

No.

200000144



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Montana Agricultural Experiment Station

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

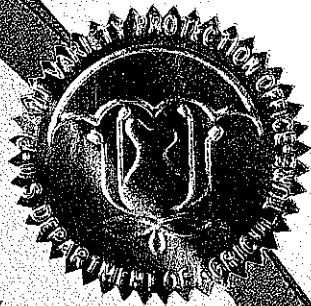
AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT, COMMON

'Scholar'

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 thirteenth day of December, in the year two thousand two.



Attest:

Acting Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secretary of Agriculture

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

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
 (Instructions and information collection burden statement 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 OWNER Montana Agricultural Experiment Station		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME MT9433	3. VARIETY NAME Scholar
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country) 202 Linfield Hall Montana State University Bozeman MT 59717		5. TELEPHONE (include area code) 406 994 3683	FOR OFFICIAL USE ONLY PVPO NUMBER 200000144
7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) Experiment Station		6. FAX (include area code) 406 994 6579	
8. IF INCORPORATED, GIVE STATE OF INCORPORATION		9. DATE OF INCORPORATION	

10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. (First person listed will receive all papers) Luther Talbert Plant Sciences Department Montana State University Bozeman MT 59717		FILING AND EXAMINATION FEES: \$ 2450 ⁰⁰ DATE 2/7/00 CERTIFICATION FEE: \$ 320 ⁰⁰ DATE 4/1/02
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11. TELEPHONE (include area code) 406 994 5060	12. FAX (include area code) 406 994 1848	13. E_MAIL usslt@montana.edu	14. CROP KIND (Common Name) wheat
15. GENUS AND SPECIES NAME OF CROP Triticum aestivum		16. FAMILY NAME (Botanical) Triticeae	17. IS THE VARIETY A FIRST GENERATION HYBRID? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO

18. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse) a. <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety b. <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness c. <input checked="" type="checkbox"/> Exhibit C. Objective Description of Variety d. <input type="checkbox"/> Exhibit D. Additional Description of the Variety (Optional) e. <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Owner's Ownership f. <input type="checkbox"/> Voucher Sample (2,500 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository) g. <input checked="" type="checkbox"/> Filing and Examination Fee (\$2,450), made payable to "Treasurer of the United States" (Mail to the Plant Variety Protection Office)	19. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? See Section 83(a) of the Plant Variety Protection Act <input type="checkbox"/> YES (If "yes", answer items 20 and 21 below) <input checked="" type="checkbox"/> NO (If "no," go to item 22)
	20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
21. IF "YES" TO ITEM 20, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED? <input type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input type="checkbox"/> CERTIFIED	

22. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OR OTHER COUNTRIES? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. (Please use space indicated on reverse.)	23. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT (PLANT BREEDER'S RIGHT OR PATENT)? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. (Please use space indicated on reverse.)
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24. The owners declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

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

SIGNATURE OF OWNER 	SIGNATURE OF OWNER
NAME (Please print or type) Sharron Quisenberry	NAME (Please print or type)
CAPACITY OR TITLE Dean and Director	DATE 10/2/99
CAPACITY OR TITLE	DATE

PVP Application (Revisions of 4/11/01 in italics).

18a.

(1) Scholar derives from the cross MT8808/'Marberg'¹. MT8808 was derived from the cross MT7746/'Lew'². MT7746 was a selection from 'Gallo', which was developed by the Center for International Maize and Wheat Improvement (CIMMYT). The pedigree of Gallo is Willet Enano*3/Narino59*2//Seneca/3/Jaral 66sib=II22529.

(2) Scholar was a F₄ plant selection from an F₃ head row. Scholar was grown in an F₅ plant row in Bozeman MT and selected for uniformity, estimated yield potential and grain protein. Selected F₆ lines were entered into a single row yield trial in Bozeman, and tested for agronomic traits, grain protein, and gluten strength using the mixograph. Selected lines from this nursery were advanced to our Preliminary Yield Trial in 1994, which is grown at four sites across Montana. Lines were measured for agronomic traits, and subjected to a full mill and bake analysis. Selected lines from this trial were entered into our Advanced Yield Trial grown at ten locations annually. Scholar has been tested in this trial since 1995.

Scholar was purified following a traditional head row/line row multiplication scheme. Approximately 400 heads were grown in 1997 and head rows true to type were selected. In 1998, 250 line rows were grown, with selection for uniformity and solid stems. These were bulked to form breeder seed. *The primary reasons for discarding line rows were poor stand and stems with lower solidness scores than the other line rows.*

(3) Scholar has been grown in several dozen yield trial plots, and in six seed increase fields. The variety is visually uniform *and stable* for *plant color, seed color, and head type*. Uniformity and stability has been assessed over five generations of seed increase.

(4) Plants approximately one head taller than the canopy were observed under well-watered conditions in Bozeman *in a single growing season (1999)* at a frequency of 1 per 4000. It is not known if this is a genetic trait, or due to micro-climatic causes.

