No. 7600049

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Seed Research Associates, Inc.

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, 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 A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS ACCEPTED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT

'5221'

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* 28th *day of* September *in the year of our Lord one thousand nine hundred and* seventy-seven

Attest:

Commissioner
Plant Variety Protection Office
Grain Division
Agricultural Marketing Service

Secretary of Agriculture

FORM GR-470
(12-15-72)

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

FORM APPROVED
OMB NO. 40-R3712

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

INSTRUCTIONS: *See Reverse.*

1. VARIETY NAME OR TEMPORARY DESIGNATION 5221	2. KIND NAME Hard red winter wheat	FOR OFFICIAL USE ONLY PV NUMBER 7600049
3. GENUS AND SPECIES NAME Triticum aestivum	4. FAMILY NAME *(Botanical)* Graminaeae	FILING DATE 3/4/76 TIME 10:30 A.M.
	5. DATE OF DETERMINATION 1972	FEE RECEIVED $ 250.00 $ 250.00 $ 250.00 BALANCE DUE $ 3-4-76 $ 12-9-76 $ 9-27-77
6. NAME OF APPLICANT(S) Seed Research Associates Inc.	7. ADDRESS *(Street and No. or R.F.D. No., City, State, and ZIP Code)* Route 2, Box 48 Scott City, Kansas, 67871	8. TELEPHONE AREA CODE AND NUMBER

9. IF THE NAMED APPLICANT IS NOT A PERSON, FORM OF ORGANIZATION: *(Corporation, partnership, association, etc.)* Corporation	10. STATE OF INCORPORATION Kansas	11. DATE OF INCORPORATION June, 1973

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

Kenneth L. Goertzen, President
Seed Research Associates Inc.
Route 2, Box 48
Scott City, Kansas, 67871

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, Botanical Description of the Variety
- [X] 13C. Exhibit C, Objective Description of the Variety
- [X] 13D. Exhibit D, Data Indicative of Novelty
- [X] 13E. Exhibit E, Statement of the Basis of Applicant's Ownership

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 3/25/80

The applicant declares 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) of this sexually-reproduced novel plant variety believes 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 is informed that false representation herein can jeopardize protection and result in penalties.

3/2/76 (DATE) — Kenneth L. Goertzen (SIGNATURE OF APPLICANT)

(DATE) — (SIGNATURE OF APPLICANT)

00001

Seed Research Associates, Inc.
ROUTE 2 - BOX 48
SCOTT CITY, KANSAS 67871
PHONE (316) 872-2807

EXHIBIT 13A: ORIGIN AND BREEDING HISTORY OF 5221

Sturdy X SRAI (parentage unknown)

Original seed stock of 5221 was obtained by bulking a single plant selection made in the F_4 generation.

From this preliminary increase sufficient seed was obtained to start test and evaluation.

Uniformity is equal to Scout when grown under the same conditions.

5221 has no known variants

Different generations produce plants that have the same appearance and performance.

Seed classes to be produced beyond breeders seed are foundation and certified seed. Only certified seed will be offered to the public.

Foundation and certified seed will be grown according to Kansas Crop Improvement requirements.

DEVELOPERS AND PRODUCERS OF FOUNDATION SEED
CONSULTANTS FOR HYBRID SEED PRODUCTION

Exhibit 13A: Origin and Breeding History of 5221

Sturdy X SRAI 2370 (parentage unknown)

Original seed stock of 5221 was obtained by bulking a single plant selection made in the F_4 generation.

From this preliminary increase sufficient seed was obtained to start test and evaluation.

Uniformity is equal to Scout when grown under the same conditions.

5221 is very stable for such practical agronomic characteristics as heading date, maturity, height, and rust reaction.

Seed classes to be produced beyond breeders seed are foundation and certified seed. Only certified seed will be offered to the public.

Foundation and certified seed will be grown according to Kansas Crop Improvement requirements.

No particular requirements are necessary in order to maintain the purity of 5221 besides using a clean drill for seeding, roguing out any variants, and a clean combine for harvesting.

Roguing is used to remove variants. Offtypes whether taller, shorter, later, or of differing glume color should represent either mechanical mixtures or natural hybrids. Off types different from those mentioned should not be present in a commercial field planted to certified seed of 5221.

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, 6525 Belcrest Road, Hyattsville, Maryland 20782. (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 Insert the date the applicant determined that he had a new variety based on the definition in Section 41 (a) of the Act and decision is made to increase the seed.

