ijk
Jagger	36	42	30	34	27	32	24	31	32.0	cdef
Karl 92	35	37	29	31	25	33	23	30	30.4	ghij
Longhorn	42	43	34	37	30	34	29	34	35.4	a
Ogallala	36	37	31	33	28	30	25	30	31.3	efgh
Pecos	34	34	26	30	24	30	24	32	29.3	jk
Quantum 579*	36	36	30	32	26	32	26	32	31.3	efgh
Rowdy	35	36	31	32	25	29	24	29	30.1	hij
Sturdy	36	35	33	33	27	33	26	33	32.0	cdef
TAM W-101	36	33	32	33	27	30	26	32	31.1	efgh
TAM 107	37	37	29	31	27	29	26	32	31.0	fgh
TAM 109	36	37	33	33	27	32	25	30	31.6	defg
TAM 110	38	38	31	33	32	30	25	32	32.4	cde
TAM 200	35	34	29	30	25	28	25	30	29.5	ijk
TAM 201	33	35	28	29	24	29	22	30	28.8	k
TAM 202	37	36	31	32	24	29	25	31	30.6	ghi
TAM 301	34	33	30	32	27	33	23	31	30.4	ghij
Tomahawk	39	38	31	35	29	33	25	31	32.6	bcd
Test Mean	36.0	36.2	30.7	32.7	26.7	30.8	24.7	31.9	31.2	
LSD (5%)	1.1	--	--	--	--	--	--	--	1.4	
CV (%)	1.2	--	--	--	--	--	--	--	4.4	

Location abbreviations are PRO=Prosper, DAL=Dallas, CHI=Chillicothe, LOC=Lockett, MUN=Munday, WIC=Wichita Falls, WAS=Washburn, and BUSI=Bushland (irrigated), A '*' denotes a hybrid wheat variety.

Table A28. Leaf rust, powdery mildew, winter hardiness, and lodging reactions of TX91D6913 and check cultivars in the West Texas Wheat Elite nursery in Texas in 1997.

Cultivar	Leaf rust (% and infection type)								Powdery mildew (0-9)	Winter hardiness (0-5)	Lodging (%)
	DAL		CHI		LOC		3 location average		DAL	DAL	BUSI
TX91D6913	10	MS	10	MR	5	R	8.3	j	3	1.5	0
2137	90	S	10	MS	60	MR	53.3	cdef	0	1.0	0
2163	90	S	20	S	40	S	50.0	defg	0	1.5	0
2180	40	MS	15	S	20	S	25.0	fghij	5	1.5	0
AP7501*	50	S	70	S	20	MR	46.7	efgh	1	1.5	0
AP7510*	50	S	60	S	20	MS	43.3	efgh	0	1.5	0
AP7601*	70	S	30	MR	20	MR	40.0	efghi	0	1.0	0
Big Dawg	5	MR	10	MR	10	MR	8.3	j	3	2.0	0
Hickok	20	MS	15	MS	30	MR	21.7	ghij	3	2.0	3
Jagger	10	MS	15	S	30	MS	18.3	hij	4	2.0	7
Karl 92	100	S	80	S	80	S	86.7	ab	0	1.0	3
Longhorn	60	MS	20	MS	20	MR	33.3	fghij	0	2.0	0
Ogallala	30	MS	40	S	60	S	43.3	efgh	4	1.0	0
Pecos	100	S	60	S	80	S	80.0	abc	4	1.5	3
Quantum 579*	20	MS	40	MS	80	S	46.7	efgh	3	1.5	3
Rowdy	100	S	40	MS	60	MR	66.7	bcde	1	2.0	3
Sturdy	60	MS	40	MS	60	S	53.3	cdef	4	2.0	0
TAM W-101	100	S	70	S	60	S	76.7	abcd	7	1.0	5
TAM 107	100	S	100	S	90	S	96.7	a	0	1.0	13
TAM 109	100	S	50	S	80	S	76.7	abcd	7	1.5	0
TAM 110	100	S	100	S	90	S	96.7	a	0	1.0	7
TAM 200	100	S	80	S	80	S	86.7	ab	0	1.0	10
TAM 201	100	MS	80	S	80	S	86.7	ab	0	2.0	0
TAM 202	100	MS	70	S	80	S	83.3	ab	0	1.5	3
TAM 301	10	MS	20	S	30	S	20.0	hij	0	1.0	0
Tomahawk	20	MS	10	MR	5	R	11.7	ij	0	1.5	0
Test Mean	62.9		44.4		50		52.3		2	1.5	2.3
LSD (5%)	--		--		--		29.0		--	--	--
CV (%)	--		--		--		33.7		--	--	--

Location abbreviations are DAL=Dallas, CHI=Chillicothe, LOC=Lockett, and BUSI=Bushland (irrigated), A '*' denotes a hybrid wheat variety. Leaf rust infection types are: none = no visible reaction, F= fleck, R = resistant (very small pustules), MR = moderately resistant (small pustules), MS = moderately susceptible (medium size pustules), and S = susceptible (large pustules).

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Table A29. Summary of yield, agronomic, and disease data for 45 wheats grown in the 1995 Southern Regional Performance Nursery.

Entry	Yield (bu/ac)	Test weight (lb/bu)	Heading (days from 1 Jan)	Height (in)	Winter survival (%)	Lodging (%)	Shattering (%)	Leaf rust (%)	Septoria tritici (0-9)	BYDV (%)	Stripe rust (%)
AP7510*	59.2	58.8	134	32	97	6	90	35	5.7	4	0
TX91D6913	58.3	56.9	137	34	91	6	30	3	5.0	4	80
OK91P648	57.6	56.8	133	31	95	10	70	10	3.0	7	80
XH1798	56.1	59.4	132	33	96	14	30	13	4.7	4	75
HBE0726-1	55.8	57.3	138	32	94	19	30	6	3.0	5	25
HBI0531-A2	54.9	57.5	135	31	89	1	40	30	5.5	8	90
TX91D6991	54.4	56.9	135	32	88	7	60	20	6.3	5	75
AP7501*	54.4	57.9	136	32	93	2	80	25	6.0	4	20
T702	54.0	58.7	135	31	91	13	50	60	7.0	12	60
2174	53.1	59.4	136	34	90	7	30	35	3.3	11	75
XH1752*	52.9	58.9	135	35	96	17	30	30	5.5	4	70
Quantum7406*	52.1	57.6	133	33	94	7	40	21	5.5	6	60
2137	51.7	58.5	136	34	96	1	80	18	3.7	2	90
TX93V5919	51.4	57.2	136	33	80	13	50	65	6.3	10	90
OK93P735	51.1	58.5	136	31	94	6	40	3	6.3	13	90
Rowdy	50.4	57.9	133	30	94	9	70	30	4.0	3	30
XH1778	50.4	58.1	134	31	94	11	30	0	6.3	4	80
Platte**	50.3	59.1	138	31	96	0	30	3	7.5	3	0
T812	50.3	58.3	132	31	95	18	40	55	5.7	9	10
TX93V5922	49.9	59.0	134	32	66	3	60	25	5.0	8	60
OK93P656	49.7	59.1	133	32	92	9	40	16	6.3	7	75
OK93P727	49.5	59.4	135	32	92	5	50	18	3.0	3	60
Oro Blanco**	49.2	58.1	138	31	96	0	30	75	4.0	3	40
NE91651	48.9	56.7	133	34	94	6	70	35	4.0	6	60
NE92646	48.7	57.2	138	34	96	19	30	80	6.0	3	80
NE92458	48.4	58.8	135	34	96	16	80	85	3.7	5	50
Coronado	48.2	57.9	133	31	99	5	70	35	4.7	7	10
T834	47.9	57.5	137	33	96	25	40	55	5.5	2	40
TX92V3108	47.7	60.1	133	32	98	5	40	50	5.5	5	40
N93L058	47.4	56.5	135	31	95	1	70	60	4.3	6	90
T861	46.8	58.2	132	33	98	7	90	35	5.0	9	80
CO890323	46.6	59.2	134	33	94	43	80	65	4.3	6	20
KS93U206	46.5	58.5	132	33	92	7	50	0	5.0	8	90
TX92V2519	46.3	58.1	136	30	90	14	50	25	6.0	4	0
TX92V4135	46.3	58.4	132	31	96	7	60	20	3.0	5	80
CO900166	45.9	58.7	135	33	96	29	70	70	5.7	5	0
TX93V4927	45.2	58.2	137	29	83	15	70	16	5.0	4	0

