No. 8900205

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Kansas Agricultural Experiment Station

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED 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 eighteen* 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 USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS [illegible] BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT

'2163'

AMENDED CERTIFICATE

*Original grant May 31, 1990.

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* 29th *day of* March *in the year of our Lord one thousand nine hundred and ninety-one.*

Attest:

Kenneth H. Evans

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Ed Madigan

Secretary of Agriculture

APPROVAL EXPIRES 2-28-88

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

FORM APPROVED: OMB NO. 0581-0055

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 on reverse)

1. NAME OF APPLICANT(S) KANSAS AGRICULTURAL ~~PIONEER HI-BRED INTERNATIONAL, INC.~~ ~~Plant Breeding Division~~ EXPERIMENT ~~Dept. of Cereal Seed Breeding~~ STATION

2. TEMPORARY DESIGNATION XW163

3. VARIETY NAME 2163

4. ADDRESS *(Street and No. or R.F.D. No., City, State, and Zip Code)* WATERS HALL, KANSAS STATE UNIVERSITY ~~7301 NW 62nd Ave., P.O. Box 85~~ ~~Johnston, IA 50131-0085~~ MANHATTAN, KS 66506-4008

5. PHONE *(Include area code)* ~~(515) 270-3311~~ (913) 532-6147

FOR OFFICIAL USE ONLY

PVPO NUMBER 8900205

6. GENUS AND SPECIES NAME Triticum aestivum L.

7. FAMILY NAME *(Botanical)* graminae

FILING — DATE May 9, 1989 — TIME 11:30 ☑ A.M. ☐ P.M.

8. KIND NAME Wheat

9. DATE OF DETERMINATION August 1, 1986

FEES RECEIVED — AMOUNT FOR FILING $ 1800.00 + 350.00 — DATE May 9, 1989; June 5, 1989 — AMOUNT FOR CERTIFICATE $ 250.00 — DATE May 3, 1990

10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION *(Corporation, partnership, association, etc.)* Corporation

11. IF INCORPORATED, GIVE STATE OF INCORPORATION Iowa

12. DATE OF INCORPORATION May, 1926

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS

~~Dr. Mark M. Iwig~~ VERNON A. SCHAFFER
~~7301 NW 62nd Ave., P.O. Box 85~~ DEPARTMENT OF AGRONOMY
~~Johnston, IA 50131-0083~~ THROCKMORTON HALL
KANSAS STATE UNIVERSITY
MANHATTAN, KS 66506-5501

PHONE *(Include area code)* ~~(515) 270-3311~~ (913) 532-6115

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED

a. ☒ Exhibit A, Origin and Breeding History of the Variety *(See Section 52 of the Plant Variety Protection Act.)*
b. ☒ Exhibit B, Novelty Statement.
c. ☒ Exhibit C, Objective Description of Variety *(Request form from Plant Variety Protection Office.)*
d. ☒ Exhibit D, Additional Description of Variety.
e. ☒ Exhibit E, Statement of the Basis of Applicant's Ownership.

15. DOES THE APPLICANT(S) 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.)* ☒ Yes *(If "Yes," answer items 16 and 17 below)* ☒ No

16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? ☒ Yes ☒ No

17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED? ☒ Foundation ☒ Registered ☒ Certified

18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.? ☐ Yes *(If "Yes," give date)* ☒ No

19. HAS THE VARIETY BEEN RELEASED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES? ☐ Yes *(If "Yes," give names of countries and dates)* ☒ No

20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is 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 Mark M. Iwig — DATE 5/1/89

SIGNATURE OF APPLICANT — DATE

FORM LS-470 (3-86) *Edition of 7-84 obsolete.*

14A. Exhibit A. Origin and Breeding History of the Variety

Pioneer cultivar 2163, Triticum aestivum L., em Thell., a hard red winter wheat, was developed by Pioneer Hi-Bred International, Inc. from the cross Pioneer line W558/Pioneer line W603. The exact parentage of W558 is not known. It is an F2-derived selection from the backcross of an unknown soft red winter wheat recurrent parent and a CIMMYT selection. W603 is an F3-derived selection from the cross Etoile de Choisy//Thorne/Clarkan/3/CI15342/4/Purdue 4946A4-18-2.