13a First, give the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method. Second, give the details of subsequent stages of selection and multiplication. Third, indicate the type and frequency of variants during reproduction and multiplication and state how these variants may be identified. Fourth, provide evidence on stability.

13b First, give any special characteristics of the seed and of the plant as it passes through the seedling stage, flowering stage and the fruiting stage. Second, describe the mature plant and compare it with a similar commercial variety grown under the same conditions, and indicate the differences.

13c A supplemental form will be furnished by the PVPO to describe in detail a variety for each kind of seed.

13d Provide complete data indicative of novelty. Seed and plant specimens or photographs of seed and plant comparisons clearly indicating novelty may be submitted. Seeds submitted may be sterile.

13e Indicate whether applicant is the actual breeder, the employer of the breeder, the owner through purchase or inheritance, etc.

RECEIVED MAR 4 1976 PVPO

13B 13B Botanical Description of 5221

The seed is hard and red with a narrow and deep crease. The brush varies from short to long but with a predominance of short brushes. The seed shape varies from oval to elliptical but oval seeds predominate.

The juvenile growth is prostrate with green color.

The stem is hollow and it has 3 nodes above the ground.

The glumes are long and wide and glabrous. The shoulder is square with an acuminate beak

The flag leaf at dough stage is usually held horizontal with twist to left.

This wheat has good straw strenth, is semi dwarf in height, and bearded

13~~C~~B Objective Description of 5221

5221 is superior to Eagle in Hessian Fly resistance
It is susceptible to soil borne mosaic
Shows resistance to leaf rust
It has good lodging resistance
Headed 1 day ahead of Eagle (KIN 1975)
Height 4.3 " shorter than Eagle (KIN 1975)
Straw chaff
Bearded
Hard red winter
Excellent functional properties of the protein

FORM APPROVED. OMB NO. 40-R3712

FORM GR-470-6
(2-15-73)

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)
Seed Research Associates Inc.

ADDRESS *(Street and No. or R.F.D. No., City, State, and ZIP Code)*
Route 2, Box 48
Scott City, Kansas, 67871

FOR OFFICIAL USE ONLY
PVPO NUMBER 7600049
VARIETY NAME OR TEMPORARY DESIGNATION '5221'

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:
[ ][ ][ ] FIRST FLOWERING
[ ][ ][ ] LAST FLOWERING

4. MATURITY *(50% Flowering)*:
[0][1] NO. OF DAYS *EARLIER* THAN KIN. 1975.....
[ ][ ] NO. OF DAYS *LATER* THAN .....
[7] 1 = ARTHUR 2 = SCOUT 3 = CHRIS 4 = LEMHI 5 = NUGAINES 6 = LEEDS 7 Eagle

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

6. PLANT COLOR AT BOOTING *(See reverse)*:
[ ] 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] Hairiness of last internode of rachis: 1 = ABSENT 2 = PRESENT
[0][3] NO. OF NODES *(Originating from node above ground)*
[2] Waxy bloom: 1 = ABSENT 2 = PRESENT
[1] Internodes: 1 = HOLLOW 2 = SOLID
[1][7] 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:
[ ] Flag leaf at booting stage: 1 = ERECT 2 = RECURVED 3 = OTHER *(Specify)*: _____
[ ] Flag leaf: 1 = NOT TWISTED 2 = TWISTED
[ ] Hairs of first leaf sheath: 1 = ABSENT 2 = PRESENT
[2] Waxy bloom of flag leaf sheath: 1 = ABSENT 2 = PRESENT
[0][9] MM. LEAF WIDTH *(First leaf below flag leaf)*
[1][9] CM. LEAF LENGTH *(First leaf below flag leaf)*:

00006

EXHIBIT D: Plant Variety Protection No. 7600049 (5221)

5221 (tested as Dual VIII) compared to most similar variety Eagle (KIN Data 1975 - sent previously)

	Eagle	5221
Hessian Fly resistance	Susceptible	Resistance
Leaf Rust	Susceptible	Resistance
Height	Normal	Semi dwarf

13E Ownership of 5221

Seed Research Associates Inc. has ownership of this wheat.

The plant breeders are Kenneth L. and Betty L. Goertzen.