Table A29. (continued)

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Entry	Yield (bu/ac)	Test weight (lb/bu)	Heading (days from 1 Jan)	Height (in)	Winter survival (%)	Lodging (%)	Shattering (%)	Leaf rust (%)	Septoria tritici (0-9)	BYDV (%)	Stripe rust (%)
NE90476	44.9	57.6	137	33	93	27	60	50	4.3	5	50
TX90V6313	44.5	57.3	134	31	90	23	60	45	4.3	6	40
NE92614	44.0	58.7	138	36	98	22	70	35	6.7	7	0
KS91H153-2	43.9	59.7	137	32	94	16	40	28	4.0	12	60
TAM 107	40.9	57.3	132	32	88	4	40	85	5.0	8	90
WI90-540W	37.7	56.2	133	29	95	9	60	10	4.0	16	0
Scout 66	31.6	58.7	138	37	94	64	30	60	6.3	5	40
Kharkof	27.4	58.7	143	40	94	71	30	65	6.7	2	20
Mean	48.7	58.1	136	33	93	20	51	40	5.1	7	45
LSD (5%)	4.2	--	--	--	--	--	--	--	--	--	--
CV (%)	14.7	--	--	--	--	--	--	--	--	--	--
No. locations	30	29	19	24	2	5	1	2	1	1	1

A"*" denotes a hybrid wheat variety. A"**" denotes a hard white winter wheat variety.

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Table A30. Summary of yield, agronomic, and disease data for 39 wheats grown in the 1996 Southern Regional Performance Nursery.

Entry	Yield (bu/ac)	Test weight (lb/bu)	Heading (days from 1 Jan)	Height (in)	Winter survival (%)	Lodging (0-9)
AP7510*	59.7	59.4	130	26	60	1
NE90476	58.1	58.3	131	28	72	3
TAM 107	57.6	59.0	127	27	69	2
CO910424	57.0	59.9	130	28	60	4
HBI0531-A2	56.8	57.7	130	26	37	1
T834	56.7	58.5	131	29	60	4
KS94093512552	56.4	58.5	129	27	45	2
NE92458	56.3	59.8	128	29	68	2
T812	56.3	59.1	128	27	55	4
TX92V3108	56.2	61.1	128	27	57	3
TX91D6991	56.1	57.6	129	26	47	1
T702	55.9	59.6	129	27	33	2
KS93U206	55.5	59.2	127	28	60	2
NE93427	55.1	60.3	129	28	55	2
NE92646	54.7	59.0	132	28	57	2
TX91D6913	54.3	56.9	133	27	46	1
NE93405	54.1	60.2	129	30	70	1
T861	53.8	58.5	128	28	61	2
KS941064-6	53.7	57.9	130	26	52	1
T89	52.9	58.4	128	27	54	3
TX93V5919	52.7	59.0	130	27	16	1
OK91P648	52.4	57.3	131	25	16	2
TAM 110	52.1	58.4	129	27	42	4
CO910748	52.1	59.4	132	28	38	2
KS84W0639393M	51.7	58.7	134	29	47	2
OK93P735	51.5	59.4	129	26	45	2
KS941064-3	51.4	57.7	130	26	52	2
KS940935-72-1	50.7	59.5	130	27	59	2
G1878	50.7	60.9	130	28	52	2
OK92403	50.1	59.4	128	25	46	2
W93-460	49.3	58.7	132	28	28	1
KS91H153-2	49.3	60.1	130	26	40	3
KS85W66311-6M	48.9	59.3	132	27	34	2
Scout 66	47.7	59.5	132	33	65	7
OK93P634	46.6	59.1	130	25	37	2
TX93V4927	45.8	58.7	132	25	14	2
TX92V2519	45.5	58.6	131	25	18	3
TX93V5922	44.6	60.3	130	27	11	1
Kharkof	36.8	58.7	137	35	75	5
Test Mean	52.5	59.0	130	27.4	47.5	2.3
LSD (5%)	4.6	--	--	--	--	--
CV (%)	12.9	--	--	--	--	--
No. locations	22	21	19	20	6	1

A"*" denotes a hybrid wheat variety.

Table A31. Seedling infection types[a] on TX91D6913 and 22 Thatcher (TC) near-isogenic lines inoculated with 16 isolates of *Puccinia recondita*. 9990067

Genotype	Isolate number															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
TX91D6913	3N	1CN	1+	3	0;1	;1	;1C	3CN	2-	1	3-	3+	0;	;1C	3N	0;
TCLr 1	0;	0;	0;	0;	0;	3+	4	3+	4	3+	3+	4	3+	3+	3+	3+
TCLr 2a	0;	;	0;	3	3+	;	0;	0;	0;	0;	3-	3+	3-	3	3	3
TCLr 2b	0;	3+	3+	3	3+	;	0;	0;	3+	0;	3-	3+	3-	3+	3	3
TCLr 2c	0;	;	0;	3	3+	;	0;	0;	3+	0;	3-	3+	3-	3+	3	3
TCLr 3a	;	4	3+	3+	3+	4	4	3+	4	4	;1	;1	3+	4	3+	4
TCLr 3bg	;1	3+	3-	12	2	;1	3+	3-	3+	;1	2+	2	3-	12	2	;1
TCLr 3ka	12	21C	12	12	12	2	3C+	21C	3+	3C-	2	21C	23	21C	12	21C
TCLr 9	0;	0;	3-	0;	0;	0;	0;	0;	0;	3	0;	0;	0;	0;	0;	3+
TCLr 10	4	4	3+	4	3+	;1	4	3+	4	3+	;1	4	0;	4	3+	;1C
TCLr 11	2c	3C	23	1C	23	23	23	23	23	3	23	23	23	1C	23	3C+
TCLr 13	2X+	23C	3+	3X+	3X+	3-	3+	3-	2X+	2X+	23C	3X+	3X-	3X+	2+	2+
TCLr 14a	2+	4X	4	3+	4X	3+	4X	3+	3X+	3+	23	4	3X+	3X+	3+	4
TCLr 15	;	4	1	4	1	4	4	3+	4	1	;	4	3+	1	1	;
TCLr 16	;1N	1CN	1CN	2CN	2CN	1CN	1CN	3CN	1CN	1CN	2CN	1CN	2CN	1CN	3N+	2CN
TCLr 17	2C	12C	12C	;1C	12C	3C+	;1C	12C	12C	12C	3C-	;1C	;1C	;1C	12C	2C
TCLr 18	2C	3C	;1C	;1C	12C	;1C	;1C	;1C	3C	12C	2C	3C+	3C	;1C	12C	3C+
TCLr 23	3+	3+	23C	23C	23C	3C+	3C+	;1	3C+	2+	2+	3+	3C	2+	23C	;1
TCLr 24	0;	0;	0;	;1	3+	0;	3+	0;	0;	0;	0;	3+	0;	3+	3+	;1
TCLr 26	;1	;1-	0;	;1	3-	3-	3+	0;	;1-	;1	3+	3+	3	;1-	3	3
TCLr 27+31	23	3X	23-	3X-	23-	2X+	23	3+	3X+	23-	23	3+	3X	2X+	2X+	2X+
TCLr 28	3+	3+	0;	3-	3-	3-	3+	3+	3+	3-	;1	3+	3	0;	3	3
TCLr 34	3+	X3-	3+	3+	3+	3+	X3-	3+	X3-	X3-	3+	X3-	3+	3+	3+	3+

[a] Infection types are coded as follows: "0" = No uredinia or other macroscopic signs of infection; ";" = no uredinia, but hypersensitive necrotic or chlorotic flecks of varying size present; "1" = small uredinia often surrounded by necrosis; "2" = small-to-medium uredinia sometimes surrounded by chlorosis or necrosis; "3" = medium-sized uredinia that may be associated with chlorosis or rarely necrosis; "4" = large-sized uredinia usually without chlorosis or necrosis; "X" = random distribution of variable sized uredinia. The seven infection types may be modified as follows: "+" = uredinia somewhat larger than normal for the infection type; "-" = uredinia somewhat smaller than normal for the infection type; "C" = more chlorosis than normal for infection type; and "N" = more necrosis than normal for infection type. More than one infection type for a given genotype:isolate combination means that a range was observed, with the most predominant infection type listed first. Infection types "0", ";", "1", and "2" represent resistant reactions and types "3" and "4" represent susceptible reactions.