The single cross of Pioneer W558/Pioneer W603 was made in the 1974 winter greenhouse cycle. The F1 generation was grown in the field at Hutchinson, Kansas, in 1975. Single F2 heads were selected in 1976 and grown in 1977 as individual rows at Hutchinson. The resulting F3 headrow was bulk harvested and in 1978 was grown again at Hutchinson and Juniata, Nebraska. Subsequent bulks were grown in the field in Kansas and Nebraska until 1982 when heads were selected from the F7 bulk. These heads were planted as individual rows in 1982. One F7-derived row was selected in 1982 and the bulked seed from this row was planted as a progeny plot in 1983 at Hutchinson and Wellington, KS and Juniata, NE. This plot was selected for superior agronomic type and the bulk seed has been tested in replicated yield tests and milling and baking trials since 1983-84. In 1985-86 an increase (0.5 acre) of 2163 in the F12 generation was grown and rogued for purity. Seed harvested from this increase

14A. Exhibit A. (cont.)

became breeder's seed and was turned over to our parent seed personnel for further seed increase and maintenance.

2163 has demonstrated uniformity and stability for all traits as described in Exhibit C (form LMGS-470-6) -- "Objective Description of Variety".

14B. Exhibit B. Novelty Statement

2163 is an awned semidwarf hard red winter wheat cultivar, most similar to the cultivar, Pioneer 2172, in many phenotypic and agronomic traits. Certain similarities are expected since both cultivars have a common half parent (W558). While 2163 resembles 2172 in some characteristics, there are a number of distinguishable differences between the two cultivars. From the "Objective Description" it can be noted that 2163 is uniquely different from 2172 in plant color at booting (yellow-green vs. blue-green for 2172), hairiness of last internode of rachis (absent vs. present for 2172), hairiness of auricles (present vs. absent for 2172), flag leaf at booting (recurved vs. erect for 2172), head density (lax vs. dense for 2172), glume shoulder (square vs. elevated for 2172), juvenile plant growth (semi-erect vs. erect for 2172) and phenol reaction (brown vs. light-brown for 2172). 2163 carries the H6 gene for Hessian fly resistance whereas, 2172 is heterogeneous for the H3 gene for resistance.

Referring to Table 1, 2163 has higher yield (5.9%), has lower test weight, heads 1 day later, is taller, and has stronger straw with better resistance to leaf rust, the leaf blight complex and wheat streak mosaic virus (WSMV) than 2172.

Overall milling and baking quality of 2163 is about equal to 2172 (Table 4). 2163 has slightly better flour yield, flour protein and loaf volume, but shorter, weaker mixing traits than 2172.

FORM APPROVED: OMB NO. 0581-0056

EXHIBIT C
(Wheat)

U. S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, MEAT, GRAIN AND SEED DIVISION
BELTSVILLE, MARYLAND 20785

OBJECTIVE DESCRIPTION OF VARIETY
WHEAT *(TRITICUM SPP.)*

INSTRUCTIONS: *See Reverse.*

NAME OF APPLICANT(S)
PIONEER HI-BRED INTERNATIONAL, INC.

ADDRESS *(Street and No. or R.F.D. No., City, State, and ZIP Code)*
Plant Breeding Division
Dept. of Cereal Seed Breeding
7301 NW 62nd Ave., P.O. Box 85
Johnston, IA 50131-0085

FOR OFFICIAL USE ONLY
PVPO NUMBER: 8900205
VARIETY NAME OR TEMPORARY DESIGNATION: 2163

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g. [0][8][9] or [0][9]) when number is either 99 or less or 9 or less.

