No. 7700109

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

George Warner Seed Co.; Harpool Seed, Inc.; McGregor Milling & Grain A Div. of Esco Limited

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 seventeen 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, 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. UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS PART OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT

'TexRed'

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 *this* tenth *day of* August *in the year of our Lord one thousand nine hundred and* seventy-eight

Attest:

Commissioner
Plant Variety Protection Office
Grain Division
Agricultural Marketing Service

Secretary of Agriculture

FORM GR-470
(1-76)

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
GRAIN DIVISION
PLANT VARIETY PROTECTION OFFICE
NATIONAL AGRICULTURAL LIBRARY
BELTSVILLE, MARYLAND 20705

FORM APPROVED
OMB NO. 40-R3712

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

INSTRUCTIONS: *See Reverse.*

1a. TEMPORARY DESIGNATION OF VARIETY	1b. VARIETY NAME	FOR OFFICIAL USE ONLY
Exp. Str. 71H896	TexRed	PV NUMBER 7700109
2. KIND NAME	3. GENUS AND SPECIES NAME	FILING DATE 9-13-77 / TIME 2:30 P.M.
Wheat, common	Triticum aestivum L.	FEE RECEIVED $250.00 / DATE 9-13-77
4. FAMILY NAME (BOTANICAL)	5. DATE OF DETERMINATION	$250.00 / 9-13-77
Gramineae	Summer 1974	$50.00 / 5-26-78

6. NAME OF APPLICANT(S)	7. ADDRESS (*Street and No. or R.F.D. No., City, State, and ZIP Code*)	8. TELEPHONE AREA CODE AND NUMBER
George Warner Seed Co.	P.O. Box 1448, Hereford, TX 79045	806-364-4470
Harpool Seeds Inc.	Drawer B, Denton, TX 76201	817-387-0541
McGregor Milling & Grain	Co, McGregor, Texas, 76657	817-840-2851
A div. of Esco Limited	P.O. Box 6467, Corpus Christi, TX	512-883-1521

9. IF THE NAMED APPLICANT IS NOT A PERSON, FORM OF ORGANIZATION: (*Corporation, partnership, association, etc.*)	10. IF INCORPORATED, GIVE STATE AND DATE OF INCORPORATION	11. DATE OF INCORPORATION
George Warner Seed Co.	Texas	Dec. 1965
Harpool Seeds, Inc.	Texas	Dec. 11, 1961
Esco Limited (Limited Partnership)		Feb. 1, 1963

12. Name and mailing address of applicant representative(s), if any, to serve in this application and receive all papers:

Tom Harpool Jr., Harpool Seeds Inc., Drawer B., Denton, TX 76201

13. CHECK BOX BELOW FOR EACH ATTACHMENT SUBMITTED:

- [X] 13A. Exhibit A, Origin and Breeding History of the Variety *(See Section 52 of the Plant Variety Protection Act.)*
- [X] 13B. Exhibit B, Novelty Statement.
- [X] 13C. Exhibit C, Objective Description of the Variety *(Request form from Plant Variety Protection Office.)*
- [X] 13D. Exhibit D, Additional Description of the Variety.

14A. 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). (If "Yes," answer 14B and 14C below.)* [X] YES [ ] NO

14B. Does the applicant(s) specify that this variety be limited as to number of generations? [X] YES [ ] NO

14C. If "Yes," to 14B, how many generations of production beyond breeder seed? [X] FOUNDATION [X] REGISTERED [X] CERTIFIED

15. Does the applicant(s) agree to the publication of his/her (their) name(s) and address in the Official Journal? [X] YES [ ] NO

16. The applicant(s) declare(s) that a viable sample of basic seed of this variety will be deposited upon request before issuance of a certificate and will be replenished periodically 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 Act.

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

2-1-78 (DATE) — Harpool Seeds Inc. (SIGNATURE OF APPLICANT)

George Warner Seed Co.

(DATE) — McGregor Mill. & Gr. a div. of Esco Ltd. (SIGNATURE OF APPLICANT)

rec. 2/6/78

INSTRUCTIONS

GENERAL: Send an original copy of the application, exhibits and $250.00 fee to U.S. Dept. of Agriculture, Agricultural Marketing Service, Grain Division, National Agricultural Library, Beltsville, Maryland 20705. (See Section 180.175 of the regulations and rules of practice.) Retain one copy for your files. All items on the face of the form are self-explanatory unless noted below.

ITEM

5 Give the date the applicant determined that he had a new variety based on (1) the definition in Section 41(a) of the Act and (2) the date a decision was made to increase the seed.

13a Give (1), the genealogy, including public and commerical varieties, lines, or clones used, and the breeding method. (2), the details of subsequent stages of selection and multiplication. (3), the type and frequency of variants during reproduction and multiplication and state how these variants may be identified and (4), evidence of stability.