Table A32. Physical grain characteristics of TX91D6913 and check cultivars in the Uniform Advanced 1 nursery in Texas in 1993.

Cultivar	Test weight (lb/bu)	1000 kernel weight (g)	Kernel sizing (%)			SKWCS average kernel			Hardness score	
			Lg	Md	Sm	Moisture (%)	Weight (mg)	Diameter (mm)	SKWCS	NIR
TX91D6913	58.0	32.6	75.9	24.1	0.0	12.4	33.9	2.95	76	66
Siouxland 89	60.0	29.1	66.7	33.3	0.0	11.7	29.6	2.82	79	69
TAM W-101	60.8	37.7	87.2	12.8	0.0	11.5	36.6	3.11	80	60
TAM 107	58.4	31.8	70.6	29.4	0.0	12.7	28.7	2.67	83	76
TAM 200	60.6	25.4	38.0	61.4	0.6	13.1	25.9	2.67	68	56
TAM 301	60.4	35.4	82.6	17.4	0.1	11.3	32.6	3.03	79	76
Test Mean	60.0	32.1	67.2	32.7	0.1	12.2	31.4	2.83	69	62
St. Dev.	1.2	3.6	13.0	12.8	0.2	0.5	3.3	0.1	17	17
CV (%)	2	11	19	39	180	4	11	5	25	27

Kernel sizing is Lg = large kernels (overs of Tyler #7); Md = medium kernels (overs of Tyler #9); and Sm = small kernels (thrus of Tyler #9). SKWCS = Single Kernel Wheat Classification System. Wheat hardness scores determined by Near-infrared (NIR) and by SKWCS; the higher the value, the harder the sample.

Table A33. Chemical, milling, and mixograph data of TX91D6913 and check cultivars in the Uniform Advanced 1 nursery in Texas in 1993.

Cultivar	Wheat grain (%)		Flour yield (%)	Milling score	Flour			Mixograph			
	Ash	Protein			Ash (%)	Protein (%)	Color value	Absorption (%)	Mix as is (min)	Mix corr. (min)	Tolerance
TX91D6913	1.48	11.8	69.8	76	0.49	10.4	81	60.3	3.50	2.84	3
Siouxland 89	1.47	12.7	74.3	77	0.45	10.9	83	61.3	4.00	3.50	2
TAM W-101	1.48	11.5	69.0	79	0.43	10.3	87	60.1	4.38	3.47	3
TAM 107	1.51	12.1	72.7	81	0.46	10.6	79	61.1	4.00	3.33	3
TAM 200	1.55	11.2	72.3	75	0.51	9.8	84	59.6	4.38	3.24	3
TAM 301	1.43	12.0	71.8	82	0.48	11.3	77	61.8	3.63	3.34	3
Test Mean	1.49	11.9	71.3	78.2	0.46	10.6	83.1	60.7	3.94	3.25	2.8
St. Dev.	0.04	0.8	4.0	4.6	0.03	0.9	3.8	1.7	0.6	0.53	0.7
CV (%)	3	7	6	6	7	8	5	3	15	16	25

Milling score = 100-{(test weight-60) + (82-flour yield) + 100(flour ash - wheat ash/3.9) + 10[(wheat protein - 1) - flour protein]}. Color values closer to 100 are better. Mixing tolerance is 6=outstanding, 5=excellent, 4=satisfactory, 3=satisfactoy-to-questionable, 2=questionable, 1= questionable-to-satisfactory, and 0=unsatisfactory.

Table A34. Bread-making data of TX91D6913 and check cultivars in the Uniform Advanced 1 nursery in Texas in 1993 9900067

Cultivar	Flour protein (%)	Absorption (%)	Mix time		Dough		Crumb grain	Loaf volume		
			As is (min)	Corr. (min)	Weight (g)	Proof height (cm)		As rec'd (cc)	Specific volume (cc/g)	Regression (cc/%protein)
TX91D6913	10.4	63.2	4.63	3.76	174.2	7.1	2	830	5.4	70
Siouxland 89	10.9	65.5	4.25	3.71	176.4	7.5	3	840	5.5	67
TAM W-101	10.3	65.5	4.88	3.87	176.0	6.9	2	825	5.3	71
TAM 107	10.6	66.4	4.25	3.54	177.1	7.0	3	900	5.8	78
TAM 200	9.8	63.4	6.50	4.80	173.6	7.2	2	925	6.1	89
TAM 301	11.3	66.2	4.75	4.37	176.8	7.2	3	845	5.5	65
Test Mean	10.6	64.8	4.67	3.85	175.5	7.2	2.7	849	5.5	72.1
St.dev.	0.9	2.9	0.9	0.8	2.9	0.2	0.6	49	0.3	9.0
CV (%)	8	4	20	21	2	3	22	6	5	12

Crumb grain is 6=outstanding, 5=excellent, 4=satisfactory, 3=satisfactoy-to-questionable, 2=questionable, 1=questionable-to-satisfactory, and 0=unsatisfactory.

Table A35. Kernel hardness of TX91D6913 and check cultivars in the Uniform Wheat Elite nursery in Texas in 1995.

Cultivar	Hardness index		Kernel diameter (mm)		Kernel weight (mg)		Hardness classification	
	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Class	Distribution (% soft→ hard)
TX91D6913	80.4	17.0	2.3	0.5	29.1	8.3	Hard	01-02-06-91-01
Jagger	80.0	16.6	2.3	0.5	29.7	9.4	Hard	00-01-08-91-01
TAM W-101	77.0	16.9	2.5	0.5	35.6	9.0	Hard	00-02-11-87-01
TAM 300	79.1	17.0	2.3	0.5	29.1	8.3	Hard	00-02-09-89-01
TAM 301	75.9	17.7	2.6	0.6	33.2	9.8	Hard	01-04-11-84-01

Table A36. Flour and mixing properties of TX91D6913 and check cultivars in the Uniform Wheat Elite nursery in Texas in 1995.

Cultivar	Flour				Mixograph		
	Yield (%)	Moisture (%)	Protein (% as is)	Protein (%, 14%mb)	Water absorption (%)	Mixing time (min:sec)	Quality rating
TX91D6913	60.2	13.2	9.65	9.57	59.7	2:30	good-fair
Jagger	64.0	12.8	10.27	10.12	60.3	2:15	good
TAM W-101	65.4	12.6	9.08	8.93	59.1	2:40	fair-good
TAM 300	56.2	14.6	10.78	10.85	60.8	2:15	good
TAM 301	63.1	13.0	10.11	10.00	60.1	3:10	fair-good

Table A37. Baking properties of TX91D6913 and check cultivars in the Uniform Wheat Elite nursery in Texas in 1995.

Cultivar	Dough			Mixograph		
	Water absorption (%)	Mixing time (min:sec)	Proof height (cm)	Loaf height (cm)	Loaf volume (cc)	Crumb texture
TX91D6913	59.6	2:33	7.8	9.0	850	good
Jagger	60.3	2:26	7.9	9.3	850	good
TAM W-101	59.1	2:37	7.9	9.3	835	good
TAM 300	60.8	2:32	7.8	8.9	830	good
TAM 301	60.2	3:03	7.9	8.9	870	good-fair

Table A38. Physical grain characteristics of TX91D6913, cultivars, and check cultivars in the Southern Regional Performance Nursery in 1995.

