

No.

20000324



# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

## Monsanto Company

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, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT, COMMON

'W91-233-21'

*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 twenty sixth day of November, in the year two thousand two.*



Attest:

*Paul M. Jahn*

Commissioner  
Plant Variety Protection Office  
Agricultural Marketing Service

*[Signature]*  
Secretary of Agriculture

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

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).

**APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE**  
 (Instructions and information collection burden statement on reverse)

1. NAME OF APPLICANT(S) (as it is to appear on the Certificate) <b>Monsanto Company</b>		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER <b>W91-233-21</b>		3. VARIETY NAME <b>W91-233-21</b>	
4. ADDRESS (Street and No. or R.F.D. No., City, State, and Zip Code) <b>Wichita Wheat Technology Center 5912 N. Meridian Street Wichita, Kansas 67204 1699</b> <i>700 chesterfield parkway North St. Louis MO 63198</i>		5. TELEPHONE (include area code) <b>316-755-7705</b>		FOR OFFICE USE ONLY PVPO NUMBER <b>200000324</b>	
7. GENUS AND SPECIES NAME <b><u>Triticum aestivum</u></b>		8. FAMILY NAME (Botanical) <b>Gramineae</b>		DATE <b>August 16, 2000</b>	
9. CROP KIND NAME (common name) <b>Hard Red Winter Wheat</b>				FILING AND EXAMINATION FEE: <b>2450.00</b>	
10. IF THE APPLICANT NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) (common name) <b>Corporation</b>				DATE <b>8/16/2000</b>	
11. IF INCORPORATED, GIVE STATE OF INCORPORATION <b>Delaware</b>		12. DATE OF INCORPORATION <b>1933</b>		CERTIFICATION FEE <b>320.00</b>	
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS <b>Mr. Randy Rich</b> <b>5912 North Meridian Street</b> <b>Wichita, Kansas 67204</b> <i>SALLY METZ</i> <i>700 chesterfield parkway North</i> <i>St. Louis, MO 63198</i>		AND <b>Dr. Rollin Sears</b> <b>12115 Tully Hill Road</b> <b>Junction City, Kansas 66441-7658</b> <b>785-5655-8305</b>		14. TELEPHONE (include area code) <b>316-755-7705</b>	
16. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (follow instructions on reverse)				15. FAX (include area code) <b>316-755-0072</b>	
a. <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety					
b. <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness					
c. <input checked="" type="checkbox"/> Exhibit C. Objective Description of the Variety					
d. <input checked="" type="checkbox"/> Exhibit D. Additional Description of the Variety					
e. <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Applicant's Ownership					
f. <input checked="" type="checkbox"/> 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. <input checked="" type="checkbox"/> 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)					
<input type="checkbox"/> YES (if "yes", answer items 18 and 19 below)		<input checked="" type="checkbox"/> NO (if "no", go to item 20)			
18. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? 19. IF 'YES' TO ITEM 18, WHICH CLASSES OF PRODUCTION BEYOND BREEDERS SEED?					
<input checked="" type="checkbox"/> YES		<input type="checkbox"/> NO		<input checked="" type="checkbox"/> FOUNDATION <input checked="" type="checkbox"/> REGISTERED <input checked="" type="checkbox"/> 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?					
<input checked="" type="checkbox"/> YES (IF "YES", give names of countries and dates)		<input type="checkbox"/> NO			
<b>Sold in Idaho and Washinton States in August of 1999. (August 20, 1999)</b>					
21. The applicant(s) declare that a viable sample of basic seed of the variety will be furnished with the 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 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)) <i>Randy K. Rich</i>			SIGNATURE OF APPLICANT (Owner(s))		
NAME (Please print or type) <b>Randy Rich</b>			NAME (Please print or type)		
CAPACITY OR TITLE <b>Program Director</b>		DATE <b>7/26/2000</b>	CAPACITY OR TITLE		DATE