FORM GR-470-6 (REVERSE)

11. HEAD:

[2] Density: 1 = LAX 2 = DENSE Mid

[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 1] 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.)*

[1] 1 Glabrous 2 Pubescent

[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:

[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:

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

[1] Cheek: 1 = ROUNDED 2 = ANGULAR

[4] 4 variable Brush: 1 = SHORT 2 = MEDIUM 3 = LONG

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

[4] 4 variable Phenol reaction 1 = IVORY 2 = FAWN 3 = LT. BROWN

FORM GR-470-6 (REVERSE)

11. HEAD:

[2] Density: 1 = LAX 2 = DENSE Mid

[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 1] 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.)*

[1] 1 Glabrous 2 Pubescent

[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:

[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:

[4] Shape: 1 = OVATE 2 = OVAL 3 = ELLIPTICAL 4 variable

[1] Cheek: 1 = ROUNDED 2 = ANGULAR

[4] Brush: 1 = SHORT 2 = MEDIUM 3 = LONG 4 variable

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

[ ] 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 7] MM. LENGTH

[0 3] MM. WIDTH

[3 3] 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'

[3] 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)

[0] STEM RUST *(Races)* _____

[2] LEAF RUST *(Races)* _____

[0] STRIPE RUST *(Races)* _____

[0] LOOSE SMUT

[ ] POWDERY MILDEW

[ ] BUNT

[1] OTHER *(Specify)* Soil borne mosaic

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

[0] SAWFLY

[0] APHID *(Bydv.)*

[0] GREEN BUG

[0] CEREAL LEAF BEETLE

[ ] OTHER *(Specify)* _____

HESSIAN FLY RACES: [ ] 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		Seed size	
Leaf size		Seed shape	
Leaf color		Coleoptile elongation	
Leaf carriage		Seedling pigmentation	

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.

Table 4. Additional information on the 1975 KIN hard wheat entries.

1975 Entry No.	Kind	Date Headed May	Ht. in.	Hessian fly %	Bunt %	SBMV	Lodging rate 0-9	Leaf rust response	Leaf rust %	Shattering Colby %	Shattering Minneola no.
1	Parker	17.9	32.7	0	60	S	2.5	S	30	9	85
2	Eagle	18.1	33.1	9	45	S	2.8	S	37	2	18
3	Tam W-101	17.9	27.5	5	T	S	1.1	S	64	4	14
4	Osage	20.0	34.3	10	11	S	1.8	R	tr	3	31
5	Tam W-103	16.1	26.7	6	18	S	1.3	S	72	9	35
6	KS73112	17.9	30.2	3	68	R	1.0	R	tr	6	23
7	KS73114	17.2	30.1	9	62	MR	1.6	R	tr	7	29
8	KS73146	17.2	29.5	3	70	R	1.5	R	tr	11	100
9	KS73148	17.4	29.4	5	70	R	1.2	R	tr	9	57
10	KS73159	16.3	28.8	1	65	R	1.5	R	tr	13	55
11	KS73167	17.4	30.5	5	70	R	1.8	R	tr	5	17
12	KS73199	16.9	30.8	5	60	R	1.5	R	tr	7	35
13	KS73248	16.9	29.7	4	65	R	1.2	R	tr	6	20
14	KS73253	16.3	29.8	3	50	MR	1.3	R	tr	8	40
15	KS73261	16.9	29.7	7	60	R	1.3	R	tr	6	17
16	KS74124	17.9	33.5	0	40	S	1.5	R	tr	14	42
17	W-332	20.3	35.7	4	11	S	2.0	R	tr*	5	37
18	W-335	20.2	30.5	0	T	S	1.0	MR	14	4	31
19	C1	22.0	31.0	2	70	S	1.1	MR	14	5	44
20	C4	22.1	29.8	0	65	S	1.6	MR	10	5	33
21	Plain V	15.1	28.4	3	65	R	1.4	MR	6	11	32
5221 22	Dual VIII	16.9	28.8	3	55	S	1.2	R	5	5	20
5232 23	Dual I	17.1	29.0	0	50	S	0.8	R	5	4	20
24	7302	17.1	33.3	2	30	S	2.3	seg.		5	19
25	7303	18.1	36.1	1	25	S	2.3	seg.		2	18
26	KS73H441	17.0	34.4	3	30	R	4.3	S	36	9	18
27	KS73H530	16.5	29.1	1	65	R	1.3	R	tr	7	33
28	KS73H590	18.2	32.7	3	65	R	1.8	R	5	7	50
29	KS73H593	17.7	32.7	2	40	R	1.8	R	7	7	72
30	Lancota	19.8	35.0	0	50	MS	2.6	R	5	2	40
Avg.		17.9	31.1								