Cultivar	Test weight (lb/bu)	1000 kernel weight (g)	Kernel sizing (%)			SKWCS average kernel			Hardness score	
			Lg	Md	Sm	Moisture (%)	Weight (mg)	Diameter (mm)	SKWCS	NIR
TX91D6913 (all)	57.9	28.7	64.1	35.1	0.8	10.3	31.3	2.42	64	61
(north-central plains)	60.0	25.6	53.0	45.8	1.2	10.1	27.0	2.31	70	59
(south-central plains)	56.4	27.6	57.2	41.3	1.5	10.2	30.5	2.34	61	64
(northern high plains)	60.3	32.4	72.9	26.5	0.6	10.1	34.5	2.51	68	64
(southern high plains)	54.8	22.3	41.2	56.3	2.5	9.3	26.3	2.25	60	67
2137 (all)	60.4	28.6	60.1	38.6	1.4	10.1	29.9	2.37	67	70
(north-central plains)	58.5	25.7	46.5	51.8	1.7	9.8	28.5	2.34	67	66
(south-central plains)	59.1	27.1	56.8	42.1	1.1	9.8	28.6	2.32	65	72
(northern high plains)	62.4	32.8	72.8	26.5	0.7	10.0	35.1	2.54	65	72
(southern high plains)	56.6	21.1	26.4	67.4	6.2	9.0	23.9	2.06	59	76
2174 (all)	61.1	27.9	65.8	33.7	0.6	10.2	29.0	2.48	73	70
(north-central plains)	59.6	25.3	55.2	43.8	1.0	10.0	28.0	2.42	75	65
(south-central plains)	59.5	27.4	62.9	36.2	0.9	10.2	30.3	2.53	70	72
(northern high plains)	63.1	29.5	72.3	27.3	0.4	9.7	32.1	2.59	73	75
(southern high plains)	57.6	21.3	27.3	69.7	3.0	9.3	24.4	2.20	69	77
AP7510* (all)	60.5	25.8	51.5	46.4	2.1	10.1	28.0	2.34	74	65
(north-central plains)	59.0	23.8	37.8	59.5	2.7	9.5	26.1	2.28	72	63
(south-central plains)	58.8	24.0	47.5	49.4	3.1	10.1	26.0	2.27	73	73
(northern high plains)	62.5	29.0	61.5	37.2	1.3	10.2	30.5	2.46	73	70
(southern high plains)	56.8	20.3	24.5	69.9	5.7	9.0	23.9	2.14	64	81
Coronado (all)	59.0	29.5	60.9	38.4	0.7	10.0	31.7	2.51	65	72
(north-central plains)	56.8	25.3	52.1	47.0	0.9	9.8	28.7	2.40	62	61
(south-central plains)	58.7	28.2	65.7	33.4	0.9	9.9	30.2	2.47	64	68
(northern high plains)	61.7	32.7	72.5	27.1	0.5	9.9	34.7	2.61	68	79
(southern high plains)	56.0	22.8	34.1	62.1	3.8	8.9	26.8	2.28	56	77
Kharkof (all)	59.6	24.9	45.4	52.8	1.9	10.5	26.8	2.21	49	45
(north-central plains)	59.4	25.3	44.0	54.8	1.3	10.2	27.2	2.26	49	49
(south-central plains)	58.6	22.9	32.4	65.4	2.2	10.2	24.2	2.12	52	48
(northern high plains)	60.2	26.3	48.9	49.0	2.0	10.1	28.3	2.29	47	42
(southern high plains)	57.2	22.9	26.7	67.7	5.7	9.5	23.3	2.07	49	55
Oro Blanco** (all)	58.5	23.2	37.2	59.0	3.8	9.9	26.2	2.24	60	61
(north-central plains)	56.5	21.4	23.8	71.0	5.3	9.7	24.1	2.10	56	54
(south-central plains)	57.3	22.8	37.1	58.4	4.5	9.9	25.0	2.16	56	54
(northern high plains)	61.4	26.2	42.4	54.7	3.0	10.0	27.8	2.27	64	60
(southern high plains)	57.2	20.1	27.7	67.0	5.3	8.9	24.1	2.11	56	72

Table A38. (continued)

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Cultivar	Test weight (lb/bu)	1000 kernel weight (g)	Kernel sizing (%)			SKWCS average kernel			Hardness score	
			Lg	Md	Sm	Moisture (%)	Weight (mg)	Diameter (mm)	SKWCS	NIR
Platte** (all)	61.6	25.7	50.1	48.2	1.7	9.8	27.9	2.40	65	63
(north-central plains)	59.0	22.8	35.1	62.4	2.5	9.7	25.3	2.28	62	61
(south-central plains)	60.2	24.9	46.7	51.3	2.0	9.8	26.8	2.32	64	65
(northern high plains)	64.1	29.9	67.0	32.2	0.8	9.8	31.9	2.56	66	70
(southern high plains)	59.0	22.7	31.2	65.2	3.6	8.9	25.6	2.27	60	79
Rowdy (all)	59.7	24.5	44.1	53.5	2.4	10.2	26.7	2.32	67	59
(north-central plains)	57.8	21.8	33.4	63.8	2.8	9.9	24.9	2.22	64	55
(south-central plains)	58.8	23.5	42.2	54.9	2.9	10.0	26.6	2.33	70	65
(northern high plains)	62.0	26.5	48.9	49.6	1.6	10.2	28.4	2.41	73	63
(southern high plains)	56.8	19.7	17.7	75.3	7.0	9.1	23.4	2.10	59	67
Scout 66 (all)	60.0	28.2	57.5	41.4	1.1	10.3	29.6	2.36	60	69
(north-central plains)	59.0	26.7	46.8	52.4	0.9	10.0	29.4	2.37	59	66
(south-central plains)	59.2	26.9	50.9	47.7	1.4	10.2	29.2	2.34	58	68
(northern high plains)	61.2	29.8	61.7	37.2	1.2	9.9	30.0	2.36	67	70
(southern high plains)	57.6	21.7	25.2	70.1	4.6	9.4	24.7	2.09	56	70
TAM 107 (all)	58.7	28.0	65.6	33.4	1.0	10.0	31.0	2.38	66	75
(north-central plains)	57.5	26.9	55.3	43.5	1.2	9.8	28.5	2.34	66	70
(south-central plains)	57.7	28.4	59.3	38.9	1.8	9.9	29.1	2.29	61	72
(northern high plains)	60.9	31.4	73.1	25.9	1.0	9.7	32.2	2.40	70	78
(southern high plains)	57.0	24.0	37.0	59.0	4.0	9.2	26.1	2.19	57	76
Test Mean (all)	59.6	26.8	54.1	44.2	1.7	10.1	28.9	2.30	63	64
(north-central plains)	57.9	24.4	42.6	55.3	2.1	9.9	26.9	2.28	62	62
(south-central plins)	58.7	25.8	50.8	47.0	2.2	10.0	28.4	2.32	61	65
(northern high plains)	61.7	29.5	62.6	36.2	1.3	10.0	31.3	2.43	65	67
(southern high plains)	56.9	21.0	27.0	68.2	4.9	9.1	24.4	2.13	57	71
St.dev. (all)	1.0	2.1	8.6	8.0	0.7	0.2	2.3	0.1	10	11
(north-central plains)	1.2	2.1	9.8	9.0	1.0	0.2	2.1	0.1	9	10
(south-central plains)	1.2	2.2	10.9	10.1	1.1	0.2	2.4	0.1	11	11
(northern high plains)	1.1	2.5	9.3	8.9	0.6	0.1	2.6	0.1	9	12
(southern high plains)	0.8	1.5	6.9	6.1	1.4	0.2	1.5	0.1	7	10
CV (%) (all)	1.7	7.7	15.9	18.2	42.6	1.8	8.0	4.3	16	17
(north-central plains)	2.1	8.6	23.1	16.4	46.0	1.7	7.7	3.7	15	16
(south-central plains)	2.0	8.6	21.4	21.5	47.7	2.0	8.5	4.4	17	17
(northern high plains)	1.7	8.5	14.9	24.5	46.8	1.8	8.5	4.3	14	17
(southern high plains)	1.5	7.1	25.7	8.9	28.0	1.7	6.0	3.5	13	14

Kernel sizing is Lg = large kernels (overs of Tyler #7); Md = medium kernels (overs of Tyler #9); and Sm = small kernels (thrus of Tyler #9). SKWCS = Single Kernel Wheat Classification System. Wheat hardness scores determined by Near-infrared (NIR) and by SKWCS; the higher the value, the harder the sample. A"*" denotes a hybrid wheat variety. A"**" denotes a hard white winter wheat variety.

Table A39. Chemical, milling, and mixograph data of TX91D6913, cultivars, and check cultivars in the Southern Regional Performance Nursery in 1995.