1. KIND:
[1] 1 = COMMON 2 = DURUM 3 = EMMER 4 = SPELT 5 = POLISH 6 = POULARD 7 = CLUB

2. TYPE:
[2] 1 = SPRING 2 = WINTER 3 = OTHER *(Specify)* _____
[2] 1 = SOFT 2 = HARD 3 = OTHER *(Specify)* _____
[2] 1 = WHITE 2 = RED 3 = OTHER *(Specify)* _____

3. SEASON - NUMBER OF DAYS FROM EMERGENCE TO:
[2][3][0] FIRST FLOWERING
[2][3][7] LAST FLOWERING

4. MATURITY *(50% Flowering)*:
[0][5] NO. OF DAYS *EARLIER* THAN .....
[ ][ ] NO. OF DAYS *LATER* THAN .....
[2] 1 = ARTHUR 2 = SCOUT 3 = CHRIS 4 = LEMHI 5 = NUGAINES 6 = LEEDS

5. PLANT HEIGHT *(From soil level to top of head)*:
[0][8][8] CM. HIGH
[ ][ ] CM. TALLER THAN .....
[2][0] CM. SHORTER THAN .....
[2] 1 = ARTHUR 2 = SCOUT 3 = CHRIS 4 = LEMHI 5 = NUGAINES 6 = LEEDS

6. PLANT COLOR AT BOOTING *(See reverse)*:
[1] 1 = YELLOW GREEN 2 = GREEN 3 = BLUE GREEN

7. ANTHER COLOR:
[1] 1 = YELLOW 2 = PURPLE

8. STEM:
[1] Anthocyanin: 1 = ABSENT 2 = PRESENT
[2] Waxy bloom: 1 = ABSENT 2 = PRESENT
[1] Hairiness of last internode of rachis: 1 = ABSENT 2 = PRESENT
[1] Internodes: 1 = HOLLOW 2 = SOLID
[0][4] NO. OF NODES *(Originating from node above ground)*
[2][4] CM. INTERNODE LENGTH BETWEEN FLAG LEAF AND LEAF BELOW

9. AURICLES:
[1] Anthocyanin: 1 = ABSENT 2 = PRESENT
[2] Hairiness: 1 = ABSENT 2 = PRESENT

10. LEAF:
[2] Flag leaf at booting stage: 1 = ERECT 2 = RECURVED 3 = OTHER *(Specify)*: _____
[1] Flag leaf: 1 = NOT TWISTED 2 = TWISTED
[1] Hairs of first leaf sheath: 1 = ABSENT 2 = PRESENT
[1] Waxy bloom of flag leaf sheath: 1 = ABSENT 2 = PRESENT
[1][2] MM. LEAF WIDTH *(First leaf below flag leaf)*
[2][4] CM. LEAF LENGTH *(First leaf below flag leaf)*:

FORM LMGS 470-6 (6-82) (Formerly Form LPGS 470-6 (3-79), which may be used)

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8900205

11. HEAD:

[1] Density: 1 = LAX 2 = DENSE

[4] Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE 4 = OTHER (Specify) Fusiform

[4] Awnedness: 1 = AWNLESS 2 = APICALLY AWNLETED 3 = AWNLETED 4 = AWNED

[1] Color at maturity: 1 = WHITE 2 = YELLOW 3 = PINK 4 = RED 5 = BROWN 6 = BLACK 7 = OTHER (Specify):

[0 9] CM. LENGTH

[1 2] MM. WIDTH

RECEIVED MAY 9 1989 OFC

12. GLUMES AT MATURITY:

[2] Length: 1 = SHORT (CA. 7 mm.) 2 = MEDIUM (CA. 8 mm.) 3 = LONG (CA. 9 mm.)

[2] Width: 1 = NARROW (CA. 3 mm.) 2 = MEDIUM (CA. 3.5 mm.) 3 = WIDE (CA. 4 mm.)