13b Give a summary statement of the variety's novelty. Clearly state how this novel variety may be distinguished from all other varieties in the same crop. If the new variety most closely resembles one or a group of related varieties; (1) identify these varieties and state all differences objectively; (2) Attach statistical data for characters expressed numerically and demonstrate that these differences are significant; and (3) submit, if helpful, seed and plant specimens or photographs of seed and plant comparisons clearly indicating novelty.

13c Fill in the Exhibit C, Objective Description form for all characteristics, for which you have adequate data.

13d Describe any additional characteristics that are not described, or whose description cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the description of characteristics that are difficult to describe; such as; plant habit, plant color, disease resistance, etc.

14A If "YES" is specified (seed of this variety be sold by variety name only as a class of certified seed) the applicant may NOT reverse his affirmative decision after the variety has either been sold and so labeled or published or the certificate has been issued. However, if the applicant specifies "NO", he may change his choice. (See Section 180.15 of the Regulations and Rules of Practice.)

TexRed Wheat*

Item 13A Exhibit A Origin And History Of TexRed

Class: Hard red winter, common bread wheat, Triticum aestivum L.

Name: The name TexRed has been approved by the Committee on variety names and the Trademark Division of Agricultural Marketing Service(See attached letter).

Developed: I.M. Atkins, Small Grain Consultant and Plant Breeder for Harpool Seeds Inc., George Warner Seed Company, and McGregor Milling And Grain Company, a division of Esco Inc. The variety is owned jointly by three firms.

Breeding and increase procedures:

Parentage: Sturdy, C.I. 13684 x Tascosa, C.I. 13023

Grown in bulk hybrid population during segregating generations. In 1970 selected 2000 heads.

1971 Grown in head row progeny nursery. Select 600 progenies for further tests.

1972 Preliminary nursery plot trials, 3 locations.

1973 Preliminary and replicated nursery tests, 3 locations.

1974 Replicated yield tests of selected 100 lines.

1975 Replicated yield tests of 50 lines. Line 71H896 identified as promising.

1976 Replicated trials. Breeder seed isolated.

1977 Replicated trials, quality tests, disease tests, Increase and purify breeder seed.

1978 Replicated trials. Increase breeder seed.

Variants observed: During the increase and purification of breeders seed, we have observed plants with white chaff (probably coming from natural crosses from wind-blown pollen), plants taller than normal, plants which develop late tillers under conditions of late spring rains and plants with nodding heads and light brown chaff. These variants should not exceed .05 percent (1 in 2000) in Foundation class seed or .1 (1 in 1000) in the Certified class.

Note: The presence or absence of black stripping on the glumes should not be considered a variant. All Blackhull type wheats (Wichita, Sturdy, Caprock, Red Chief, Blackhull etc) may or may not develop this color.

* The name should be spelled as one word TexRed, with no hyphen between syllabels but using a capital on the second syllable.

TexRed Wheat

Item 13 B Exhibit B

Novelty Statement (Revised)

TexRed is a new variety of semi-dwarf, hard red winter wheat most similar to Sturdy, the dominant semi-dwarf variety in the Southwest. TexRed differs from Sturdy in having brown chaff color with black stripes in contract to the white chaff and black stripes of Sturdy. The black stripping occurs on both varieties only under certain conditions. TexRed differs also in having statistically longer beaks, second internodes and greater cold tolerance than Sturdy. Other glume, spike and seed measurements were not significantly different. Yields and test weight were equal or superior than Sturdy and grain quality for commercial bakery flour was rated excellent.

TexRed responds to environment differently than Sturdy or most other varieties. Under the low elevations and warmer winter temperatures of South Texas, TexRed may be 6 to 8 days earlier than Sturdy but on the High Plains maturity will be the same. Other differences may be observed under some conditions.

Caprock, a sister of Sturdy, is similar to Sturdy in plant characters, so TexRed differs by the same characteristics enumerated above. TAMU-101 and TAMU-103 have white chaff, are 1 to 3 days earlier, and 2 to 4 centimeters shorter. TexRed differs from the standard-height varieties; Centurk, Scout 66, etc. in growing 10 to 15 centimeters shorter, is earlier in maturity, has stronger and more storm resistant straw and is superior in rust resistance.

FORM GR-470-6
(10-15-72)

FORM APPROVED. OMB NO. 40-R3712

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
GRAIN DIVISION
HYATTSVILLE, MARYLAND 20782

EXHIBIT C
(Wheat)

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

INSTRUCTIONS: *See Reverse.*

NAME OF APPLICANT(S) Jointly by three firms:
Harpool Seeds Inc, Drawer B, Denton, T. 76201
ADDRESS *(Street and No. or R.F.D. No., City, State, and ZIP Code)*
George Warner Seed Co, Box 1448, Hereford, Tex. 79045
Esco Limited, P.O. Box6467, Corpus Christi, Tex. 78411

FOR OFFICIAL USE ONLY
PVPO NUMBER 7700109
VARIETY NAME OR TEMPORARY DESIGNATION TexRed

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:
[1][9][4] FIRST FLOWERING 122-200(see notes) [2][0][0] LAST FLOWERING