Cultivar	Wheat grain (%)		Flour yield (%)	Milling score	Flour			Mixograph			
	Ash	Protein			Ash (%)	Protein (%)	Color value	Absorption (%)	Mix as is (min)	Mix corr. (min)	Tolerance
TX91D6913 (all)	1.64	11.8	65.1	76	0.49	10.6	84	64.3	3:94	3:28	3
(north-central plains)	1.79	12.2	64.5	75	0.52	11.1	84	66.5	4:72	4:19	4
(south-central plains)	1.51	12.4	64.4	71	0.50	11.0	84	64.3	3:90	3:43	2
(northern high plains)	1.52	11.5	67.1	71	0.47	9.9	86	65.4	3:62	2:72	2
(southern high plains)	1.80	14.4	62.2	77	0.56	13.6	80	67.7	3:04	3:04	1
2137 (all)	1.66	11.8	67.5	80	0.49	10.9	85	66.0	4:14	3:59	2
(north-central plains)	1.70	12.0	64.4	78	0.49	11.0	85	67.3	4:30	3:76	3
(south-central plains)	1.60	12.4	66.3	61	0.51	10.0	85	63.3	3:95	3:01	2
(northern high plains)	1.56	11.6	66.6	68	0.50	10.2	87	66.9	4:55	3:58	3
(southern high plains)	1.92	16.0	62.7	71	0.60	14.7	80	67.5	3:33	3:33	2
2174 (all)	1.71	12.9	66.0	71	0.55	11.8	84	67.6	3:53	3:45	2
(north-central plains)	1.87	13.3	66.4	80	0.52	12.2	82	66.3	3:85	3:85	3
(south-central plains)	1.68	13.7	66.8	69	0.56	12.3	84	65.5	3:30	3:30	3
(northern high plains)	1.65	12.6	66.9	67	0.51	10.9	87	65.1	3:39	2:96	2
(southern high plains)	1.83	15.4	64.6	70	0.61	14.3	79	64.9	2:91	2:91	2
AP7510* (all)	1.72	12.6	66.0	73	0.51	11.2	84	65.8	4:70	4:25	2
(north-central plains)	1.77	12.5	63.5	79	0.50	11.6	84	65.3	4:73	4:50	3
(south-central plains)	1.66	13.9	66.5	72	0.52	12.5	82	66.8	4:12	4:12	3
(northern high plains)	1.64	10.9	67.2	73	0.49	9.6	88	61.9	4:08	2:89	2
(southern high plains)	1.84	15.3	63.4	72	0.61	14.4	79	65.0	3:09	3:09	2
Coronado (all)	1.67	13.1	67.2	79	0.51	12.2	82	67.3	4:73	4:73	3
(north-central plains)	1.78	13.5	66.5	83	0.51	12.6	81	66.0	5:46	5:46	4
(south-central plains)	1.61	14.1	66.7	75	0.49	12.7	82	66.2	4:14	4:14	3
(northern high plains)	1.61	12.3	67.5	72	0.49	10.9	85	66.1	4:40	3:83	3
(southern high plains)	1.84	16.3	63.5	74	0.57	15.2	80	66.4	3:28	3:28	4
Kharkof (all)	1.83	13.6	62.4	75	0.48	12.1	90	65.1	4:09	4:09	2
(north-central plains)	1.88	13.8	64.1	82	0.46	12.5	88	64.6	4:46	4:46	3
(south-central plains)	1.74	14.3	62.1	66	0.47	12.0	88	64.0	4:31	4:31	3
(northern high plains)	1.72	13.0	61.8	70	0.48	11.4	90	65.0	3:34	3:09	2
(southern high plains)	1.76	15.3	61.7	69	0.51	13.5	84	65.6	4:11	4:11	3
Oro Blanco** (all)	1.68	12.5	62.9	78	0.47	11.5	86	65.2	4:36	4:10	4
(north-central plains)	1.85	12.9	61.1	82	0.49	12.0	86	67.0	5:55	5:55	5
(south-central plains)	1.59	14.1	61.8	73	0.45	12.6	87	66.0	4:84	4:84	3
(northern high plains)	1.62	11.1	64.1	68	0.48	9.5	90	63.7	5:47	3:82	4
(southern high plains)	1.81	15.3	61.2	72	0.57	14.3	83	66.9	3:31	3:31	3

Table A39. (continued)

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Cultivar	Wheat grain (%)		Flour yield (%)	Milling score	Flour			Mixograph			
	Ash	Protein			Ash (%)	Protein (%)	Color value	Absorption (%)	Mix as is (min)	Mix corr. (min)	Tolerance
Platte** (all)	1.64	12.7	66.0	72	0.51	11.6	86	66.3	4:80	4:57	3
(north-central plains)	1.78	13.1	62.0	80	0.48	12.3	85	65.5	4:16	4:16	4
(south-central plains)	1.57	13.8	65.6	72	0.48	12.4	86	65.7	3:91	3:91	4
(northern high plains)	1.64	10.9	67.2	73	0.49	9.6	88	61.9	4:60	3:56	2
(southern high plains)	1.80	15.8	62.9	68	0.59	14.7	80	65.5	3:27	3:27	4
Rowdy (all)	1.62	12.3	66.8	75	0.51	11.2	86	65.8	4:84	4:38	2
(north-central plains)	1.76	12.5	64.9	84	0.48	11.7	83	64.5	4:42	4:25	2
(south-central plains)	1.58	13.6	66.9	74	0.50	12.4	84	64.7	3:70	3:70	2
(northern high plains)	1.58	11.5	67.4	72	0.49	10.3	87	64.1	3:80	3:02	2
(southern high plains)	1.84	14.3	62.7	75	0.59	13.7	82	65.8	3:28	3:28	2
Scout 66 (all)	1.69	12.8	67.9	83	0.46	11.8	85	68.1	3:90	3:81	2
(north-central plains)	1.81	13.4	66.6	86	0.47	12.5	83	65.8	3:64	3:64	3
(south-central plains)	1.55	12.9	67.8	73	0.51	11.7	84	65.5	3:29	3:17	3
(northern high plains)	1.69	12.8	67.9	79	0.44	11.3	86	66.8	3:07	2:81	2
(southern high plains)	1.89	14.9	65.5	80	0.54	13.9	81	66.2	3:07	3:07	2
TAM 107 (all)	1.66	12.4	65.6	79	0.47	11.3	83	65.8	4:59	4:20	2
(north-central plains)	1.76	13.0	65.7	81	0.47	11.7	82	66.5	4:35	4:20	4
(south-central plains)	1.57	12.7	66.1	74	0.48	11.2	83	65.6	4:10	3:72	3
(northern high plains)	1.61	12.6	67.2	74	0.46	11.0	84	66.3	3:30	2:93	2
(southern high plains)	1.85	15.1	65.5	76	0.57	14.0	78	66.4	3:08	3:08	2
Test Mean (all)	1.67	12.4	65.9	77	0.48	11.2	85	66.0	4:39	3:78	3
(north-central plains)	1.78	12.8	63.6	80	0.49	11.7	84	65.9	4:60	4:40	3
(south-central plins)	1.58	13.2	65.5	73	0.48	11.8	85	64.8	4:02	3:84	3
(northern high plains)	1.61	11.6	66.8	72	0.48	10.1	87	64.8	4:10	3:17	2
(southern high plains)	1.80	15.0	62.9	73	0.60	14.0	81	66.3	3:26	3:26	2
St.dev. (all)	0.1	0.5	3.2	4	0.1	0.5	3	1.2	0.87	0.82	1
(north-central plains)	0.1	0.5	3.1	5	0.1	0.4	2	1.1	0.74	0.74	1
(south-central plains)	0.1	0.6	2.9	5	0.1	0.6	3	1.5	0.86	0.83	1
(northern high plains)	0.1	0.7	2.7	4	0.1	0.6	3	1.5	0.83	0.63	1
(southern high plains)	0.0	0.7	2.8	4	0.0	0.7	2	1.0	0.47	0.47	1
CV (%) (all)	3.8	3.8	4.9	5	5.5	4.1	3	1.8	19.7	20.6	39
(north-central plains)	4.1	3.7	4.8	6	4.9	3.8	3	1.7	16.0	16.9	31
(south-central plains)	4.3	4.6	4.4	7	5.9	5.2	3	2.3	21.5	21.5	36
(northern high plains)	4.2	5.7	4.1	6	5.4	5.9	3	2.3	20.3	19.9	46
(southern high plains)	2.6	4.7	4.4	6	4.3	4.7	3	1.5	14.3	14.3	51

Milling score = 100-{(test weight-60) + (82-flour yield) + 100(flour ash - wheat ash/3.9) + 10[(wheat protein - 1) - flour protein]}. Color values closer to 100 are better. Mixing tolerance is 6=outstanding, 5=excellent, 4=satisfactory, 3=satisfactoy-to-questionable, 2=questionable, 1= questionable-to-satisfactory, and 0=unsatisfactory. A"*" denotes a hybrid wheat variety. A"**" denotes a hard white winter wheat variety.

