No. 9300074

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Minnesota 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 [illegible]RIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. [illegible]E UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS [illegible] 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.)

BARLEY

'Stander'

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* 30th *day of* September *in the year of our Lord one thousand nine hundred and* ninety-three.

Attest:

Kenneth R. Evans

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secretary of Agriculture

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Agriculture, Clearance Office, OIRM, Room 404-W, Washington, D.C. 20250; and to the Office of Management and Budget, Paperwork Reduction Project (OMB #0581-0055), Washington, 20250.

FORM APPROVED: OMB 0581-0055, Expires 1/31/91

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

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

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

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NO.: Minn M64

3. VARIETY NAME: Stander

4. ADDRESS *(street and no. or R.F.D. no., city, state, and ZIP)*: Univ. of Minnesota, 220 Coffey Hall
1420 Eckles Ave., St. Paul, MN 55108

5. PHONE *(Include area code)*: 612-625-7278

FOR OFFICIAL USE ONLY

PVPO NUMBER: 9300074

FILING — Date: January 7, 1993 — Time: 2:55 [ ] A.M. [X] P.M.

FEES RECEIVED — Filing and Examination Fee: $ 2150.00 — Date: January 7, 1993 — Certificate Fee: $ 250.00 — Date: August 30, 1993

6. GENUS AND SPECIES NAME: Hordeum vulgare L.

7. FAMILY NAME *(Botanical)*: Graminae

8. CROP KIND NAME *(Common Name)*: Barley, six-rowed

9. DATE OF DETERMINATION: ~~Feb. 15, 1993~~ Nov. 7, 1991 AAA 2 Aug 1993

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

11. IF INCORPORATED, GIVE STATE OF INCORPORATION:

12. DATE OF INCORPORATION:

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS
Donald C. Rasmusson
Dept. of Agronomy and Plant Genetics
Univ. of Minnesota
St. Paul, MN 55108
PHONE *(Include area code)*:

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED *(Follow INSTRUCTIONS on reverse)*

a. [X] Exhibit A, Origin and Breeding History of the Variety.
b. [X] Exhibit B, Novelty Statement.
c. [X] Exhibit C, Objective Description of Variety.
d. [X] Exhibit D, Additional Description of Variety.
e. [X] Exhibit E, Statement of the Basis of Applicant's Ownership.
f. [X] Seed Sample (2,500 viable untreated seeds). Date Seed Sample mailed to Plant Variety Protection Office _____.
g. [X] Filing and Examination Fee ($2,150) made payable to "Treasurer of the United States."

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.)*
[X] YES *(If "YES," answer items 16 and 17 below)* [ ] NO *(If "NO," skip to item 18 below)*

16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
[X] YES [ ] NO

17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
[X] FOUNDATION [X] REGISTERED [X] CERTIFIED

18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?
[ ] YES *(If "YES," through* [ ] Plant Variety Protection Act [ ] Patent Act. Give date: _____ .)
[X] NO

19. HAS THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?
[X] YES (If "YES," give names of countries and dates) United States of America, February 1993
[ ] 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 *(Owner(s))*	CAPACITY OR TITLE	DATE
Donald C Rasmusson	Professor	December 14, 1992
Michael V Martin	Assistant Director	January 5, 1993

930007-4

BARLEY

'Stander'

14A. Exhibit A. Origin and Breeding History of Stander Barley.

'Stander' spring barley (Hordeum vulgare L.), (Reg. no. cv-___, PI _____) was developed by the Minnesota Agricultural Experiment Station and released February 15, 1993. Stander, whose experimental designation was M64, has the pedigree 'Excel'/M80-224. M80-224 has the pedigree 'Robust'/'Bumper' so the pedigree of Stander can be written Excel// Robust/Bumper. Excel and Robust are currently grown malting cultivars and Bumper also is a malting cultivar. The cross that led to Stander was made in 1984. The breeding method was a combination of single-seed descent and pedigree. There was no selection in early generations with the population being advanced in the F_3 and F_4 generations via single seed descent in a glasshouse. Stander originated from a single plant taken at random from a selected F_5 line. The F_5 line was chosen because it was comparatively short and apparently resistant to lodging. Replicated agronomic and disease testing began in Minnesota in 1987 and regional testing in 1989. Evaluation of malting quality began in 1986 (F_5 line testing) and industry malting and brewing evaluation began in 1989. In 1989, 98 uniform head-rows were bulked to reconstitute the line. Stander is uniform in appearance and contains no off-type plants in the reconstituted line.

Seed stocks will be maintained by the Minnesota Agricultural Experiment Station and the Minnesota Crop Improvement Association. Certification will be limited to three generations after breeder seed: Foundation, Registered and Certified. Certified seed will be offered for sale in 1994. Application will be made for protection via the "Certification Option."