4. MATURITY *(50% Flowering)*:
[0][7] NO. OF DAYS *EARLIER* THAN Centurk(Scout). [ ] 1 = ARTHUR 2 = SCOUT 3 = CHRIS
[ ][ ] NO. OF DAYS *LATER* THAN ..... [ ] 4 = LEMHI 5 = NUGAINES 6 = LEEDS

5. PLANT HEIGHT *(From soil level to top of head)*:
[ ][7][1] CM. HIGH
[ ][ ] CM. TALLER THAN ..... [ ] 1 = ARTHUR 2 = SCOUT 3 = CHRIS
[1][0] CM. SHORTER THAN Tascosa, Scout ..... [ ] 4 = LEMHI 5 = NUGAINES 6 = LEEDS

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

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

8. STEM:
[1] Anthocyanin: 1 = ABSENT 2 = PRESENT
[1] Waxy bloom: 1 = ABSENT 2 = PRESENT
[1] Hairiness of last internode of rachis: 1 = ABSENT 2 = PRESENT
[1] Internodes: 1 = HOLLOW 2 = SOLID
[ ][3] NO. OF NODES *(Originating from node above ground)*
[1][7] CM. INTERNODE LENGTH BETWEEN FLAG LEAF AND LEAF BELOW

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

10. LEAF:
[ ] 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][1] MM. LEAF WIDTH *(First leaf below flag leaf)*
[2][0] CM. LEAF LENGTH *(First leaf below flag leaf)*:

4

[1] STEM RUST *(Races)* ____ [1] LEAF RUST *(Races)* ____ [1] STRIPE RUST *(Races)* ____ [0] LOOSE SMUT
[1] POWDERY MILDEW [0] BUNT [0] OTHER *(Specify)* ____

19. INSECT: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)
[0] SAWFLY [1] APHID *(Bydv.)* [1] GREEN BUG [0] CEREAL LEAF BEETLE
[0] OTHER *(Specify)* ____
HESSIAN FLY RACES: [0] GP [ ] A [ ] B [ ] C [ ] D [ ] E [ ] F [ ] G

20. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	Sturdy	Seed size	Sturdy
Leaf size	Sturdy	Seed shape	Sturdy
Leaf color	Sturdy	Coleoptile elongation	Sturdy
Leaf carriage	Sturdy	Seedling pigmentation	Sturdy

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.

5

TexRed Wheat

Comments by the Breeder:

Item 3 and 4: The number of days from seeding to flowering is not an accurate measure in winter wheat. Some varieties, such as Sturdy, are grown over a range of 300 miles where the crop may be seeded from August to December. Heading depends upon many things, the least of which is date of seeding. Day length, winter and spring temperatures, soil moisture and elevation all enter into heading. TexRed is especially sensitive to these conditions, maturing with Sturdy at the high elevation of West Texas and maturing 6 to 8 days earlier than Sturdy at San Antonio. This is a genetically inherited characteristic and not due to lack of stability.

Items 8 to 12: We measured from 50 to 100 samples for these characters and picked from two locations. There is wide variability in the parents as well as the new varieties. We ran statistical analysis on all characters which showed substantial differences.

Neither the experimental or the named parent varieties have been purified for minor agronomic characters of the spike leaves or grain. I had a part in the development of Sturdy and most other varieties grown in Texas and we normally do not do this. Furthermore, we know that these may vary widely depending upon environment. Awns and beak lengths will vary as much as 100 percent from the bottom to the top of a given spike and from the lead tiller to late tillers.

Item 12: The Blackhull wheats, which develop black stripes, i.e. Blackhull, Chiefkan, Wichita, Kaw, Sturdy etc., do this depending upon environment. Dry conditions with low humidity is favorable and they seldom develop stripes in the more humid areas of Texas. No one knows or can predict when these stripes will occur. The attached photograph shows TexRed in a season when the black became very intense. no photograph in application 5/4/78 B - Photograph not considered necessary

Semi-dwarf varieties outcross more than standard height varieties because the ovary of the center or third floret is usually fertile and is pollinated by wind-blown pollen. The F_1 plants and hybrids resulting from outcrosses are more evident in semi-dwarf varieties than in standard height varieties. Therefore we have used the same limitations on variants as is currently being used for Sturdy and Caprock wheats in Texas.