[4] Shoulder shape: 1 = WANTING 2 = OBLIQUE 3 = ROUNDED 4 = SQUARE 5 = ELEVATED 6 = APICULATE

[3] Beak: 1 = OBTUSE 2 = ACUTE 3 = ACUMINATE

13. COLEOPTILE COLOR:

[3] 1 = WHITE 2 = RED 3 = PURPLE

14. SEEDLING ANTHOCYANIN:

[1] 1 = ABSENT 2 = PRESENT

15. JUVENILE PLANT GROWTH HABIT:

[2] 1 = PROSTRATE 2 = SEMI-ERECT 3 = ERECT

16. SEED:

[3] Shape: 1 = OVATE 2 = OVAL 3 = ELLIPTICAL

[1] Cheek: 1 = ROUNDED 2 = ANGULAR

[2] Brush: 1 = SHORT 2 = MEDIUM 3 = LONG

[1] Brush: 1 = NOT COLLARED 2 = COLLARED

[4] Phenol reaction (See instructions): 1 = IVORY 2 = FAWN 3 = LT. BROWN 4 = BROWN 5 = BLACK

[3] Color: 1 = WHITE 2 = AMBER 3 = RED 4 = PURPLE 5 = OTHER (Specify)

[0 6] MM. LENGTH [0 3] MM. WIDTH [3 0] GM. PER 1000 SEEDS

17. SEED CREASE:

[1] Width: 1 = 60% OR LESS OF KERNEL 'WINOKA' 2 = 80% OR LESS OF KERNEL 'CHRIS' 3 = NEARLY AS WIDE AS KERNEL 'LEMHI'

[1] Depth: 1 = 20% OR LESS OF KERNEL 'SCOUT' 2 = 35% OR LESS OF KERNEL 'CHRIS' 3 = 50% OR LESS OF KERNEL 'LEMHI'

18. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant) *Refer to Addendums 1, 2, and 3.

[2*] STEM RUST (Races) 15-TNM

[2*] LEAF RUST (Races) UN5, UN13, UN17

[0] STRIPE RUST (Races)

[0] LOOSE SMUT

[2] POWDERY MILDEW

[0] BUNT

[2*] OTHER (Specify) Soil-Borne Mosaic Virus

19. INSECT: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[0] SAWFLY

[0] APHID (Bydv.)

[1] GREEN BUG

[0] CEREAL LEAF BEETLE

[0] OTHER (Specify)

HESSIAN FLY RACES: [2] GP [2] A [2] B [1] C [0] D [0] E [0] F [0] G

20. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	Pioneer 2172	Seed size	Pioneer 2157
Leaf size	Pioneer 2172	Seed shape	Pioneer 2180
Leaf color	Pioneer 2180	Coleoptile elongation	Pioneer 2172
Leaf carriage	ArKan	Seedling pigmentation	Pioneer 2172

INSTRUCTIONS

GENERAL: The following publications may be used as a reference aid for the standardization of terms and procedures for completing this form:

(a) L.W. Briggle and L. P. Reitz, 1963, Classification of Triticum Species and Wheat Varieties Grown in the United States, Technical Bulletin 1278, United States Department of Agriculture.

(b) W.E. Walls, 1965, A Standardized Phenol Method for Testing Wheat Seeds for Varietal Purity, contribution No. 28 to the handbook of seed testing prepared by the Association of Official Seed Analysts. *(See attachment.)*

LEAF COLOR: Nickerson's or any recognized color fan should be used to determine the leaf color of the described variety.

FORM LMGS 470-6 (6-82) (Reverse)

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14D. Exhibit D. Additional Description of the Variety

Pioneer cultivar 2163 is a common hard red winter wheat, Triticum aestivum L.

Flowering date of 2163 is about 5 days earlier than the cultivar Scout and 3 days later than Pioneer 2180. The plant height of 2163 has averaged 88 cm, about 20 cm shorter than Scout and about the same height as Pioneer cultivar 2157 (Table 1).

The plant color at booting stage is yellow-green, similar to 2180. Anther color of 2163 is yellow, similar to 2172 and Newton.

Anthocyanin has been absent in the stem of 2163. A waxy bloom occurs on the stem. Internodes of 2163 are hollow and at maturity, stems are yellow and strong. Normally four stem nodes are present above ground, and internode length between flag leaf and the leaf below is about 24 cm. The last internode of the rachis is free of hairiness.