14B. Exhibit B. Novelty Statement.

'Stander' barley (Hordeum vulgare L.) (Reg. No. _____, P.I. _____) is a six-row, smooth-awn, spring barley. Its covered kernels have short hairs on the rachilla and a white aleurone. The spike is medium-lax, medium-long and semierect.

Stander is most similar to Robust and Excel, both of which occur in its pedigree. It can be distinguished from Robust because it is shorter by several centimeters (Table 5). The height difference is relatively large and consistent as indicated by height data from 25 regional trials over three years (1989, 1990 and 1992). In these trials, average height for Stander was 81.6 centimeters and Robust, 88.1 centimeters.

Stander and Robust also differ in level of alpha amylase. The difference in alpha amylase between Robust and Stander is large and consistent as indicated by Minnesota and regional trial data (Tables 3 and 4). In terms of barley quality standards, the difference in alpha amylase is large. This difference is highly repeatable and Stander always exceeds Robust in alpha amylase. The U.S. malting and brewing industry recognizes that Robust is low in alpha amylase; in contrast, Stander is high and similar to Morex and Excel (Tables 3 and 4). The alpha amylase data are from the Cereal Research Unit at Madison. They can verify the repeatability of the difference.

Stander and Excel can be distinguished by rachilla hair length (often used as a taxonomic trait) and percentage plump kernels. Stander has short-haired rachilla while Excel has long-haired rachilla.

Stander has a high percentage of plump kernels while Excel has a low-medium level of plump kernels. Their respective values were 70% versus 59% in 22 Minnesota trials (Table 1) and 63% versus 49% in three regional trials (Table 4). By barley standards, the plump kernel difference between Excel and Stander is large. The difference is consistent as indicated by good agreement between the two sets of data (Tables 1 and 4). Kernel plumpness data is commonly obtained on bulk samples on the trial basis (grain from all replications is bulked before measuring kernel plumpness). So we do not have replication information.

FORM APPROVED: OMB NO. 40-R3822

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK AND SEED DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Barley)

OBJECTIVE DESCRIPTION OF VARIETY
BARLEY *(HORDEUM VULGARE)*

INSTRUCTIONS: *See Reverse.*

NAME OF APPLICANT(S)
Minnesota Agricultural Experiment Station

ADDRESS *(Street and No. or R.F.D. No., City, State, and ZIP Code)*
University of Minnesota
St. Paul, MN 55108

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PVPO NUMBER 9300074
VARIETY NAME OR TEMPORARY DESIGNATION Stander

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

1. GROWTH HABIT:

[1] 1 = SPRING 2 = FACULTATIVE WINTER 3 = WINTER [3] Early Growth: 1 = PROSTRATE 2 = SEMIPROSTRATE 3 = ERECT

2. MATURITY (50% Flowering):

[2] 1 = EARLY (California Mariout) 2 = MIDSEASON (~~Betzes~~ Robust) 3 = LATE (Frontier)

[ ] No. of days *Earlier* than ..... [ ] } 1. = Robust ~~1 = BETZES~~ 2 = CALIFORNIA MARIOUT 3 = CONQUEST 4 = DICKSON
[2] No. of days *Later* than ..... [1] } 5 = PIROLINE 6 = PRIMUS 7 = UNITAN

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

[3] 1 = SEMIDWARF 2 = SHORT (California Mariout) 3 = MEDIUM TALL (~~Betzes~~ Robust) 4 = TALL (Conquest)

[ ][6] Cm. *Shorter* than ..... [1] } 1 = Robust ~~1 = BETZES~~ 2 = CALIFORNIA MARIOUT 3 = CONQUEST 4 = DICKSON
[ ][ ] Cm. *Taller* than ..... [ ] } 5 = PIROLINE 6 = PRIMUS 7 = UNITAN

4. STEM:

[2] Exertion *(Flag to spike at maturity)*: 1 = 0 - 3 cm. 2 = 3 - 10 cm. 3 = 10 - 15 cm. [1] Anthocyanin: 1 = ABSENT 2 = PRESENT

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

[1] Collar Shape: 1 = CLOSED 2 = V-SHAPED 3 = OPEN 4 = MODIFIED CLOSED OR OPEN [1] Shape of Neck: 1 = STRAIGHT 2 = SNAKY 3 = OTHER (Specify) _____

5. LEAF:

[1] Basal leaf sheath *(seedling)*: 1 = GLABROUS 2 = PUBESCENT [1] Position of flag leaf *(at boot stage)*: 1 = DROOPING 2 = UPRIGHT