TDA-S1

D-24

TEXAS DEPARTMENT OF AGRICULTURE
SEED LABORATORY
REAGAN V. BROWN, COMMISSIONER

241 EAST McNEIL, STEPHENVILLE, TEXAS 76401

Test No. S 24788

Designated by Sender: Wheat, Tex Red Lot No. –

Received: 10/20/1977 Test Requested ~~XXXXXXX~~ PHENOL: $3.00 Germ. Only _____ Purity Only _____

KIND 283	PURE SEED %	INERT MATTER %	OTHER CROP SEED %	WEED SEED %	GERMI-NATION %	HARD SEED %	Dor-mant seed %	NOXIOUS WEEDS PER POUND

Date Completed Phenol Test 10-21-1977

Submitted By Harpool Seed, Inc.
Drawer B
#5490 Denton, Texas 76201

Additional Information

PHENOL TEST:

100% Light brown

Signed: Luther Butler
Luther Butler, Seed Analyst

TDA-S1

D-24

TEXAS DEPARTMENT OF AGRICULTURE
SEED LABORATORY
REAGAN V. BROWN, COMMISSIONER

241 EAST McNEIL, STEPHENVILLE, TEXAS 76401

Test No. S 24787

Designated by Sender: Wheat, Sturdy Lot No. –

Received: 10/20/1977 Test Requested ~~XXXXXXX~~ PHENOL: $3.00 Germ. Only _____ Purity Only _____

KIND 283	PURE SEED %	INERT MATTER %	OTHER CROP SEED %	WEED SEED %	GERMI-NATION %	HARD SEED %	Dor-mant seed %	NOXIOUS WEEDS PER POUND

Date Completed 10/21/1977

Submitted By Harpool Seed, Inc.
Drawer B
#5490 Denton, Texas 76201

Additional Information

PHENOL: 99% Brown
1% Light Brown

7

Signed: Luther Butler
Luther Butler, Seed Analyst

TexRed Wheat

Item 13 D Exhibit D (Revised)

Additional Botanical Description And Agronomic Information

1. Kind: TexRed is a hard red winter wheat, *Triticum aestivum* L. common bread wheat, similar in many respects to the parent Sturdy, the first semi-dwarf hard red winter wheat ever developed and now grown on more than 4 million acres in Texas and the Southwest.

2. Type: TexRed is a prostrate growing, obligate winter wheat variety. Like the Sturdy parent, it has somewhat more erect growing seedling leaves than the cold-tolerant standard varieties such as Scout. In a survival test at Ames, Iowa in 1976, TexRed survived 75 percent, the same as Centurk, whereas Sturdy survived only 45 percent.

3. Season: A statement on the effect of location on heading of winter wheat is given in the Breeders comments.

An example of the variation in length of season from seeding to flowering is given below.

	Days from emergence	Date headed	Days from emergence	Date headed
	Hereford 1974		San Antonio 1974	
Sturdy	183	May 12	137	April 1
TexRed	181	May 10	130	Mar. 24
Centurk	185	May 14	141	April 5
	Hereford 1977		San Antonio 1977	
Sturdy	195	May 9	122	Mar. 30
TexRed	194	May 8	118	Mar. 25
Centurk	201	May 15	124	April 1

Maturity: As shown above, TexRed usually matures the same as Sturdy or perhaps one day earlier in Central and West Texas but may head from 4 to 8 days earlier than Sturdy in South Texas.

5. Plant height: In eight tests, over three seasons and four locations, TexRed varies little from Sturdy, averaging the same in height. Standard height varieties ie. Scout and Tascosa are usually about 10 centimeters taller.

Item 13 D, Exhibit 13 D (revised)

6,7. Plant and anther colors:
TexRed is very similar to Sturdy under field conditions.

8. Stem: TexRed has hollow stems and solid nodes like other hard red winter wheat varieties. No anthocyanin pigmentation or hariness of the nodes was observed. The second internode of TexRed averaged 17.13 cm. in length compared to 15.47 cm. for Sturdy. The difference of 1.66 cm. was statistically significant (t value of 4.175 vs .05 level of 2.01.).

10 Leaf: The flag leaf of TexRed is recurved and is glabrous. Leaves are moderate size and length. The TexRed leaves measured at Denton averaged .47cm. longer than Sturdy and those at Hereford measured .63 cm. longer but the differences were not significantly different. Leaf widths of TexRed and Sturdy were nearly the same at both locations.

11. Spike: The spike of TexRed averaged 7.98 centimeters long at Denton and was 0.33 cm. less than Sturdy. This was not statistically significant but the difference at Hereford under irrigated conditions, was 1.367 cm. and this was statistically significant. From this it appears that the heads of TexRed are slightly smaller. The width of the spikes of the two varieties was equal.

12. Glumes: The outer glumes of TexRed were shorter than Sturdy at both locations. The difference of 1.19mm. at Denton was statistically significant but that of 0.55 mm at Hereford was not significant. The glumes of TexRed are glabrous and light to dark brown, depending on the weathering conditions. As explained in the Comments earlier, the development of black stripes depends upon environmental conditions, and may or may not be present.

The awns of TexRed and Sturdy are of the same length within limits of experimental error. However, the beak of TexRed is about 50 percent longer than Sturdy and much longer than that of Tascosa. The beaks of TexRed averaged 9.17 mm. compared to 6.86 mm for Sturdy at Denton and were 8.06 mm at Hereford compared to 6.13mm for Sturdy. Both differences were statistically significant (t value of 5.09 and 6.45 vs 2.01 at 5 %).