Table A40. Bread-making data of TX91D6913, cultivars, and check cultivars in the Southern Regional Performance Nursery in 1995.

Cultivar	Flour protein (%)	Absorption (%)	Mix time		Dough		Crumb grain	Loaf volume		
			As is (min)	Corr. (min)	Weight (g)	Proof height (cm)		As rec'd (cc)	Specific volume (cc/g)	Regression (cc/%protein)
TX91D6913 (all)	10.6	64.3	3:63	3:00	178.9	6.8	3	795	5.1	65
(north-central plains)	11.1	66.7	4:38	3:89	176.7	7.0	3	875	5.6	71
(south-central plains)	11.0	63.3	3:75	3:30	174.2	6.7	2	790	5.1	61
(northern high plains)	9.9	64.3	3:50	2:63	174.7	6.6	3	730	4.6	61
(southern high plains)	13.6	66.8	3:38	3:38	177.4	6.6	2	785	4.9	46
2137 (all)	10.9	66.8	3:88	3:35	176.0	6.8	4	795	5.0	62
(north-central plains)	11.0	67.0	4:38	3:83	176.6	6.5	3	800	5.1	62
(south-central plains)	10.0	63.5	3:63	2:77	173.4	6.0	2	695	4.4	55
(northern high plains)	10.2	66.2	4:25	3:35	175.9	6.2	4	750	4.7	61
(southern high plains)	14.7	67.8	3:75	3:75	177.3	7.1	3	865	5.5	48
2174 (all)	11.8	67.7	3:75	3:68	177.2	6.9	2	860	5.4	63
(north-central plains)	12.2	66.3	3:50	3:50	176.4	6.7	2	845	5.3	59
(south-central plains)	12.3	66.0	3:63	3:63	175.8	7.1	1	905	5.8	65
(northern high plains)	10.9	64.1	3:38	2:95	174.8	6.4	1	775	4.9	59
(southern high plains)	14.3	66.2	3:25	3:25	175.3	7.0	3	855	5.5	49
AP7510* (all)	11.2	65.8	4:38	3:96	175.1	6.8	3	815	5.2	62
(north-central plains)	11.6	65.1	4:38	4:17	174.7	7.1	2	855	5.5	64
(south-central plains)	12.5	64.9	4:00	4:00	174.6	7.0	3	825	5.4	55
(northern high plains)	9.6	62.0	4:50	3:18	177.5	6.5	2	725	4.7	63
(southern high plains)	14.4	65.3	3:25	3:25	175.2	7.2	3	875	5.7	50
Coronado (all)	12.2	67.4	5:13	5:13	177.0	7.2	3	880	5.6	63
(north-central plains)	12.6	63.1	4:50	4:50	172.9	6.6	4	825	5.3	55
(south-central plains)	12.7	66.1	4:50	4:50	175.8	7.0	3	850	5.4	57
(northern high plains)	10.9	66.3	4:38	3:81	175.7	7.0	3	790	5.1	61
(southern high plains)	15.2	68.7	3:88	3:88	177.4	7.1	2	890	5.7	49
Kharkof (all)	12.1	66.1	4:38	4:38	176.0	7.3	4	885	5.6	65
(north-central plains)	12.5	64.7	4:75	4:75	174.4	7.1	4	935	6.0	67
(south-central plains)	12.0	64.0	5:13	5:13	173.6	7.2	4	900	5.8	66
(northern high plains)	11.4	65.0	4:00	3:70	174.6	6.8	3	815	5.2	61
(southern high plains)	13.5	69.9	4:00	4:00	175.6	7.1	3	885	5.7	56
Oro Blanco** (all)	11.5	65.3	4:88	4:56	174.3	6.8	3	845	5.5	64
(north-central plains)	12.0	66.3	5:88	5:88	176.5	7.3	4	905	5.8	67
(south-central plains)	12.6	65.9	5:00	5:00	175.4	7.0	3	875	5.7	60
(northern high plains)	9.5	64.8	4:88	3:30	173.6	6.7	2	750	4.9	67
(southern high plains)	14.3	68.0	3:50	3:50	177.6	7.0	2	870	5.6	50

Table A40. (continued)

9900067

Cultivar	Flour protein (%)	Absorption (%)	Mix time		Dough		Crumb grain	Loaf volume		
			As is (min)	Corr. (min)	Weight (g)	Proof height (cm)		As rec'd (cc)	Specific volume (cc/g)	Regression (cc/%protein)
Platte** (all)	11.6	67.6	4:13	3:95	175.7	6.8	4	865	5.5	65
(north-central plains)	12.3	65.8	4:88	4:88	175.7	7.1	4	910	5.8	66
(south-central plains)	12.4	65.8	4:88	4:88	175.5	7.2	4	865	5.6	60
(northern high plains)	10.1	63.7	4:50	3:48	173.0	6.5	3	750	4.9	62
(southern high plains)	14.7	70.0	3:75	3:75	177.9	7.5	3	915	5.8	53
Rowdy (all)	11.2	65.2	4:25	3:85	174.7	6.7	3	825	5.3	64
(north-central plains)	11.7	64.8	4:50	4:33	174.2	6.7	2	810	5.2	59
(south-central plains)	12.4	64.0	3:50	3:50	175.0	6.7	1	790	5.0	52
(northern high plains)	10.3	63.9	3:88	3:08	173.8	6.6	2	785	5.0	66
(southern high plains)	13.7	66.2	3:50	3:50	175.6	7.0	3	865	5.6	53
Scout 66 (all)	11.8	68.3	4:00	3:91	179.6	7.4	3	885	5.5	66
(north-central plains)	12.5	66.1	3:75	3:75	176.2	7.0	3	915	5.8	65
(south-central plains)	11.7	64.7	3:63	3:50	175.5	7.2	3	850	5.4	63
(northern high plains)	11.3	66.8	3:38	3:09	176.6	7.2	2	863	5.4	68
(southern high plains)	13.9	67.4	3:00	3:00	177.2	7.1	3	870	5.6	52
TAM 107 (all)	11.3	66.7	3:75	3:42	175.8	7.0	2	860	5.5	67
(north-central plains)	11.7	66.4	4:25	4:11	176.5	7.2	3	945	6.1	74
(south-central plains)	11.2	66.9	4:13	3:74	175.0	7.1	2	865	5.6	68
(northern high plains)	11.0	66.2	3:50	3:08	176.2	6.9	2	820	5.2	65
(southern high plains)	14.0	66.6	3:13	3:13	175.8	7.2	3	860	5.5	51
Test Mean (all)	11.2	66.3	4.34	3.94	176.1	6.9	3	834	5.3	65
(north-central plains)	11.7	65.4	4:59	4:39	175.2	6.9	3	866	5.6	65
(south-central plins)	11.8	64.7	4:28	4:10	174.6	6.8	2	822	5.3	59
(northern high plains)	10.1	64.7	4:11	3:18	174.6	6.7	3	771	4.9	65
(southern high plains)	14.0	67.1	3:45	3:45	176.6	7.1	3	865	5.5	52
St.dev. (all)	0.5	1.5	0.9	0.9	1.5	0.2	1	51	0.3	6
(north-central plains)	0.4	1.5	0.9	0.9	1.3	0.2	1	45	0.3	5
(south-central plains)	0.6	1.6	0.9	0.9	1.5	0.3	1	65	0.4	7
(northern high plains)	0.6	1.6	0.8	0.6	1.5	0.3	1	44	0.3	6
(southern high plains)	0.7	1.4	0.5	0.5	1.2	0.3	1	51.8	0.4	6
CV (%) (all)	4.1	2.3	21.9	23.2	0.8	3.4	30	6	6.4	9
(north-central plains)	3.8	2.3	19.4	20.8	0.8	3.4	25	5	5.4	8
(south-central plains)	5.2	2.4	22.8	23.6	0.9	5.1	40	8	8.3	12
(northern high plains)	5.9	2.5	19.6	19.4	0.8	4.0	32	6	5.4	9
(southern high plains)	4.7	2.1	14.3	14.3	0.7	3.5	34	6	6.5	11

Crumb grain is 6=outstanding, 5=excellent, 4=satisfactory, 3=satisfactoy-to-questionable, 2=questionable, 1=questionable-to-satisfactory, and 0=unsatisfactory. A"*" denotes a hybrid wheat variety. A"**" denotes a hard white winter wheat variety.

Table A41. Physical grain characteristics of TX91D6913, cultivars, and check cultivars in the Southern Regional Performance Nursery in 1996.