Date headed: Av. of 7 locations, missing are Powhattan, Newton, and Belleville.
Height: Av. of all 10 locations.
Hessian fly: Percent of infected tillers in the Hutchinson test. Harry Somsen.
Bunt: Percent infected heads from inoculated seed. E. D. Hansing.
SBM: Reaction in early April at Newton and Powhattan.
Lodging: Rating-0 (none) to 9 (poorest). Av. of 4 locations, Manhattan, Belleville, Colby, and Hays.
Leaf rust: Response: R - resistant to S - susceptible. Av. of three locations, Manhattan (4 reps), Hays (1 rep), Hutchinson (4 reps), *entry 17 about 5% susceptible plants.
Shattering: Percent shattering at Colby, number of kernels per sq. ft. on the ground at Minneola. Av. of 3 reps at Colby, four reps at Minneola.

Table 2. Yield, in percent of test average, of the hard winter wheats in the 1975 KIN (see Table 1 for bushels).

1975 Entry No.	Kind	E. KS Pow-hattan	E. KS Man-hattan	E. KS Hutch-inson	E. KS New-ton	E. KS Belle-ville	E. KS 5 sta. avg.	W. KS 5 sta. avg.	KS 10 sta. avg.
1	Parker	107*	99*	103	98	81	98	88	93
2	Eagle	104*	102*	102	85	95	98	110	104
3	Tam W-101	92	104*	98	87	102*	97	105	101
4	Osage	103*	115*	109*	86	112*	105	109	107
5	Tam W-103	80	79	97	88	89	87	101	94
6	KS73112	102*	110*	113*	116*	117*	112	114	113
7	KS73114	108*	105*	100	104*	113*	106	109	108
8	KS73146	100*	107*	110*	118*	101	107	78	92
9	KS73148	101*	112*	102	113*	107*	107	88	98
10	KS73159	101*	100*	103	109*	109*	104	81	93
11	KS73167	100*	110*	103	117*	104*	107	111	109
12	KS73199	104*	107*	103	104*	116*	107	92	99
13	KS73248	102*	104*	101	101*	107*	103	107	105
14	KS73253	104*	99*	116*	110*	107*	107	100	104
15	KS73261	101*	112*	97	106*	110*	105	109	107
16	KS74124	105*	107*	112*	114*	103*	108	96	102
17	W-332	105*	101*	104	99	111*	104	107	106
18	W-335	103*	87	98	99	90	95	106	101
19	C1	103*	101*	119*	85	88	99	118	109
20	C4	111*	92	109*	85	109*	101	115	108
21	Plain V	99*	100*	104	109*	89	100	81	91
5221 22	Dual VIII	107*	99*	103	99	88	99	102	101
5232 23	Dual I	94	98	95	88	84	92	104	98
24	7302	101*	94	90	86	98	94	87	91
25	7303	106*	90	89	90	91	93	89	91
26	KS73H441	100*	95	97	81	104*	95	104	100
27	KS73H530	104*	94	102	107*	80	97	96	97
28	KS73H590	93	94	104	103*	90	97	104	101
29	KS73H593	95	94	99	99	99	97	102	99
30	Lancota	104*	103*	112*	117*	108*	109	118	113
Avg.		100	100	100	100	100	100	100	100
LSD (.05)		12.0	15.9	11.5	16.0	15.4			

CHEMICAL, MILLING, AND BAKING DATA FOR THE KANSAS INTRASTATE NURSERY COMPOSITES OF HARD WINTER WHEAT VARIETIES HARVESTED IN 1975

Chemical, milling, and baking data for the Kansas Intrastate Nursery composites of hard winter wheat progenies harvested in 1975 are given in Table 1. Mixograms of 10-g. flour samples are reproduced in Figures 1 and 2.

A composite sample of each entry was made up of 500 g. from each of five stations in the eastern half and five stations in the western half of Kansas. Stations in the eastern half included Newton, Hutchinson, Manhattan, Powhattan, and Belleville. Those in the western half included Minneola, Garden City, Tribune, Hays, and Colby.