13,14,15. See form

Item 13 D, Exhibit 13 D (revised)

16. Seed: The seed of TexRed measured slightly shorter and more narrow but these differences die not prove to be statistically significant. TexRed seed averaged approximately the same as Sturdy in weight per 100 seed.

The test weight of TexRed was higher in 10 of the 15 tests recorded and averaged 0.47 pound higher but this was not statistically significant. (t value of .961 vs 5 % value of 2.01).

Phenol reaction by the Texas State Department of Agriculture show TexRed 100 percent light brown. A sample of Sturdy showed 99 percent brown and 1 percent light brown. Copy attached.

17. See form

18. Diseases: TexRed has some tolerance to leaf rust but leaves become yellow as plants near maturity and susceptibility develops.

Field characteristics:

TexRed appears to be a very stable variety and no problems are anticicated in maintaing high purity in foundation and other seed fields. Variants observed to date include white-chaffed plants due to outcrossing, late tillering plants, late maturing plants, a few beardless plants due to out crossing and plants with nodding instead of erect heads. These types should not exceed .05 percent (1 in 2000) in Foundation class fields and not to exceed 0.1 percent (1 in 1000) in Certified class fields.

Yields of TexRed vs Sturdy: Yield tests of 13 year-location trials under our supervision show TexRed yielding 33.1 bushels compared to 31.9 for Sturdy. This difference of 1.4 bushels is not significant, In State and County trials of 14 station-years, TexRed averaged 43.3 bushels and Sturdy 42.2 and again this difference is not significant. The advantage of TexRed in production is its short strong straw making it resistant to field lodging.

Grain Yields Of TexRed And Sturdy Wheat Varieties In Texas Test Locations

Station	TexRed	Sturdy	Tascosa	Coker 68-15
Hereford 1973	44.6	43.6	41.9	–
McGregor 1973	33.7	31.6	–	37.7
San Antonio 1973	30.5	19.2	–	33.3
Hereford, RN 1974	32.7	33.0	27.2	–
Hereford, RN. 1974	34.0	29.8	–	–
Denton 1974	17.7	23.7	–	19.6
McGregor 1974	27.1	28.3	24.1	27.6
San Antonio 1975	26.2	27.2	–	36.9
San Antonio 1976	36.9	32.3	–	29.7
Hereford 1975	33.5	34.5	–	–
Denton 1975	31.2	24.3	–	24.9
Hereford 1977	32.5	40.9	–	
Denton 1977	55.8	46.9		
Average	33.1	31.9		
Difference	+1.2	t value = 2.01	0.05% value = 2.16	
Texas Exet. Sta and Ext. tests				
Bushland 1976	84.7	86.8		
Chillicothe, 1976	37.0	29.3		
Crum 1976	42.6	34.1		
Renner 1976	50.6	45.8		
McGregor 1976	30.1	37.2		
Crum 1977	40.4	47.8		
Temple 1977	50.2	46.9		
McGregor 1977	43.8	37.4		
Foard 1977	22.1	19.9		
Cottle 1977	26.9	29.3		
Baylor 1977	31.8	32.5		
Roby 1977	37.0	30.0		
Greyson 1977	57.0	50.8		
Hunt 1977	51.8	62.4		
Average	43.3	42.2		
Difference	+1.1		t value = 2.39	.05% value 2.12

Shatter, Hereford	Tr	8%
Hail damage, Hereford	Tr	6%
Leaf rust, 8 tests	37	10
Survival, Ames Iowa	75	40

QUALITY CHARACTERISTICS OF TEXRED WHEAT

Paired quality comparisons have been made in four seasons between TexRed and Sturdy, the first semi-dwarf hard red winter wheat, now grown on an estimated four million acres in Texas and the Southwest. Sturdy is considered by the Trade to be a high quality, strong gluten wheat suited to manufacture of commercial bakery flour or for blending with weaker wheats for the production of family flours or other uses.

TexRed was compared in four seasons by three commercial mill laboratories. Data on paired comparisons with wheat grown under the same considitions are given in a table. Laboratories use different tests and methods of comparison so it is difficult to average results. Only protein and ash were determined by all technicians. In seven tests, Sturdy averaged 13.5 percent protein, TexRed 13.1 percent; while, for ash content, Sturdy averaged .471 and TexRed .467 percent. Differences were non-significant. Paired comparisons for Sturdy and TexRed for many quality characteristics show that TexRed is a strong gluten wheat, equal in all respects to Sturdy. Favorable comments were made by all mill Chemists and the new variety TexRed was rated as a strong gluten wheat suitable for commercial baker flour production. A farinograph curve of TexRed and Sturdy are attached.