[3] Waxiness: 1 = ABSENT (Glossy) 2 = SLIGHTLY WAXY 3 = WAXY [2][1] MM. WIDTH (First leaf below flag leaf)

[2][9] CM. LENGTH (First leaf below flag leaf) [1] Anthocyanin in leaf sheath: 1 = ABSENT 2 = PRESENT

6. HEAD:

[2] Type: 1 = TWO-ROWED 2 = SIX-ROWED [2] Density: 1 = LAX 2 = ERECT (Not dense) 3 = ERECT (Dense)

[2] Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE 4 = OTHER (Specify) _____ [2] Waxiness: 1 = ABSENT (Glossy) 2 = SLIGHTLY WAXY 3 = WAXY

[3] Lateral Kernels Overlap: 1 = NONE 2 = AT TIP 3 = 1/4 - 1/2 OF HEAD [2] Rachis *(Hair on edge)*: 1 = LACKING 2 = FEW 3 = COVERED

7. GLUME:

[3] Length: 1 = 1/3 OF LEMMA 2 = 1/2 OF LEMMA 3 = MORE THAN 1/2 OF LEMMA [2] Hairs: 1 = NONE 2 = SHORT 3 = LONG

[1] Hair covering: 1 = NONE 2 = RESTRICTED TO MIDDLE 3 = CONFINED TO BAND 4 = COMPLETELY COVERED

[3] Awns: 1 = LESS THAN EQUAL TO LENGTH OF GLUMES 2 = EQUAL TO LENGTH OF GLUMES 3 = MORE THAN EQUAL TO LENGTH OF GLUMES

[1] Awn Surface: 1 = SMOOTH 2 = SEMISMOOTH 3 = ROUGH

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8. LEMMA:

[5] Awn: 1 = AWNLESS 2 = AWNLETS ON CENTRAL ROWS, AWNLESS ON LATERAL ROWS 3 = SHORT ON CENTRAL ROWS, AWNLETS ON LATERAL ROWS 4 = SHORT (less than equal to length of spike) 5 = LONG (longer than spike) 6 = HOODED

[2] Awn Surface: 1 = AWNLESS 2 = SMOOTH 3 = SEMISMOOTH 4 = ROUGH

[2] Teeth: 1 = ABSENT 2 = FEW 3 = NUMEROUS

[1] Hair: 1 = ABSENT 2 = PRESENT

[3] Shape of base: 1 = DEPRESSION 2 = SLIGHT CREASE 3 = TRANSVERSE CREASE

[1] Rachilla Hairs: 1 = SHORT 2 = LONG

9. STIGMA:

[1] Hairs: 1 = FEW 2 = MANY

10. SEED:

[2] Type: 1 = NAKED 2 = COVERED

[1] Hairs on Ventral Furrow: 1 = ABSENT 2 = PRESENT

[3] Length: 1 = SHORT (8.0 mm.) 2 = SHORT TO MIDLONG (7.5 - 9.0 mm.) 3 = MIDLONG (8.5 - 9.5 mm.) 4 = MIDLONG TO LONG (9.0 - 10.5 mm.) 5 = LONG (10.0 mm.)

[2] Wrinkling of hull: 1 = NAKED 2 = SLIGHTLY WRINKLED 3 = SEMIWRINKLED 4 = WRINKLED

[1] Aleurone Color: 1 = COLORLESS (White or Yellow) 2 = BLUE

[0 0] PERCENT ABORTIVE

[3 4] GMS. PER 1000 SEEDS

11. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[0] SEPTORIA	[0] NET BLOTCH	[2] SPOT BLOTCH	[1] POWDERY MILDEW
[1] LOOSE SMUT	[0] BACTERIAL BLIGHT	[0] COVERED SMUT	[0] FALSE LOOSE SMUT
[2] STEM RUST Susc. to Race QCC	[0] LEAF RUST	[0] SCAB	[0] SCALD
[0] AY	[0] BSMV	[0] BYDV	[ ] OTHER (Specify)

12. INSECT: (0 = Not tested, 1 = Susceptible, 2 = Resistant)

[0] GREEN BUG	[0] ENGLISH GRAIN APHID	[0] CHINCH BUG	[0] ARMYWORM
[0] GRASS HOPPERS	[0] CERIAL LEAF BETTLE	[0] OTHER (Specify)	

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

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13. CHEMICAL (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[0] DDT [0] OTHER (Specify)

14. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	Robust	Seed size	Robust
Leaf size	Excel	Coleoptile elongation	Robust
Leaf color	Robust	Seedling pigmentation	Robust
Leaf carriage	Robust		

REFERENCES: The following publications may be used as a reference aid for the standardization of character descriptions and terms used in this form:

1. Wiebe, G. A., and D. A. Reid, 1961, Classification of Barley Varieties Grown in the United States and Canada in 1958, Technical Bulletin No. 1224, U.S. Dept. of Agriculture.
2. Reid, D. A., and G. A. Wiebe, 1968, Barley: Origin, Botany, Culture, Winter Hardiness, Genetics, Utilization, Pests, Agriculture Handbook No. 338, U.S. Dept. of Agriculture. pp. 61 - 84.
3. Malting Barley Improvement Association, Milwaukee, Wisconsin, 1971, Barley Variety Dictionary.