Auricles of 2163 are hairy but lacking in anthocyanin.

Flag leaves are generally recurved at booting and tend not to be twisted. Hairs have not been detected on the first leaf sheath. There is no waxy bloom on the flag leaf sheath. The first leaf below the flag leaf averages about 12 mm wide and 24 cm long when measured in the field at Hutchinson, KS.

Spikes are generally lax, fusiform, awned and white at maturity. Awns are rough and about 3 to 6 cm in length. Spike width and length averages about 12 mm and 9 cm, respectively.

14D. Exhibit D (cont.)

However, spike width and length are variable with plant population and level of production.

Glumes of 2163 are of medium length and width and generally with square shoulders. Beaks are acuminate.

Coleoptile color is purple and seedling anthocyanin is absent. Juvenile plant growth is semi-erect.

Kernels of 2163 are red in color, elliptical in shape, with rounded cheeks and a shallow crease. The brush is medium in size and is not collared. The embryo is medium in size. Kernels average 6 mm long and 3 mm wide and weigh about 30 gm per 1000. Phenol reaction is brown.

2163 is moderately resistant to soil-borne mosaic virus and the predominant local races of leaf rust (*Puccinia recondita* f. sp. *tritici*), stem rust (*P. graminis* f. sp. *tritici*), and powdery mildew (*Erysiphe graminis* f. sp. *tritici*). It has not been tested for reaction to loose smut or bunt.

2163 is resistant to the Hessian fly races GP, A and B, but susceptible to race C. (These results suggest that 2163 carries the H6 gene for Hessian fly resistance). Hessian fly tests were conducted by the Plant Science and Entomology Research Group, USDA-ARS, Department of Entomology, Kansas State University, Manhattan, Kansas. 2163 is susceptible to greenbug biotype C and E, but has not been tested for resistance to sawfly, BYDV or cereal leaf beetle.

2163 has an outstanding yield record when compared with currently grown hard red winter wheats. A summary from Pioneer

14D. Exhibit D (cont.)

replicated yield tests is shown in Tables 1, 2, and 3. In the presence of fungal foliar diseases, it has exhibited a pronounced yield advantage over susceptible varieties. Medium-short plant height and good straw strength give 2163 very good resistance to lodging. 2163's level of winterhardiness is very similar to Pioneer 2157.

2163 has intermediate hard red winter wheat quality characteristics when compared to the average of current standard cultivars being grown in the HRW region. A summary of several years of milling and baking performance in the Pioneer Quality Lab at Hutchinson, KS, is presented in Table 4. The data shows that 2163 is generally equal in flour yield to the average of all check cultivars, but poorer than 2157, 2154, Arkan and Hawk. Protein is equivalent to 2154, 2172, 2180, Newton and Hawk, but lower than 2157 and Arkan. Mixing traits are superior to 2154 but shorter and weaker than all other cultivars. Loaf volume is slightly better than 2154, 2172, 2180 and Hawk but inferior to the other cultivars.

Table 1. Performance of Pioneer Cultivars 2163, 2172 and 2157 in Elite, Regional and Commercial Yield Trials, 1984-1988.

Table	No. of Reps	2163	2172	2157
Yield (bu/ac)	275	57.3	54.1*	51.8*
Test Weight (lbs/bu)	197	55.5	56.2*	58.3*
Heading Date (after 1/1)	66	125.7	124.8*	125.6
Height (cm)	48	87	82*	86
Winterhardiness +	18	6.3	5.9	5.9
Straw Lodging +	57	7.3	6.1*	7.9*
Straw Breakage +	29	7.6	7.3	8.5*
Leaf Rust +	60	7.8	6.6*	5.3*
Stem Rust +	6	7.0	6.8	2.3*
Leaf Blight Complex + @	26	7.0	5.9*	5.5*
Wheat Streak Mosaic Virus + (WSMV)	30	6.5	5.5*	6.2*

Pioneer yield trials were grown in Colorado, Kansas, Nebraska, and Oklahoma.