Comparisons Of Quality Characteristics Of Sturdy And Tex Red Wheat Varieties Under Texas Conditions

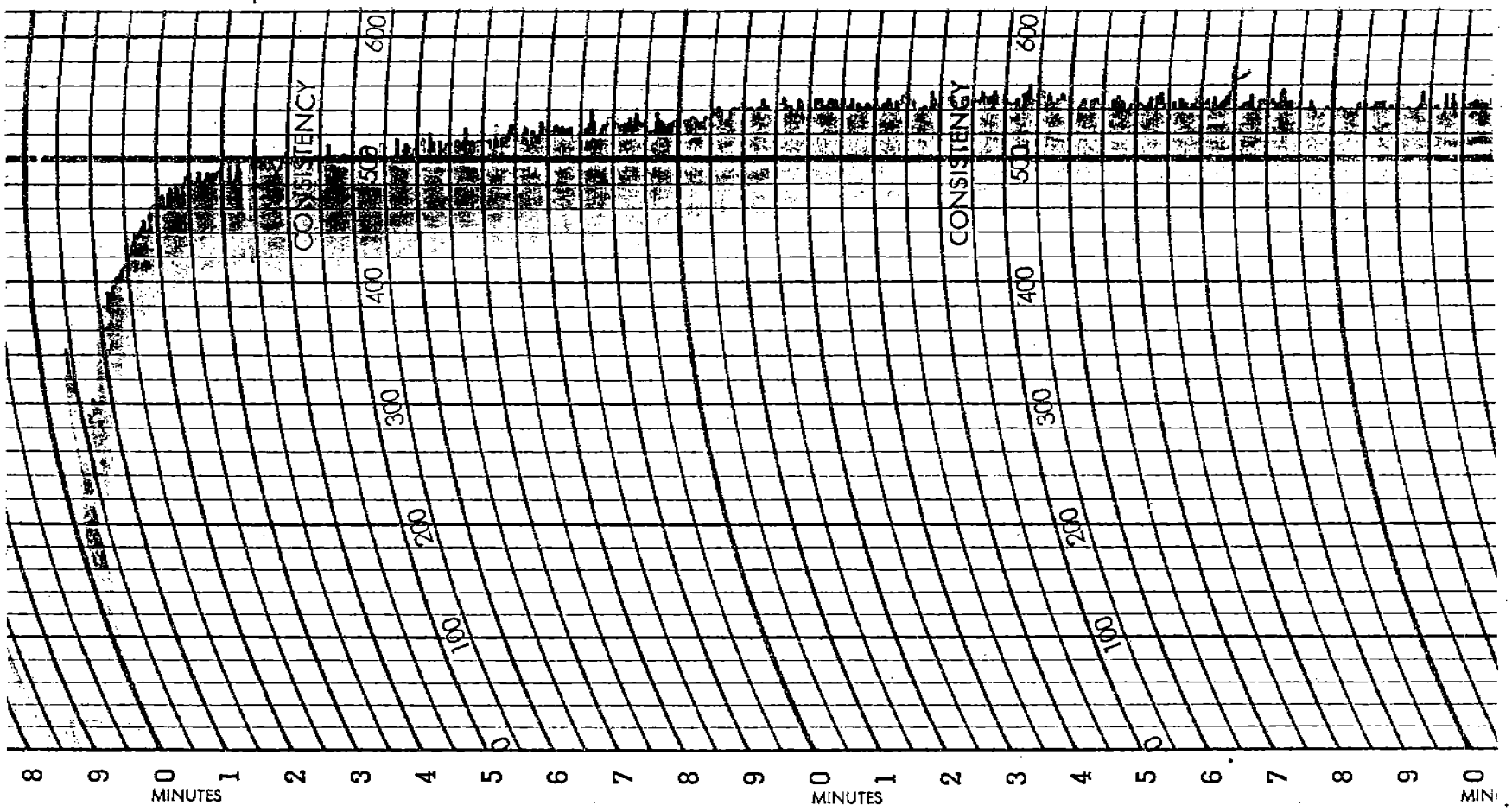
Item	Cargill 1974 (a)		Con Agri 1974 (b)		Con Agri 1975 (c)		Morrison 1974 (d)		Morrison 1975 (d)		Morrison 1976 (d)		Morrison 1977 (d)	
	Sturdy	Tex Red	Sturdy	Tex Red	Sturdy	Tex Red	Sturdy	Tex Red	Sturdy	Tex Red	Sturdy	Tex Red	Sturdy	Tex Red
Moisture %	11.7	16.5	12.4	13.0	12.0	12.0	—	—	12.1	12.4	11.7	11.0	11.2	11.4
Protein %	14.1	15.2	14.7	13.4	14.7	13.2	12.5	11.9	9.9	9.9	14.7	14.8	14.0	13.5
Ash %	.48	.41	.48	.48	.51	.47	.45	.47	.50	.49	.50	.57	.42	.38
Extraction %	71.6	72.1	73.3	75.2	73.5	75.6	—	—	70.9	72.3	69.3	65.0	69.0	70.0
% patent flour	91.2	90.7	—	—	—	—	—	—	—	—	—	—	—	—
Weight of flour	—	—	—	—	—	—	—	—	—	—	—	—	1140	1143
Weight of bran	—	—	—	—	—	—	—	—	—	—	—	—	352	335
Weight of shorts	—	—	—	—	—	—	—	—	—	—	—	—	161	156
Total product	—	—	—	—	—	—	—	—	—	—	—	—	1653	1634
Flour protein	—	—	—	—	—	—	—	—	9.9	9.2	—	—	12.8	12.2
Absorption %	69.0	71.0	59.2	59.4	62.7	61.1	58.3	57.3	55.9	56.1	—	—	—	—
Mix. index tol.	—	—	35	36	45	40	—	—	—	—	—	—	—	—
Mixing time	1-2-9	1-2-10					7	9	10	11	—	—	—	—
First peak	—	—	8	9.5	—	—	7	8	—	—	12.5	12.3	18	25
Time on 500 line	—	—	—	—	—	—	11	14	8	9	—	—	20	25
Dough, volume	G+	G+	—	—	—	—	2780	2710	—	—	—	—	—	—
Crumb color	G+	G+	—	—	—	—	13	12	—	—	—	—	—	—
Grain + texture	G+	G+	—	—	—	—	18	18	—	—	—	—	—	—
Bread score	—	—	84	84	—	—	77	76	—	—	—	—	—	—
Rating	—	—	Strong	Strong	—	—	—	—	—	—	—	—	—	—
Test weight of wheat	—	—	60.5	61.9	—	—	60.0	61.3	—	—	—	—	58.9	61.1