When producing a continuous phase of protein during mixing, protein content becomes increasingly limiting as it decreases below about 12%, so that mixing time increases as protein content decreases below about 12%. Thus, when flour protein content is below 12%, mixing time in Table 1 has been decreased about 12% for each 1% of protein below 12% before comparing mixing times of varieties.

Most of the CIMMYT/Scout selections have good overall quality characteristics. A few have been noted because of preferred protein content, mixing time, or loaf volume potential. Thus, KS73146, KS73148, 73199, and KS73261 are labeled as promising; KS73159 is particularly promising because of good mixing properties and outstanding loaf volume potential. Mixing time of KS73253 may be somewhat shorter than is desirable.

Overall quality characteristics of C 4, Dual VIII, Dual I, and KS73H441 also are promising. F_1 hybrids 7302 and 7303 are particularly promising because of high wheat and flour protein contents.

Referring to the three CIMMYT/Scout samples from Hays, KS73H530 is promising and distinctly the best of the three selections. Mixing times of the other two are undesirably short. Also, the wheat protein content of KS73H530 is somewhat higher than that of Lancota.

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Table 1. (cont.), page 2

Variety	C.I. or Sel. No.	Wheat[2/] Wt. Per Bu.	Wheat[2/] Ash	Wheat[2/] Protein	Wheat[2/] Flour Yield	Flour[2/] Ash	Flour[2/] Protein	Bread-baking Data[2/] Absorption	Bread-baking Data[2/] Mixing Time[3/]	Bread-baking Data[2/] Crumb Grain	Bread-baking Data[2/] Loaf Volume As Rec'd	Bread-baking Data[2/] Loaf Volume Corrected To 14.5% P
		lbs.	%	%	%	%	%	%	min.		cc.	cc.
GROUP 2 (cont.)												
LB 7575		58.9	1.68	15.8	74.0	.47	14.6	68.2	$3\frac{1}{2}$	S	1098	1091 5/
LB 7576		60.6	1.69	15.7	74.2	.50 Q	14.7	67.1	$3\frac{1}{4}$	S	1120	1106
LB 7577		60.8	1.70	16.0	73.2	.48	15.0	71.2	$3\frac{1}{8}$	S	1176	1139
LB 7578		59.8	1.71	16.3	72.8	.47	15.3	69.9	$10\frac{1}{2}$ U	S	1198	1140
LB 7579		61.1	1.56	16.2	73.9	.44	15.2	68.1	$2\frac{3}{4}$	S	1110	1064
LB 7580	2148	57.8	1.78	15.9	72.8	.44	15.2	72.2	$2\frac{3}{4}$	S	1168	1118
LB 7581		60.7	1.57	13.8	74.6	.48	12.8	65.5	$4\frac{1}{4}$	S	1005	1127
LB 7582	III	61.6	1.81 Q	14.2	74.3 4/	.51 Q	12.9	62.1	$5\frac{5}{8}$	S	1098	1228

1/ Chemical data expressed on a 14% moisture basis.

2/ S, Q, and U - Satisfactory, questionable, and unsatisfactory quality with respect to properties in question. A satisfactory rating is inferred in the absence of a designated one. One unsatisfactory rating, in general, characterized a variety as undesirable for hard wheat milling and breadmaking purposes. Crumb colors were satisfactory for all entries.

3/ Mixing time used in baking is evaluated in conjunction with other mixing properties obtained from the 10-g. mixogram.

4/ Softer than average hard wheat milling properties but entirely satisfactory.

5/ Promising overall quality characteristics.

6/ Particularly promising overall quality characteristics.