***Exhibit A.***  
***Origin and Breeding History of W91-233-21***

W91-233 was an F3 derived single plant selection from the cross Era / Tobari 66 // Lovrin 11 /3/ Oligoculm /4/ Archer /5/ 86PYI042-192. 86PYI042-192 is the Agripro experimental designation for an F6, single plant selection from a bulk population constituted at Berthoud, Colorado in 1981 on the basis of large spike size. The original bulk was made by combining three F2 populations with the following pedigrees: Plainsman V / Oligoculm // TX71A562-6; Plainsman V / Oligoculm // Sage; and Plainsman V / Oligoculm // Baca. This bulk was grown in Nardin, Oklahoma in 1982, 1983 and 1984 and in Berthoud, Colorado in 1985. The plant selection, made in Berthoud, Colorado in 1985, was based upon head size, plant height, fertility, and the absence of leaf rust. The final cross for W91-233 was made in 1986 and the plant selection based upon plant height, fertility and the absence of leaf rust was made in Berthoud, Colorado in 1989. The resulting F4 plant row was tested in preliminary yield trials in 1990 and advanced on the basis of uniform plant height and the absence of soilborne mosaic virus symptoms and leaf rust resistance. The line was given the experimental designation, W91-233, and was tested as a pure-line in replicated trials in 1991 and 1992.

In 1992, 48 head-rows were grown in Berthoud, Colorado and evaluated for phenotypic similarity. One unique head-row was selected on the basis of plant height, maturity and straw strength. Seed from the selected head-row (designated W91-233-21) was planted as a progeny plot in 1993. The remaining seed from this head row was used as the trial seed source for replicated trials in 1993. Seed from the 1993 progeny plot was used for additional replicated trialing in 1994 and an initial seed increase in 1996. The replicated trials represent a broad geographic area in the Hard Winter Wheat region and in the Pacific Northwest. In 1997 a 0.4 acre Breeders seed increase was grown in Washington and partially abandoned. In 1999 a 43 acre Breeders seed increase was grown in Washington. There are 192 acres of foundation seed production being grown in Washinton and Idaho in 2000.

W91-233-21 has been uniform and stable since 1995. About 0.7% of the plants were rogued from the Breeders seed increase in 1998. Approximately 70% of the rogued variant plants were taller height wheat plants (5 to 15 cm.), 8% were awnletted wheat plants, and 4% were bronze chaff. A white seeded variant of 0.05% has also been identified in the Breeders seed production plots. Up to 1.0% variant plants may be encountered in subsequent generations.

***Exhibit B.***  
***Statement of Distinctness***

W91-233-21 is most similar to the hard red winter wheat 'Big Dawg'. However, it can be easily distinguished by the following morphological characteristics:

- W91-233-21 has a strap head shape (Berthoud, Colorado 1995 and 1996). Big Dawg has a tapering head shape (Berthoud, Colorado 1995 and 1996).
- W91-233-21 has an oblique shoulder shape on the glume (Berthoud, Colorado 1995 and 1996). Big Dawg has a rounded shoulder shape on the glume (Berthoud, Colorado 1995 and 1996).

**OBJECTIVE DESCRIPTION OF VARIETY**  
 WHEAT (*Triticum* Spp.)

NAME OF APPLICANT(S) <b>Monsanto Company</b>	FOR OFFICIAL USE ONLY
	PVPO NUMBER <b>200000324</b>
ADDRESS ( <i>Street and No. or R.F.D. No., City, State, and Zip Code</i> ) <b>5912 N. Meridian Street Wichita, Kansas 67204-1699</b>	NAME OR EXPERIMENTAL DESIGNATION <b>W91-233-21</b>

Place the appropriate number that describes the varietal character of this variety in the boxes below.  
 Place a zero in the first box 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 standard may be used to determine plant colors; designate system used.  
 Please answer all questions for your variety; lack of response may delay progress of your application.