+ Scale 1-9 where 9 = excellent or resistant and 1 = poor or 100% susceptible.

@ Primary diseases include tan spot, Septoria sp. and bacterial blight.

* Significantly different from 2163 at the .05 probability level.

Table 2. Performance of Pioneer Cultivars 2163, 2154 and 2180 in Elite, Regional and Commercial Yield Trials, 1985-1988.

Trait	No. of Reps	2163	2154	No. of Reps	2163	2180
Yield (bu/ac)	232	54.7	49.7*	242	57.2	54.2*
Test Weight (lbs/bu)	158	55.3	54.8*	178	55.4	56.4*
Heading Date (after 1/1)	50	125.3	127.4*	64	126.3	123.3*
Height (cm)	31	83	77*	43	86	77
Winterhardiness +	14	6.5	6.6	10	6.4	5.6*
Straw Lodging +	33	6.8	8.1*	47	7.3	7.7*
Straw Breakage +	25	7.6	8.2*	25	7.6	8.5*
Leaf Rust +	42	7.8	7.9	56	7.8	6.8*
Stem Rust +	6	7.0	8.2*	6	7.0	4.3*
Leaf Blight Complex + @	22	6.9	6.7	20	7.0	5.4*
WSMV +	24	6.5	5.8*	18	6.7	5.3*

Pioneer yield trials were grown in Colorado, Kansas, Nebraska and Oklahoma.

\+ Scale 1-9 where 9 = excellent or resistant and 1 = poor or 100% susceptible.

@ Primary diseases include tan spot, Septoria sp. and bacterial blight.

* Significantly different from 2163 at the .05 probability level.

Table 3. Performance of Pioneer Cultivar 2163 and Commercial cultivars Arkan, Hawk and Newton in Elite, Regional and Commercial Yield Trials, 1984-1988.

Trait	Locs/ Exp	2163	Arkan	Locs/ Exp	2163	Hawk	Locs/ Exp	2163	Newton
Yield (bu/ac)	77	60.6	53.2*	70	52.9	45.3*	64	54.4	45.2*
Test Weight (lbs/bu)	59	56.2	57.6*	45	55.0	55.7*	46	55.4	56.0
Heading Date @	23	124.1	123.3*	16	125.4	127.2*	19	124.8	127.7*
Height (cm)	19	88	95*	9	81	89*	13	84	93*
Winter-hardiness +	6	6.1	6.4	4	6.4	6.5	4	6.0	5.2
Straw Lodging +	19	7.7	6.1*	9	6.7	4.8*	15	6.9	5.5*
Straw Breakage +	8	7.4	7.1	9	7.6	4.0*	11	7.6	4.4*
Leaf Rust +	21	7.9	6.3*	11	8.0	3.2*	14	8.1	3.5*
Stem Rust +	2	7.0	8.7*	2	7.0	6.8	2	7.0	5.7*
Leaf Blight Complex + #	8	6.7	5.8*	8	6.8	4.1*	8	7.1	3.8*
WSMV +	5	6.8	5.4*	9	6.4	5.6*	2	6.8	6.0

Pioneer yield trials were grown in Colorado, Kansas, Nebraska and Oklahoma.

\+ Scale 1-9 where 9 = excellent or resistant and 1 = poor or 100% susceptible.

@ After 1/1.

\# Primary diseases include tan spot, Septoria sp. and bacterial blight.

* Significantly different from 2163 at the .05 probability level.

Table 4. Milling and Baking Evaluation of 2163 (Pioneer Wheat Quality Lab).