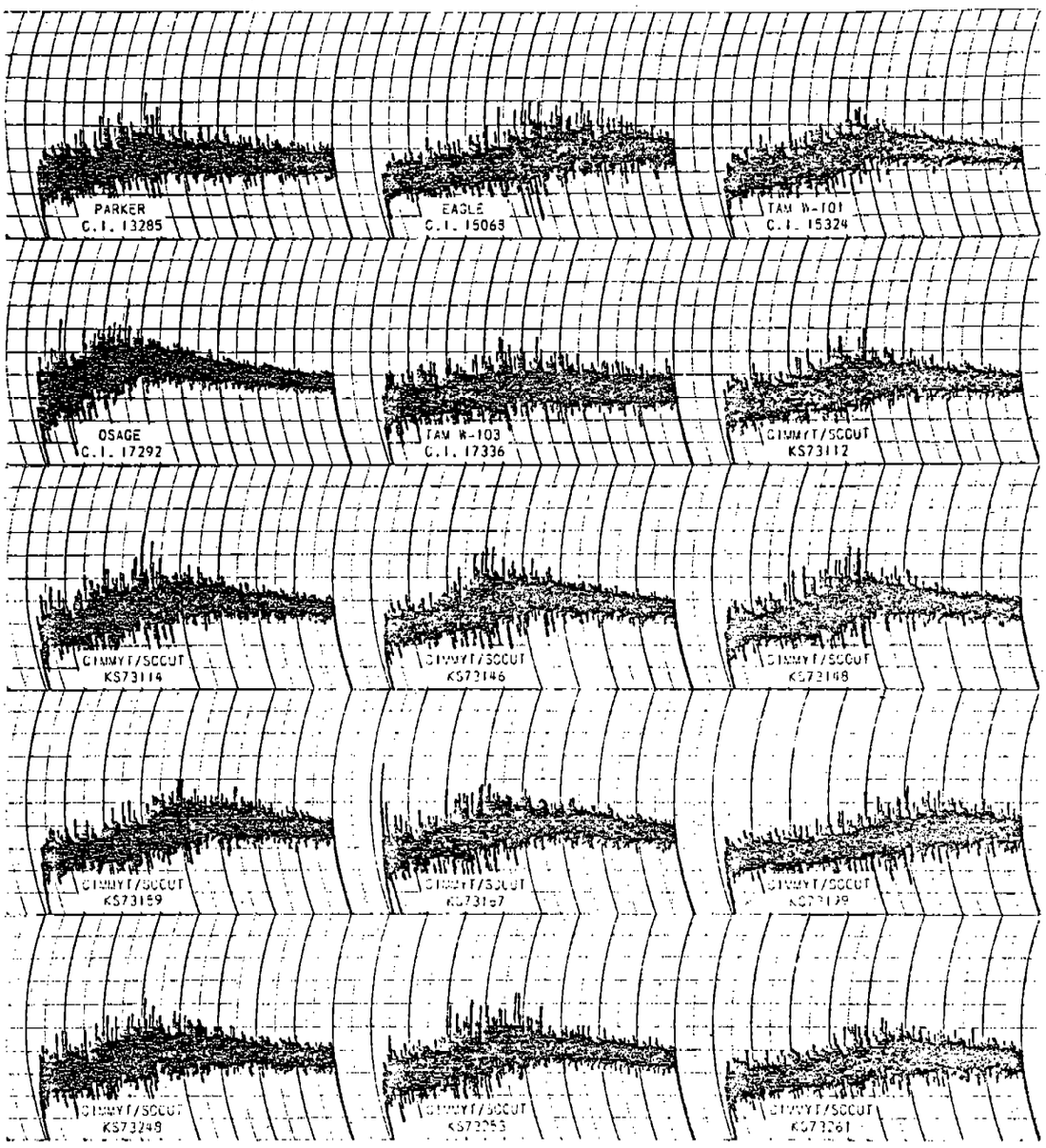

Fig. 1. Mixograms (10-g.) for the Kansas Intrastate Nursery composites of hard winter wheat cultivars harvested in 1975.