1. KIND:

1=Common    2=Durum    3=Club    4=Other (*specify*) \_\_\_\_\_

2. VERNALIZATION:

1=Spring    2=Winter    3=Other (*specify*) \_\_\_\_\_

3. COLEOPTILE ANTHOCYANIN:

1=Absent    2=Present

4. JUVENILE PLANT GROWTH:

1=Prostrate    2=Semi-erect    3=Erect

5. PLANT COLOR (*boot stage*):

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

6. FLAG LEAF (*boot stage*):

1 = Erect    2 = Recurved

1 = Not Twisted    2 = Twisted

7. EAR EMERGENCE:

Number of Days Earlier Than \_\_\_\_\_ \*

Number of Days Later Than **Tomahawk** \*

8. ANTHER COLOR:

1 = YELLOW    2 = PURPLE

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

cm Taller Than \_\_\_\_\_ \*

cm Shorter Than **Tomahawk** \*

\* Relative to a PVPO-Approved Commercial Variety Grown in the Same Trial

## 10. STEM:

## A. ANTHOCYANIN

**1** 1= Absent 2=Present

## B. WAXY BLOOM

**2** 1=Absent 2=PresentC. HAIRINESS (*last internode of rachis*)**1** 1=Absent 2=PresentD. INTERNODE (*specify number*) \_\_\_\_\_**1** 1=Hollow 2=Semi-solid 3=Solid

## E. PEDUNCLE

**1** 1=Erect 2=Recurved**1 8** cm Length11. HEAD (*at Maturity*):

## A. DENSITY

**2** 1=Lax 2=Middense 3=Dense

## B. SHAPE

**2** 1 = Tapering 2= Strap 3 = Clavate 4 = Other (*specify*) \_\_\_\_\_

## C. CURVATURE

**2** 1 = Erect 2 = Inclined 3 = Recurved

## D. AWNEDNESS

**4** 1 = Awnless 2 = Apically Awnletted 3 = Awnletted 4 = Awned12. GLUMES (*at Maturity*):

## A. COLOR

**1** 1 = White 2 = Tan 3 = Other (*specify*) \_\_\_\_\_

## B. SHOULDER

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

## C. BEAK

**3** 1 = Obtuse 2 = Acute 3 =Acuminate

## D. LENGTH

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

## E. WIDTH

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

## 13. SEED:

## A. SHAPE

**1** 1 = Ovate 2 = Oval 3 = Elliptical

## B. CHEEK

**1** 1=Rounded 2=Angular

## C. BRUSH

**2** 1=Short 2=Medium 3=Long**1** 1 = Not Collared 2 = Collared

## D. CREASE

**1** 1 = Width 60% or less of Kernel  
2 = Width 80% or less of Kernel  
3 = Width Nearly as Wide as Kernel**1** 1 = Depth 20% or less of Kernel  
2 = Depth 35% or less of Kernel  
3 = Depth 50% or less of Kernel