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

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14D. Exhibit D. Additional Description of Stander.

Lodging resistance of Stander is very good and was the basis for choosing its name. Average lodging percent of Stander, Robust, Excel, and Morex in seven Minnesota trials (1989-1992) (where lodging occurred) were 26, 38, 41, and 52%, respectively (Table 1). Stander was 18% higher yielding than Morex and 6% higher yielding than Robust in 32 trials in Minnesota (1988-1992) (Table 2). It yielded two bushel per acre below Excel in the 32 trials. Stander, Excel, Morex and Robust had 70, 59, 64 and 71% plump kernels, respectively, in 22 Minnesota trials (1989-1992) (Table 1).

Excel possesses the ND B112 gene for resistance to spot blotch [Bipolaris sorokiniana (Sacc.) Shoemaker], and some tolerance to net blotch [Pyrenephora teres Drechs.) (Table 1). It has the T gene for resistance to stem rust [Puccinia graminis (Pers.:Pers.) var. tritici] which conditions resistance to all current races of stem rust except race QCC. Its reaction to race QCC is intermediate compared to all barley lines tested to date but it is classified as susceptible. It is susceptible to loose smut [Ustilago tritici (Pers.) Rostr.].

Stander's malting quality traits, determined in collaboration with the USDA Cereal Research Unit at Madison, WI, and industry testing in cooperation with the American Malting Barley Association, appear to be similar or superior to Morex, the industry six-row quality standard. Diastatic power and alpha-amylase levels are similar to Morex (Tables 3 and 4). In comparison to Robust, the most widely grown cultivar in Minnesota, Stander was 24 and 36% higher in alpha-amylase in four Minnesota (Table 3) and three regional trials (Table 4), respectively. In four Minnesota and three regional trials, extract level of Stander was 1.8 and 2.6% above Morex, respectively, (Tables 3 and 4). Grain protein of Stander was lower than Morex in both state and regional trials (Tables 3 and 4). In most situations, low protein is preferred. Stander is currently being evaluated for malting and brewing quality by the American Malting Barley Association, Inc.

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Table 1. Characteristics of barley varieties, 1989-1992.

	Heading (June)	Height (cm)	Lodging (%)	Plump kernels (%)	Net blotch (1-5)[1]
	17[2]	15	7	22	6
Morex	19	86	52	64	4.6
Robust	20	86	38	71	3.6
Excel	20	81	41	59	3.6
Stander	21	81	26	70	3.3

[1] 1 most desirable; [2] number trials

Table 2. Grain yield in bushels per acre, 1988-1992.

	Location					
	Crookston	Morris	Stephen	Roseau	St. Paul	Mean
	9[1]	10	2	3	8	32
Morex	87	69	56	74	83	77
Robust	95	75	67	91	90	86
Excel	106	83	76	94	93	93
Stander	107	76	75	97	93	91
LSD (0.05)	8	7	13	9	7	4

[1] number trials

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Table 3. Quality comparisons from four Minnesota trials.

	Barley protein (%)	Malt extract (%)	Diastatic power (L°)	Alpha amylase (20° units)
Morex	13.3	77.8	134	45.3
Robust	13.1	78.1	124	34.7
Excel	12.0	78.9	118	44.5
Stander	11.8	79.2	124	43.0

Table 4. Quality comparisons from regional nurseries (Brandon, Manitoba and Carrington, Langdon, North Dakota), 1991.

	Barley protein (%)	Malt extract (%)	Diastatic power (L°)	Alpha amylase (20° units)	Plump kernels (%)
Morex	14.4	76.0	158	46	45
Robust	14.2	76.9	149	33	61
Excel	13.7	77.1	148	43	49
Stander	13.6	78.0	163	45	63

Table 5. Height (in centimeters) of Stander and Robust for three years in Mississippi Valley Nursery.

	1989	1990	1992	Average
n =	7[1]	10	8	25
Robust	82.4	88.9	92.2	88.1
Stander	74.0	81.9	88.0	81.6
LSD (.05)	3.1	2.8	4.0	1.9

[1] number trials

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

The Minnesota Agricultural Experiment Station is the owner of Stander. The Minnesota Agricultural Experiment Station is the employer of the breeder who developed Stander.