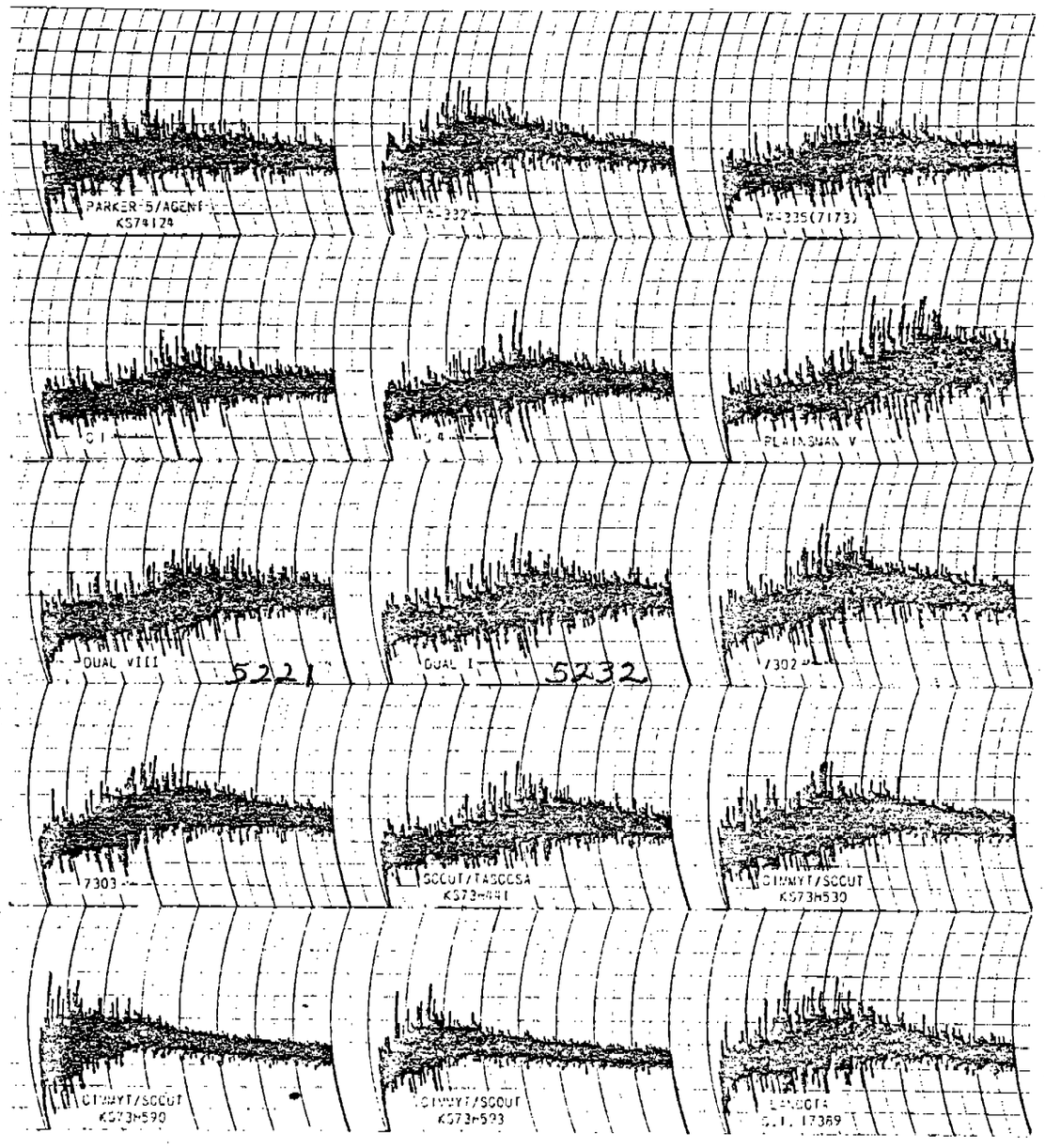

Fig. 2. Mixograms (10-g.) for the Kansas Intrastate Nursery composites of hard winter wheat cultivars harvested in 1975.

Sheet # 1

74 - 75 HIGH PROT WHEATS GLUTEN FUNCTIONALITY

(15% CONSTANT PROTEIN BASIS)

	SRA	Mix Time	Loaf Volume	Volume/gram of Protein
	LB75124	3.40	1230	55.33
	LB75125	3.30	1200	53.33
	LB75126	3.30	1100	46.67
	LB75127	4.20	1150	50.00
	LB75128	6.30	1205	53.67
	LB75129	5.00	1080	45.33
	LB75130	5.20	1285	59.00
	LB75131	7.30	1250	56.67
	LB75132	7.15	1150	50.00
5210	LB75133	5.30	1300	60.00
	LB75134	3.40	1280	58.67
	LB75135	7.15	1050	43.33
	LB75136	5.15	1150	50.00
5232	LB75137	5.00	1250	56.67
	LB75138	4.35	1150	50.00
	LB75139	4.25	1150	50.00
	LB75140	4.45	1100	46.67
	LB75143	4.40	1190	52.67
5221	LB75144	6.00	1310	60.67
	LB75145	2.25	1150	50.00
	LB75146	5.25	1130	48.67
	LB75142	4.15	1235	55.67
	~~Control~~	~~4.30~~	~~1010~~	~~40.67~~
	Control	7.00	1145	49.67
	Control	5.05	1140	49.33

The two controls were excellent quality spring wheats.

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