Cultivar	Test weight (lb/bu)	1000 kernel weight (g)	Kernel sizing (%)			SKWCS average kernel			Hardness score	
			Lg	Md	Sm	Moisture (%)	Weight (mg)	Diameter (mm)	SKWCS	NIR
TX91D6913										
(north-central plains)	60.0	32.1	78.6	21.0	0.4	11.5	35.0	2.76	75	64
(south-central plains)	57.3	27.0	50.5	48.9	0.7	11.6	28.9	2.41	78	69
(northern high plains)	58.8	32.3	77.9	21.7	0.4	11.7	36.7	2.75	63	66
(southern high plains)	55.2	21.2	18.8	77.3	4.0	11.4	26.4	2.24	71	71
AP7510*)										
(north-central plains)	62.0	26.9	58.8	40.0	1.2	11.8	30.7	2.61	79	70
(south-central plains)	59.9	23.7	34.5	63.0	2.6	12.0	26.4	2.39	81	75
(northern high plains)	60.6	27.7	62.1	36.2	1.7	11.8	29.4	2.49	66	61
(southern high plains)	55.6	18.1	5.5	83.5	11.0	11.2	22.6	2.04	70	76
Kharkof										
(north-central plains)	60.8	29.2	57.8	41.9	0.3	12.1	29.5	2.45	50	42
(south-central plains)	59.1	24.7	40.0	59.2	0.8	11.9	27.8	2.31	49	48
(northern high plains)	60.5	27.7	50.9	48.3	0.8	10.3	30.8	2.48	47	45
(southern high plains)	56.8	20.3	10.7	84.9	4.4	11.1	24.4	2.11	60	59
Scout 66										
(north-central plains)	61.6	32.4	73.3	26.4	0.3	11.5	34.8	2.80	62	69
(south-central plains)	60.3	27.1	44.8	54.5	0.8	11.5	28.9	2.40	72	73
(northern high plains)	61.1	32.2	75.2	24.1	0.6	10.3	35.0	2.74	57	71
(southern high plains)	57.2	20.5	12.5	81.7	5.8	10.9	24.9	2.14	69	63
TAM 107										
(north-central plains)	60.4	32.8	81.0	18.4	0.6	11.5	36.0	2.71	64	57
(south-central plains)	59.9	29.7	60.6	38.8	0.7	10.8	31.4	2.49	70	75
(northern high plains)	59.7	35.9	85.4	14.2	0.5	10.0	38.8	2.90	58	76
(southern high plains)	56.4	21.9	20.4	75.6	4.0	10.8	26.1	2.20	69	78
TAM 110										
(north-central plains)	60.8	34.0	84.4	14.9	0.7	11.4	36.8	2.78	68	79
(south-central plains)	59.4	30.2	67.1	32.1	0.8	11.8	32.2	2.49	72	71
(northern high plains)	59.2	33.4	79.1	20.2	0.7	11.5	34.9	2.60	64	75
(southern high plains)	55.8	20.5	15.8	77.8	6.4	11.4	26.6	2.27	70	81

Table A41. (continued)

Cultivar	Test weight (lb/bu)	1000 kernel weight (g)	Kernel sizing (%)			SKWCS average kernel			Hardness score	
			Lg	Md	Sm	Moisture (%)	Weight (mg)	Diameter (mm)	SKWCS	NIR
Test Mean										
(north-central plains)	61.1	30.9	70.9	28.5	0.6	11.5	33.4	2.69	66	66
(south-central plins)	60.0	27.1	48.8	50.3	1.0	11.8	29.2	2.43	69	67
(northern high plains)	59.9	31.3	69.5	29.8	0.7	11.4	33.5	2.64	58	64
(southern high plains)	56.3	20.8	14.7	79.7	5.6	11.2	25.5	2.19	63	70
St.dev.										
(north-central plains)	1.1	3.0	11.1	10.9	0.4	0.3	2.8	0.1	10	12
(south-central plains)	1.2	2.5	11.8	11.5	0.5	0.3	2.1	0.1	12	13
(northern high plains)	0.9	3.1	11.0	10.8	0.3	0.4	2.6	0.1	11	12
(southern high plains)	1.0	1.6	6.5	5.6	2.0	0.2	1.9	0.1	7	10
CV (%)										
(north-central plains)	1.8	9.6	15.6	38.0	67.1	2.4	8.4	4.82	15	18
(south-central plains)	1.9	9.3	24.3	22.8	52.2	2.7	7.4	4.68	18	19
(northern high plains)	1.5	10.0	15.8	36.1	46.3	3.8	7.8	4.49	19	18
(southern high plains)	1.8	7.9	44.3	7.0	35.6	1.9	7.5	4.70	12	15

Kernel sizing is Lg = large kernels (overs of Tyler #7); Md = medium kernels (overs of Tyler #9); and Sm = small kernels (thrus of Tyler #9). SKWCS = Single Kernel Wheat Classification System. Wheat hardness scores determined by Near-infrared (NIR) and by SKWCS; the higher the value, the harder the sample. A"*" denotes a hybrid wheat variety.

Table A42. Chemical, milling, and mixograph data of TX91D6913, cultivars, and check cultivars in the Southern Regional Performance Nursery in 1996.

Cultivar	Wheat grain (%)		Flour yield (%)	Milling score	Flour			Mixograph			
	Ash	Protein			Ash (%)	Protein (%)	Color value	Absorption (%)	Mix as is (min)	Mix corr. (min)	Tolerance
TX91D6913											
(north-central plains)	1.61	12.9	67.4	79	0.44	11.6	83	64.6	3:60	3:43	4
(south-central plains)	1.48	14.1	66.7	79	0.45	12.9	82	64.7	3:55	3:55	4
(northern high plains)	1.52	12.8	68.5	81	0.45	11.8	84	63.9	3:27	3:18	3
(southern high plains)	1.60	16.6	66.2	82	0.46	15.3	81	67.6	3:78	3:78	4
AP7510*											
(north-central plains)	1.80	13.7	68.4	79	0.45	12.1	83	63.4	4:12	4:12	3
(south-central plains)	1.56	14.8	68.2	79	0.43	13.3	80	64.5	4:40	4:40	4
(northern high plains)	1.58	13.0	68.7	80	0.45	11.8	84	62.9	3:84	3.75	1
(southern high plains)	1.71	17.8	64.8	75	0.49	16.1	78	65.5	3:93	3:93	3
Kharkof											
(north-central plains)	1.80	14.9	63.1	75	0.45	13.2	89	63.2	4:56	4:56	4
(south-central plains)	1.62	15.6	63.7	71	0.46	13.9	88	63.2	4:33	4:33	3
(northern high plains)	1.70	14.6	63.2	77	0.45	13.3	90	63.6	3:67	3:67	4
(southern high plains)	1.62	16.9	61.9	64	0.49	14.8	85	66.9	4:08	4:08	2
Scout 66											
(north-central plains)	1.63	14.4	69.6	81	0.43	12.9	85	66.4	3:25	3:25	3
(south-central plains)	1.45	14.0	69.7	82	0.42	12.9	82	65.5	3:26	3:26	3
(northern high plains)	1.51	13.2	70.3	86	0.41	12.2	86	65.4	3:08	3:08	4
(southern high plains)	1.46	15.6	68.1	81	0.43	14.4	81	67.1	3:64	3:64	4
TAM 107											
(north-central plains)	1.61	12.3	68.3	83	0.42	11.1	83	63.6	3:67	3:27	4
(south-central plains)	1.32	13.0	68.1	78	0.40	11.8	82	64.9	3:91	3:80	4
(northern high plains)	1.51	13.1	67.8	83	0.40	11.8	82	65.0	3:95	3:87	3
(southern high plains)	1.47	15.3	67.7	75	0.46	13.8	78	66.7	3:09	3:09	4
TAM 110											
(north-central plains)	1.63	12.6	67.7	78	0.44	11.1	82	64.7	3:95	3:52	4
(south-central plains)	1.36	12.8	68.1	74	0.44	11.4	84	63.2	4:02	3:71	4
(northern high plains)	1.51	12.8	68.1	78	0.44	11.4	83	63.7	4:01	3:73	4
(southern high plains)	1.58	15.2	66.3	77	0.50	14.1	78	66.6	3:87	3:87	4

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9900067

Table A42. (continued)