13. SEED: (continued)

E. COLOR

3 1 = White 2 = Amber 3 = Red 4 = Other (specify) \_\_\_\_\_

F. TEXTURE

1 1=Hard 2=Soft

G. PHENOL REACTION (see instructions):

0 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

<input checked="" type="checkbox"/> 4	Stem Rust ( <i>Puccinia graminis</i> f. sp. <i>tritici</i> ) Field races	<input checked="" type="checkbox"/> 4	Leaf Rust ( <i>Puccinia recondita</i> f. sp. <i>tritici</i> ) Field races
<input checked="" type="checkbox"/> 1	Stripe Rust ( <i>Puccinia striiformis</i> ) PNW field races	<input checked="" type="checkbox"/> 0	Loose Smut ( <i>Ustilago tritici</i> )
<input checked="" type="checkbox"/> 0	Tan Spot ( <i>Pyrenophora tritici-repentis</i> )	<input checked="" type="checkbox"/> 0	Flag Smut ( <i>Urocystis agropyri</i> )
<input checked="" type="checkbox"/> 0	Halo Spot ( <i>Selenophoma donacis</i> )	<input checked="" type="checkbox"/> 0	Common Bunt ( <i>Tilletia tritici</i> or <i>T. laevis</i> )
<input checked="" type="checkbox"/> 0	<i>Septoria nodorum</i> (Glume Blotch)	<input checked="" type="checkbox"/> 0	Dwarf Bunt ( <i>Tilletia controversa</i> )
<input checked="" type="checkbox"/> 0	<i>Septoria avenae</i> (Speckled Leaf Disease)	<input checked="" type="checkbox"/> 0	Karnal Bunt ( <i>Tilletia indica</i> )
<input checked="" type="checkbox"/> 0	<i>Septoria tritici</i> (Speckled Leaf Blotch) Field races	<input checked="" type="checkbox"/> 0	Powdery Mildew ( <i>Erysiphe graminis</i> f. sp. <i>tritici</i> ) Field races
<input checked="" type="checkbox"/> 0	Scab ( <i>Fusarium</i> spp.)	<input checked="" type="checkbox"/> 0	Snow Molds
<input checked="" type="checkbox"/> 0	Black Point (Kernel Smudge)	<input checked="" type="checkbox"/> 0	Common Root Rot ( <i>Fusarium</i> , <i>Cochliobolus</i> and <i>Bipolaris</i> spp.)
<input checked="" type="checkbox"/> 0	Barley Yellow Dwarf Virus (BYDV)	<input checked="" type="checkbox"/> 0	Rhizoctonia Root Rot ( <i>Rhizoctonia solani</i> )
<input checked="" type="checkbox"/> 0	Soilborne Mosaic Virus (SBMV) Field races	<input checked="" type="checkbox"/> 0	Black Chaff ( <i>Xanthomonas campestris</i> pv. <i>translucens</i> )
<input checked="" type="checkbox"/> 0	Wheat Yellow (Spindle Streak) Mosaic Virus Field races	<input checked="" type="checkbox"/> 0	Bacterial Leaf Blight ( <i>Pseudomonas syringae</i> pv. <i>syringae</i> )
<input checked="" type="checkbox"/> 0	Wheat Streak Mosaic Virus (WSMV) Field races	<input type="checkbox"/>	Other (specify) _____
<input type="checkbox"/>	Other (specify) _____	<input type="checkbox"/>	Other (specify) _____
<input type="checkbox"/>	Other (specify) _____	<input type="checkbox"/>	Other (specify) _____
<input type="checkbox"/>	Other (specify) _____	<input type="checkbox"/>	Other (specify) _____



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

PLEASE SPECIFY BIOTYPE (where needed)

<input checked="" type="checkbox"/> 0	Hessian Fly ( <i>Mayetiola destructor</i> )	<input type="checkbox"/>	Other ( <i>specify</i> )
<input checked="" type="checkbox"/> 0	Stem Sawfly ( <i>Cephus</i> spp.)	<input type="checkbox"/>	Other ( <i>specify</i> )
<input checked="" type="checkbox"/> 0	Cereal Leaf Beetle ( <i>Oulema melanopa</i> )	<input type="checkbox"/>	Other ( <i>specify</i> )
<input checked="" type="checkbox"/> 0	Russian Aphid ( <i>Diuraphis noxia</i> )	<input type="checkbox"/>	Other ( <i>specify</i> )
<input checked="" type="checkbox"/> 0	Greenbug ( <i>Schizaphis graminum</i> )	<input type="checkbox"/>	Other ( <i>specify</i> )
<input checked="" type="checkbox"/> 0	Aphids		

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

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*Exhibit D.*  
*Additional Description of W91-233-21*

W91-233-21 is a hard red winter wheat bred and developed by Agripro Wheat. W91-233-21 is a medium height semidwarf with medium-early maturity. W91-233-21 offers tolerance to Leaf rust and Stem rust. Milling and baking characteristics are acceptable.