Year/Sample	1,000 Kernel Weight(g)	%Flour Yield	%Flour Protein	Mixograph Time	Mixograph Tolerance	Loaf Volume(cc)
Avg. 1984-88 Data (17 comparisons)						
2163	29.4[1]	68.4	11.1	3.2	2.8	68.4[2]
2172	33.7*	67.7	10.9	3.3	3.8*	65.2
2157	29.1	70.0*	12.1*	3.8*	3.2	71.8
Newton	27.9	67.2*	11.1	3.8*	4.5*	70.2
Avg. Check (Standard)	28.6	68.7	11.4	3.9*	4.8*	69.6
Avg. 1985-88 Data (15 comparisons)						
2163	29.5[1]	67.9	11.2	3.3	2.9	69.1[2]
2154	30.2	70.3*	11.3	2.8*	2.3	66.8
2180	29.9	68.0	11.4	3.6*	3.5	66.5
Avg. Check	30.2	68.5	11.4	4.0*	4.8*	69.3
Avg. 1985-88 Data (13 comparisons)						
2163	29.0[1]	67.9	11.3	3.2	2.7	71.2[2]
Arkan	29.5	69.8*	12.1*	3.8*	3.2	74.5
Avg. Check	29.1	68.4	11.5	3.9*	4.5*	70.0
Avg. 1985-88 Data (13 comparisons)						
2163	29.2[1]	67.7	11.1	3.2	2.8	69.3[2]
Hawk	30.9	69.7*	11.1	4.8*	6.3*	67.0
Avg. Check	29.7	68.5	11.3	4.0*	4.8*	69.3

[1] 1,000 Kernel weight data includes only 15, 13, 11, and 11 comparisons, respectively.

[2] Loaf Volume data includes only 11, 10, 7 and 8 comparisons, respectively.

* Significantly different from 2163 at the .05 probability level.

Notes: Locations tested include: Belleville, Belle Plaine, Garden City, Hutchinson and Minneola, KS; Beatrice and Cambridge, NE; and Lahoma, OK.

Addendum 1. Seedling reaction of 2163 to selected isolates of stem rust, *Puccinia graminis* f. sp. *tritici* and leaf rust, *Puccinia recondita* f. sp. *tritici* and postulated genes (by Plant Disease Clinic, Univ. of Minnesota), 1988.

Reaction Produced by Stem Rust Isolates

Variety	151		11-32-113			15B-2		Sr Gene
	72-00-1370C QFBS	69-21-399 QSHS	71-21-584B RHRS	72-25-639C RKQS	72-00-53A RTQQ	72-01-4A TNMH	74-21-1409A TNMK	
2163	2	s	s	s	s	2	2	9a

Reaction Produced by Leaf Rust Isolates

Variety	PBRQ	JCDB	PLMQ	TBGL	THBL	TBBL	CBGL	KBBQ	KFBL	SBJB	MDBL	Lr Gene
2163	3	;1c	3	3	3	3	3	3	3	;	3	3

The single gene lines compared to include Lr 1, 2a, 2c, 3a, 9, 10, 11, 16, 17, 18, 24, 26, 30 and 3ka.

Addendum 2. Seedling reaction of 2163 in the 1989 Southern Regional Performance Nursery to selected isolates of *Puccinia graminis* f. sp. *tritici* and postulated genes (by D. V. McVey, USDA, ARS, Cereal Rust Laboratory, U. of Minn., St. Paul, MN).

	Reaction Produced by Isolates							
	76-47-142A HJCS	70-21-528A QFBS	72-44-703A QSHS	78-48-450A RHRS	76-32-744C RKQS	72-8-187B RTQQ	76-24-849A TNMK	
Variety	17	151		11-32-113			15B-	Sr Gene
2163	2=	2	s	s	s	0	2	17,9a?

14E. Exhibit E. Statement of the Basis of Applicant's Ownership

Pioneer Hi-Bred International, Inc., Plant Breeding Division, believes it is the sole, original and first breeder of the 2163 cultivar of hard red winter wheat for which it solicits a certification of protection.

8900205

WHEAT DONATION AGREEMENT

Agreement made this 29th day of August, 1990 between Pioneer Hi-Bred International, Inc., an Iowa Corporation, with offices at 700 Capital Square, 400 Locust Street, Des Moines, Iowa 50309, (Pioneer) and Kansas State University, whose address is 113 Waters Hall, Manhattan, KS 66506-4008, (University).