(a) grown at 4 stations, composite
(b) grown at McGregor, Texas
(c) grown at Hereford, Texas
(d) grown at Denton, Texas

Sturdy ___
Abs. ~~64~~ 62.4

C. W. BRABENDER INSTRUMENTS, INC. SOUTH HACKENSACK, N. J. U. S.

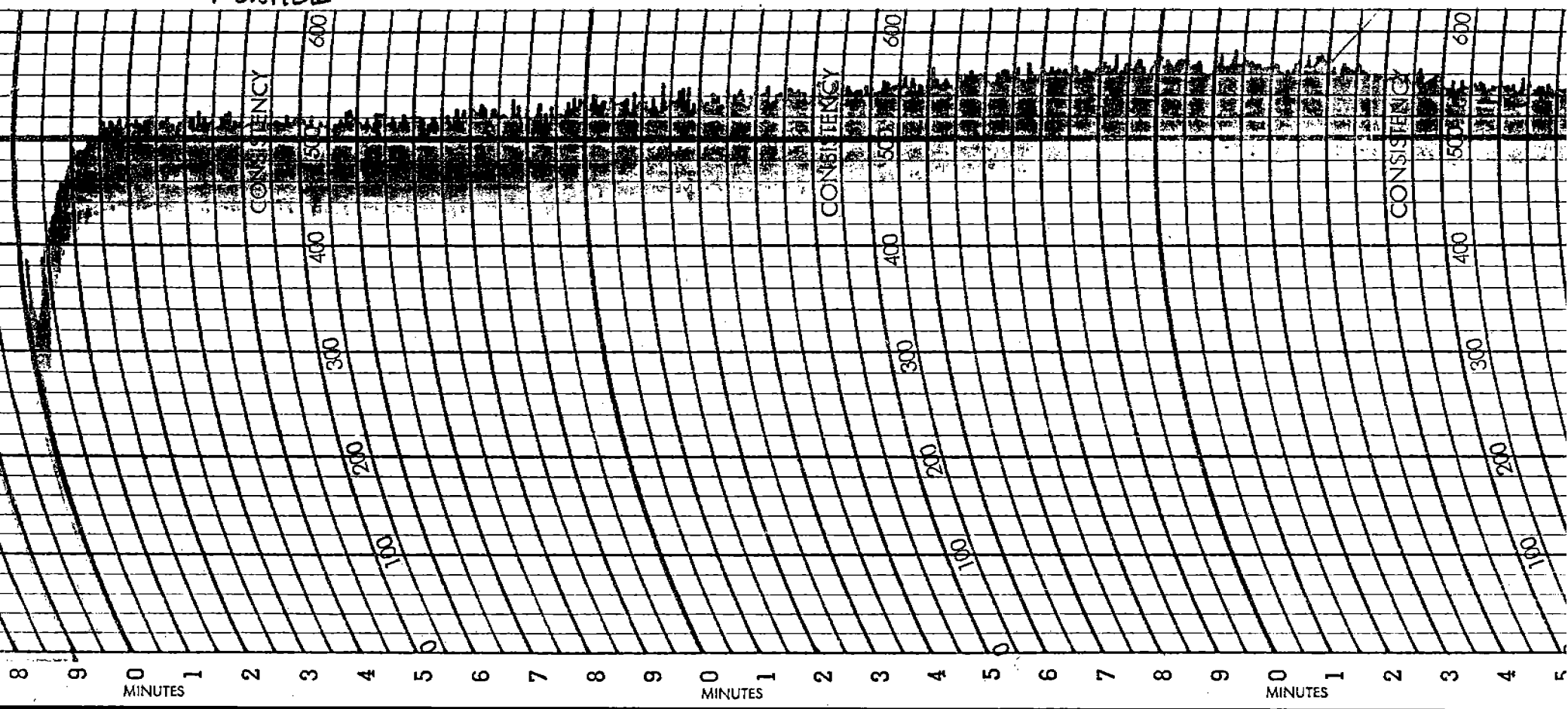
Harpool Exp. 1977
Sturdy check



Tex-Red
Abs. 61.2

SOUTH HACKENSACK, N.J. U.S.A. CWB FARINOGRAPH CHART

15 Harpool Exp. 1977
TexRed



FORM GR-470-6
(10-16-72)