Juvenile growth habit is semierect. Plant color at boot stage is blue green. Auricle anthocyanin and auricle hairs are present. Flag leaf at boot stage is recurved and twisted. Waxy bloom is present on the head, stem and flag leaf sheath. Anther color is yellow. Head shape is strap and awned. Glumes are glabrous, wide in width and long in length with oblique shoulders and acuminate beaks. Seed shape is ovate. Brush hairs are medium in size and occupy a large area of the seed. Seed crease depth is shallow and width is narrow. Seed cheeks are rounded.

W91-233-21 has been evaluated for adaptation in Oregon, Washington, and western Idaho since 1995.

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# AgriPro Wheat

## HRWW Quality Summary

Year-Loc	Flour/Wheat Quality				Mixogram				Baking Quality				Crumb		Over	
	Wht Prot	Flr Prot	Norris Hard	Flr Yld	Ash	Peak Time	Ht	Tol	Abs	Mix Time	Loaf Vol	Grain	Tex	Color	All	R
	14%mb	14%mb	%	%	mm	N.U.	mm	%	min	cc	R	R	R	R	R	R
1994 - BR	11.8	128			3.25	4.8	708	64.0								
1993 - BR	10.7	122			3.25	4.8	886	62.0								
1993 - TI	13.4	2	50	69.4	0.540	5.0	733	64.0	2.25	5	820	3	2	1	2	39
1992 - SK	13.9	4	63	66.6	3.00	5.0	1124	64.0	3.00	4	950	3	3	2	2	44
1991 - NO	14.1	4	53	72.7	2.75	5.0	1249	62.0	2.75	5	990	4	2	2	2	44
<b>Average</b>	<b>13.8</b>	<b>3</b>	<b>83</b>	<b>69.6</b>	<b>0.540</b>	<b>4.9</b>	<b>940</b>	<b>63.2</b>	<b>2.67</b>	<b>5</b>	<b>920</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>42</b>

W91-233-21

Ratings 1-2=Excellent 3-4=Good 5-6=Acceptable 7-8=Questionable 9=Unacceptable

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Data Summary

Var./Line	Heading	Maturity	Coleoptile	Height	Straw	Leaf Rust	Stem Rust	Powdery Mildew	Hessian fly	WSMV	SBMV	SSMV
W91-233-21	5	5	5	3	4	3	3	2	9	5	8	5
TOMAHAWK	4	4	4	4	4	3	5	3	8	8	3	4

Data generated in 1990 (W91-233):

Colorado - Heading, Leaf Rust, Powdery mildew  
Wichita, KS - Maturity, Leaf Rust

Data generated in 1991(W91-233):

Colorado - Yield, Test Wt., Heading, Height, Leaf Rust, Lodge Severity,  
Powdery mildew, Hessian fly, Aluminum tolerance (Lab Screen),  
Coleoptile length

Beloit, KS - Tan Spot

Salina, KS - Yield, Test Wt., Heading, Height, Leaf Rust, Septoria

Everest, KS - Winterkill, Spindle Streak, Soilborne

Saint John, KS - Spindle Streak

Dumas, TX - Test Wt., Shatter, Leaf Rust

Wichita, KS - Leaf Rust, Septoria, Tan Spot

Nardin, OK - Yield, Test Wt.

Data generated in 1992 (W91-233):

Colorado - Yield, Test Wt., Heading, Height, Lodge Severity,  
Greenhouse Screening for: Coleoptile, Tan Spot, Stem Rust,

Powdery Mildew, and Hessian fly

Imperial, NE - Yield

Salina, KS - Yield, Test Wt., Leaf rust

Wichita, KS - Test Wt., Leaf rust

Garden City, KS - BYDV (Visual screening).

Hugoton, KS - WSMV (Visual screening).

Nardin, OK - Maturity, Lodge breakage, Leaf rust

Data generated in 1993 (W91-233 and W91-233-21):

Colorado - Yield, Test Wt., Maturity, Lodge severity, Leaf rust, Powdery mildew

Salina, KS - Maturity, Leaf rust

Wichita, KS - Septoria, Tan Spot

Goodland, KS - Yield

Rome, KS - Yield, Test Wt.