Cultivar	Wheat grain (%)		Flour yield (%)	Milling score	Flour			Mixograph			
	Ash	Protein			Ash (%)	Protein (%)	Color value	Absorption (%)	Mix as is (min)	Mix corr. (min)	Tolerance
Test Mean											
(north-central plains)	1.71	13.4	67.7	80	0.44	11.9	84	64.4	3:98	3:81	4
(south-central plins)	1.45	13.9	68.1	78	0.42	12.5	84	64.2	4:13	4:09	4
(northern high plains)	1.56	13.1	68.2	81	0.43	11.9	85	63.8	3:79	3:66	3
(southern high plains)	1.58	16.1	65.4	78	0.46	14.7	81	66.7	3:89	3:89	3
St.dev.											
(north-central plains)	0.1	0.8	2.5	4	0.0	0.7	2	1.3	0.8	0.8	1
(south-central plains)	0.1	0.7	2.6	5	0.0	0.7	3	0.9	0.9	0.9	1
(northern high plains)	0.1	0.6	2.3	4	0.0	0.6	3	0.9	0.7	0.7	1
(southern high plains)	0.1	0.6	2.9	5	0.0	0.6	3	1.0	0.8	0.8	1
CV (%)											
(north-central plains)	6.2	5.9	3.6	5	6.4	6.3	3	2.0	19.9	20.6	24
(south-central plains)	5.6	4.9	3.8	6	8.6	5.2	4	1.4	21.4	21.3	30
(northern high plains)	4.4	4.5	3.4	5	7.3	4.9	3	1.5	19.6	19.9	44
(southern high plains)	4.5	4.0	4.4	6	5.9	3.8	4	1.5	19.9	19.9	41

Milling score = 100-{(test weight-60) + (82-flour yield) + 100(flour ash - wheat ash/3.9) + 10[(wheat protein - 1) - flour protein]}. Color values closer to 100 are better. Mixing tolerance is 6=outstanding, 5=excellent, 4=satisfactory, 3=satisfactoy-to-questionable, 2=questionable, 1= questionable-to-satisfactory, and 0=unsatisfactory. A"*" denotes a hybrid wheat variety.

Table A43. Bread-making data of TX91D6913, cultivars, and check cultivars in the Southern Regional Performance Nursery in 1996.

Cultivar	Flour protein (%)	Absorption (%)	Mix time		Dough		Crumb grain	Loaf volume		
			As is (min)	Corr. (min)	Weight (g)	Proof height (cm)		As rec'd (cc)	Specific volume (cc/g)	Regression (cc/%protein)
TX91D6913										
(north-central plains)	11.6	66.3	4:00	3:81	176.2	7.5	3	905	6.0	70
(south-central plains)	12.9	67.1	4:50	4:50	176.8	7.8	4.2	950	6.3	65
(northern high plains)	11.8	64.5	3:50	3:40	174.3	7.7	4.0	960	6.4	75
(southern high plains)	15.3	67.7	4:88	4:88	177.3	7.8	4.0	1040	6.8	60
AP7510*										
(north-central plains)	12.1	64.3	3:75	3:75	174.0	7.6	2	925	6.2	68
(south-central plains)	13.3	65.4	4:75	4:75	174.2	7.6	2.8	945	6.3	62
(northern high plains)	11.8	63.7	4:88	4:77	173.1	7.9	3.0	930	6.2	71
(southern high plains)	16.1	66.1	3:75	3:75	174.8	7.9	2.8	1000	6.6	54
Kharkof										
(north-central plains)	13.2	67.2	5:13	5:13	177.5	7.7	3	885	5.8	57
(south-central plains)	13.9	66.0	4:88	4:88	175.7	7.9	4.0	985	6.5	63
(northern high plains)	13.3	65.4	3:63	6:63	175.0	7.6	3.0	970	6.4	65
(southern high plains)	14.8	68.6	4:38	4:38	176.8	8.2	3.0	1035	6.8	62
Scout 66										
(north-central plains)	12.9	68.6	3:13	3:13	177.9	8.1	3	1000	6.5	71
(south-central plains)	12.9	66.3	3:63	3:63	175.7	7.8	3.5	965	6.4	67
(northern high plains)	12.2	65.7	3:63	3:63	175.1	7.6	3.0	955	6.3	71
(southern high plains)	14.4	67.3	4:88	4:88	176.9	8.0	4.0	1060	6.9	67
TAM 107										
(north-central plains)	11.1	67.8	5:13	4:57	177.3	7.5	2	935	6.2	78
(south-central plains)	11.8	67.8	4:50	4:37	177.9	7.5	3.5	975	6.3	77
(northern high plains)	11.8	65.8	3:75	3:67	175.6	7.7	3.0	935	6.2	72
(southern high plains)	13.8	67.3	3:50	3:50	176.6	7.8	2.5	1005	6.6	65
TAM 110										
(north-central plains)	11.1	66.5	4:00	3:57	175.1	7.7	3	945	6.2	79
(south-central plains)	11.4	67.9	4:38	4:04	175.0	7.6	2.5	985	6.5	82
(northern high plains)	11.4	64.7	4:00	3:72	174.0	7.2	3.0	895	5.9	70
(southern high plains)	14.1	70.2	4:88	4:88	179.2	8.0	2.8	1122	7.3	74

Table A43. (continued)

Cultivar	Flour protein (%)	Absorption (%)	Mix time		Dough		Crumb grain	Loaf volume		
			As is (min)	Corr. (min)	Weight (g)	Proof height (cm)		As rec'd (cc)	Specific volume (cc/g)	Regression (cc/%protein)
Test Mean										
(north-central plains)	11.9	66.2	4:36	4:17	175.8	7.6	3	923	6.1	70
(south-central plins)	12.5	66.2	5:11	5:07	175.4	7.7	3.5	969	6.4	71
(northern high plains)	11.9	64.5	4:11	3:98	174.1	7.6	3.0	940	6.2	72
(southern high plains)	14.7	68.3	4:57	4:57	177.3	7.9	3.3	1031	6.7	63
St.dev.										
(north-central plains)	0.7	1.9	1.3	1.3	1.8	0.2	1	59	0.4	6
(south-central plains)	0.7	1.7	1.6	1.6	1.4	0.2	0.6	48	0.3	6
(northern high plains)	0.6	1.8	1.1	1.2	1.5	0.2	0.8	45	0.3	5
(southern high plains)	0.6	1.4	1.2	1.2	1.2	0.2	0.7	43	0.3	4
CV (%)										
(north-central plains)	6.3	2.8	29.8	31.2	1.0	3.0	26	6	6.7	9
(south-central plains)	5.2	2.5	30.5	30.7	0.8	3.1	17.7	5	5.2	8
(northern high plains)	4.9	2.8	27.7	29.3	0.9	3.1	26.0	5	4.9	7
(southern high plains)	3.8	2.0	26.3	26.3	0.7	2.2	21.1	4	4.4	7

Crumb grain is 6=outstanding, 5=excellent, 4=satisfactory, 3=satisfactoy-to-questionable, 2=questionable, 1=questionable-to-satisfactory, and 0=unsatisfactory. A"*" denotes a hybrid wheat variety.

 FORM APPROVED - OMB NO. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S)
Texas Agricultural Experiment Station

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER
TX91D6913

3. VARIETY NAME
TAM 302

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP, and Country)*
Room 110 Administration Building
College Station, TX 77843-2147

5. TELEPHONE *(include area code)*
409/847-8682

6. FAX *(include area code)*
409/845-1402

7. PVPO NUMBER
9900067

8. Does the applicant own all rights to the variety? *Mark an "X" in appropriate block.* If no, please explain. [X] YES [ ] NO

9. Is the applicant (individual or company) a U.S. national or U.S. based company? [X] YES [ ] NO
If no, give name of country

10. Is the applicant the original owner? [X] YES [ ] NO *If no, please answer one of the following:*

a. If original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. national(s)?
[ ] YES [ ] NO **If no, give name of country**

b. If original rights to variety were owned by a company(ies), is(are) the original owner(s) a U.S. based company?
[ ] YES [ ] NO **If no, give name of country**

11. Additional explanation on ownership *(if needed, use reverse for extra space)*:
TAES policy and handbook manual provide that all germplasm and varieties developed by its employees in the course of their duties are owned by TAES. A copy of this policy is provided for your records.

PLEASE NOTE:

Plant variety protection can be afforded only to owners (not licensees) who meet one of the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.

2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.

3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definition.