FORM APPROVED. OMB NO. 40-R3712

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
GRAIN DIVISION
HYATTSVILLE, MARYLAND 20782

EXHIBIT C
(Wheat)

OBJECTIVE DESCRIPTION OF VARIETY

WHEAT *(TRITICUM SPP.)*

INSTRUCTIONS: *See Reverse.*

NAME OF APPLICANT(S): Jointly by three firms:

ADDRESS *(Street and No. or R.F.D. No., City, State, and ZIP Code)*: Harpool Seeds Inc, Drawer B, Denton, T. 76201
George Warner Seed Co, Box 1448, Hereford, Tex. 79045
Esco Limited, P.O. Box6467, Corpus Christi, Tex. 78413

FOR OFFICIAL USE ONLY

PVPO NUMBER: 7700109

VARIETY NAME OR TEMPORARY DESIGNATION: TexRed

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:

[1][9][4] FIRST FLOWERING 122-200(see notes) [2][0][0] LAST FLOWERING

4. MATURITY *(50% Flowering)*:

[0][7] NO. OF DAYS *EARLIER* THAN Centurk(Scout). [ ] 1 = ARTHUR 2 = SCOUT 3 = CHRIS

[ ][ ] NO. OF DAYS *LATER* THAN ..... [ ] 4 = LEMHI 5 = NUGAINES 6 = LEEDS

5. PLANT HEIGHT *(From soil level to top of head)*:

[ ][7][1] CM. HIGH

[ ][ ] CM. TALLER THAN ..... [ ] 1 = ARTHUR 2 = SCOUT 3 = CHRIS

[1][0] CM. SHORTER THAN Tascosa, Scout ..... [ ] 4 = LEMHI 5 = NUGAINES 6 = LEEDS

6. PLANT COLOR AT BOOTING *(See reverse)*:

[2] 1 = YELLOW GREEN 2 = GREEN 3 = BLUE GREEN

7. ANTHER COLOR:

[1] 1 = YELLOW 2 = PURPLE

8. STEM:

[1] Anthocyanin: 1 = ABSENT 2 = PRESENT

[1] Waxy bloom: 1 = ABSENT 2 = PRESENT

[1] Hairiness of last internode of rachis: 1 = ABSENT 2 = PRESENT

[1] Internodes: 1 = HOLLOW 2 = SOLID

[ ][3] NO. OF NODES *(Originating from node above ground)*

[1][7] CM. INTERNODE LENGTH BETWEEN FLAG LEAF AND LEAF BELOW

9. AURICLES:

[1] Anthocyanin: 1 = ABSENT 2 = PRESENT

[1] Hairiness: 1 = ABSENT 2 = PRESENT

10. LEAF:

[ ] 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][1] MM. LEAF WIDTH *(First leaf below flag leaf)*

[2][0] CM. LEAF LENGTH *(First leaf below flag leaf)*:

TEXAS

[1] Density: 1 = LAX 2 = DENSE

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

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

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

[7 9] CM. LENGTH

[1 0] MM. WIDTH

12. GLUMES AT MATURITY:

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

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

[2] 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:

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

14. SEEDLING ANTHOCYANIN:

[1] 1 = ABSENT 2 = PRESENT

15. JUVENILE PLANT GROWTH HABIT:

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

16. SEED:

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

[1] Cheek: 1 = ROUNDED 2 = ANGULAR

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

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

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

3 5/4/78 as per Amendment of 11/4/77

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

[6 0] MM. LENGTH

[2 9] MM. WIDTH

[3 3] GM. PER 100 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)

[1] STEM RUST (Races) _____

[1] LEAF RUST (Races) _____

[1] STRIPE RUST (Races) _____

[1] POWDERY MILDEW

[0] BUNT

[0] LOOSE SMUT

[0] OTHER (Specify) _____

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

[0] SAWFLY

[1] APHID (Bydv.)

[1] GREEN BUG

[0] CEREAL LEAF BEETLE

[0] OTHER (Specify) _____

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

20. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	Sturdy	Seed size	Sturdy
Leaf size	Sturdy	Seed shape	Sturdy
Leaf color	Sturdy	Coleoptile elongation	Sturdy
Leaf carriage	Sturdy	Seedling pigmentation	Sturdy

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.