Geneva, NE - Yield, Green leaf retention

Imperial, NE - Yield, Test Wt., Maturity

Hereford, TX - Yield, Test Wt., Shatter

Dumas, TX - Yield, Test Wt.,

Nardin, OK - Leaf rust, Green leaf retention, Septoria, Tan Spot

Data generated in 1994 (W91-233-21):

Colorado - Yield, Test Wt., Heading, Pollination, Maturity, Height,  
Leaf Rust (greenhouse screening), Powdery Mildew, Hessian fly,  
Coleoptile length

Salina, KS - Yield, Test Wt.,

Garden City, KS - Yield, Leaf rust, Shatter

Hays, KS - WSMV (Visual screening).

Nardin, OK - Yield, Test Wt., Septoria nodorum, Leaf rust, Green leaf retention  
Imperial, NE: - Yield, Test Wt.

Data generated in 1995 (W91-233-21):

Colorado - Yield, Test Wt., Heading, Lodge severity, Leaf rust,  
Powdery mildew, Hessian fly, Aluminum tolerance (Lab Screen),  
Coleoptile length

Salina, KS - Yield, Test Wt., Heading, Height, Leaf rust, Septoria  
Everest, KS - Yield, Test Wt.

Beloit, KS - Yield, Test Wt., Tan spot

Goodland, KS - Yield, Test Wt., Lodge severity

Saint John, KS - Spindle Streak

Burlington, CO - Yield

Imperial, NE - Yield, Test Wt.

Dumas, TX - Yield, Test Wt. Shatter, Leaf rust

Nardin, OK - Green leaf retention

Note: Rankings in this table represent the average for a given trait on a 1-9 scale where 1 and 9 represent the extremes for the respective traits.

Trait	1	9
Heading	early	late
Maturity	early	late
Coleoptile	long	short
Height	short	tall
Straw Strength	strong	weak
All disease & insect ratings	resistant	susceptible

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233-21, 233 data

Yield Summary Over-years by Region and State

Region	Yield (Bu/A)		1991 Yield (Bu/A)		1992 Yield (Bu/A)		1993 Yield (Bu/A)		1994 Yield (Bu/A)		1995 Yield (Bu/A)		TOMAHAWK	
	Locs	W91-233-21	Locs	W91-233	Locs	W91-233	Locs	W91-233	Locs	W91-233-21	Locs	W91-233-21		
Continuous	5	41.0	5	37.9	5	41.2	5	56.6	5	142.8	5	118.5	5	26.0
Irrigated	8	96.5	10	103.8	10	98.2	10	115.8	10	142.8	10	125.7	10	64.3
Dryland	1	68.1	1	68.0	1	68.2	1	68.2	1	68.0	1	68.0	1	58.9
State														
Colorado	4	115.0	5	118.1	2	100.9	1	136.7	1	142.8	1	125.7	2	82.1
Kansas	6	52.7	4	50.2	1	48.5	1	56.6	1	54.2	2	25.3	2	28.1
Nebraska	2	86.4	3	71.8	1	63.3	1	84.9	2	79.5	2	47.8	2	50.1
Oklahoma	1	49.3	1	33.9	1	33.9	1	37.4	2	60.3	2	60.3	1	65.3
Texas	1	47.1	3	84.2	1	85.9	1	91.8	2	78.4	2	78.4	1	69.4
Overall	14	74.7	16	80.9	5	76.0	3	98.1	1	142.8	7	72.5	6	62.9



*Exhibit E.*  
*Statement of the Basis of Applicant's Ownership*

The variety for which Plant Variety Protection is hereby sought was developed by Dr. John Moffatt, an employee of Agripro Wheat. By agreement between employees and Agripro Wheat all rights to any invention, discovery, or development made by the employee while employed by Agripro Wheat, were assigned to Agripro Wheat, with no rights of any kind pertaining to 'W91-233-21' being retained by the employees.

By contractual agreement the variety 'W91-233-21' was purchased from Agripro Wheat, a business unit of Advanta USA, Inc. in June of 1996 and is currently owned by Monsanto Company.