RECITALS

Whereas, Pioneer has decided to discontinue its research and development of hard red winter wheat varieties and the marketing and sale of such varieties in North America; and

Whereas, Pioneer desires to ensure the continued availability of said hard red winter wheat varieties and germplasm to the public; and

Whereas, the University has demonstrated the ability to maintain and develop said varieties and germplasm and to make them available to the public;

Now therefore the parties agree as follows:

I. GERMPLASM

A. Pioneer agrees to donate to the University all of its right, title, and interest including Plant Variety Protection rights, except as restricted in Section II(A) below, to the following hard red winter germplasm lines:

2157, 2163, 2172, 2180, XW171

B. The donation shall include:

	(50# units unless otherwise indicated)		
2157	Stage 0 (Breeder)	7	Carryover
	Stage 1 (Foundation)	225	Carryover
	Stage 2 (Registered)	150	Carryover
	Head Row Pkts	3000	Carryover
2163	Stage 0 (Breeder)	22	Carryover
	Stage 0 (Breeder)	19	Est. new crop
	Foundation	33,285	Est. new crop
	Head Rows	200	Est. new crop
	Head Row Pkts	3200	Carryover

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2172	Stage 0 (Breeder)	9	Carryover
	Foundation	861	new crop
	Head Row Pkts	4600	Carryover
2180	Breeder	29	Est new crop
	Foundation	21825	Est new crop
	Head Rows	200	Est new crop
	Head Row Pkts	1800	Carryover
XW171	Foundation	4461	Est new crop
	Head Rows	200	Est new crop
	Head Row Pkts	3000	Carryover

including but not limited to seed stock, pedigree information, field books, quality and testing data. The University agrees to remove all of the above described wheat seed from Pioneer's facilities by March 1, 1991.

C. The University understands and agrees that Pioneer® varieties of hard red winter wheat will be made available for sale through individual farmer producers and/or commercial channels through the 1990 sales season.

II. RESTRICTIONS

A. The University understands and agrees that the donation of the varieties and germplasm is restricted to development of varieties and sale of seed in North America only. The University agrees to use its best efforts to prevent the distribution of the varieties and germplasm outside of North America.

B. The University will not be permitted to use the name Pioneer® or any other registered trademark or service mark of Pioneer Hi-Bred International, Inc. in any manner whatsoever without the express written permission of Pioneer. The University may use the variety numbers listed on the Plant Variety Protection certificates.

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C. It is the hope and desire of Pioneer that the University share the donated varieties and germplasm with other agricultural institutions, specifically Oklahoma State University.

III. ANNOUNCEMENT AND EFFECTIVE DATA

A. The effective date of this Agreement shall be February 22, 1990.

B. Pioneer shall announce this Agreement to the public at 10:00, February 22, 1990 at a press conference to be held at the meeting of the Wheat Quality Council in Kansas City, Missouri.

IV. LIMITATION OF LIABILITY

A. Pioneer makes no warranty express or implied as to the yield, quality or tolerance to diseases, insects, or growing conditions of the varieties or the germplasm.

V. REPRESENTATIVES

A. All notices and correspondence shall be directed to the following representatives:

Pioneer: C. Sue Crum
Manager, Business Development
Pioneer Hi-Bred International, Inc.
317 6th Avenue, Suite 720
Des Moines, Iowa 50309

University: Dr. George E. Ham
Associate Dean & Associate Director
Agricultural Experiment Station
113 Waters Hall
Manhattan, KS 66506-4008

This Agreement constitutes the entire agreement and understanding between the parties and all previous discussions, representations, understandings or agreements are hereby merged in this Agreement.

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This Agreement shall be binding upon the legal representatives, successors and assigns of the Parties.

PIONEER HI-BRED INTERNATIONAL, INC.

By Owen J. Newlin

By Jerry L. Chicoine

KANSAS STATE UNIVERSITY

By Walter R. Woods

By Tom Ranson

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