18b. Scholar is intended to be grown in dryland areas of northern Montana, especially in areas with moderate to light sawfly infestation potential. *Scholar most closely resembles the variety Amidon*. Scholar has moderate resistance to the wheat stem sawfly by virtue of having semi-solid stems. Table 1 presents paired t-tests comparing Scholar to other spring wheat varieties grown in Montana yield trials grown at Havre, Conrad, and Sidney, sites which represent the northern and northeastern parts of the state. Scholar yields significantly better than sawfly resistant varieties Fortuna and Ernest, and more than moderately resistant Lew. Scholar is numerically though not significantly better than Amidon, which is also moderately resistant to the sawfly. Yield of Scholar at these locations is not significantly different than hollow-stemmed McNeal, which is the leading variety in the state. Test weight of Scholar is as good or better than other leading varieties when grown in Conrad, Havre and Sidney (Table 1). Heading date of Scholar is significantly earlier than Lew and Newana, but later than most other popular spring wheat varieties (Table 1). Grain protein percent is significantly higher than both Amidon and McNeal,

and significantly lower than Ernest (Table 1).

Table 2 presents observations regarding insect and disease reaction of Scholar to natural *and* artificial infestations in Montana. *Stripe rust reaction of Scholar was obtained in two years in Bozeman (1997 and 1998) from natural infestations. Additionally, stem rust data was obtained after inoculation with spores that had been increased after collection in eastern Montana. Data regarding stem rust resistance was obtained in Bozeman in 1994, 1995, 1996, 1997, and 1998. The races of rust used are not known. Data regarding stem solidness (which confers stem saw fly resistance) has been obtained in Bozeman each year since 1995. Reaction to wheat streak mosaic virus was assessed in 1999 and 2000 in Bozeman by artificial inoculation with a strain that was collected in Conrad MT. Reaction to the Russian wheat aphid was observed in 1996, 1997, and 1998 in Bozeman after artificial infestation with aphids collected in central Montana.*

Tables 3-9 present agronomic data obtained with Scholar over four years at ten locations in Montana. No statistical tests were performed for data combined over years at each location in that experimental entries are different every year. However, statistically treated data shown in Table 1 reflects the trend in Tables 3-9.

Table 10 presents milling and baking quality data. Scholar performed similarly to other spring wheat lines, probably being closest to Amidon in terms of over-all end-use quality.

Appendix Tables 1-5 present yearly means for grain yield, test weight, heading date, plant height and grain protein of Scholar grown in Havre Montana relative to other popular spring wheat varieties. Tables 6-10 present the same data from Sidney, while Table 11-15 present the same data from Conrad. LSDs are presented for each location and each year for all traits except protein, as only one replication per location was analyzed for this trait.

Unique attributes of Scholar that merit release are its combination of high yield, high protein, and moderate resistance to the wheat stem sawfly. No other available variety combines these attributes.

References

- McNeal, F. H. and M. A. Berg. 1977. Registration of Lew wheat. *Crop Sci.* 17:674.
- McNeal, F. H. and D. L. Klindworth. 1980. Registration of Marberg wheat. *Crop Sci.* 20:828.

Table 1. 1995-1998 OVERALL PAIRED T-TEST RESULTS FOR SCHOLAR AND COMPARED TO OTHER SPRING WHEAT VARIETIES GROWN ON DRYLAND AT HAVRE, CONRAD AND SIDNEY, MONTANA

GRAIN YIELD (BU/AC)

REFERENCE MEAN: SCHOLAR 55.2 (N= 12)

ID	NAME	ACTUAL MEAN	NO. OBS	MEAN DIFF	T-PAIRED VALUE	P-VALUE
CI 13596	FORTUNA	47.8	12	-7.4	-4.5	.001
CI 17429	LEW	50.8	12	-4.4	-4.7	.001
CI 17430	NEWANA	54.9	12	-.3	-.2	.822
CI 17790	LEN	51.5	12	-3.6	-3.7	.003
PI549275	HI-LINE	53.5	12	-1.7	-1.5	.164
PI574642	MCNEAL	57.1	12	1.9	1.7	.109
PI527682	AMIDON	54.0	12	-1.2	-1.2	.255
PI592761	ERNEST	52.1	12	-3.1	-2.6	.026

TEST WEIGHT (LB/BU)

REFERENCE MEAN: SCHOLAR 61.5 (N= 12)

ID	NAME	ACTUAL MEAN	NO. OBS	MEAN DIFF	T-PAIRED VALUE	P-VALUE
CI 13596	FORTUNA	61.5	12	.0	-.0	.985
CI 17429	LEW	61.4	12	-.1	-.2	.851
CI 17430	NEWANA	60.2	12	-1.3	-5.0	.000
CI 17790	LEN	60.3	12	-1.3	-5.7	.000
PI549275	HI-LINE	61.2	12	-.3	-.7	.485
PI574642	MCNEAL	59.9	12	-1.6	-3.6	.004
PI527682	AMIDON	60.6	12	-.9	-4.1	.002
PI592761	ERNEST	61.5	12	.0	.0	.992

HEADING DATE (JULIAN DAYS)

REFERENCE MEAN: SCHOLAR 179.9 (N= 12)

ID	NAME	ACTUAL MEAN	NO. OBS	MEAN DIFF	T-PAIRED VALUE	P-VALUE
CI 13596	FORTUNA	178.1	12	-1.7	-6.0	.000
CI 17429	LEW	181.1	12	1.3	4.5	.000
CI 17430	NEWANA	180.7	12	.9	3.4	.006
CI 17790	LEN	179.1	12	-.8	-2.3	.041
PI549275	HI-LINE	176.7	12	-3.1	-7.2	.000
PI574642	MCNEAL	179.4	12	-.5	-1.3	.235
PI527682	AMIDON	178.6	12	-1.2	-4.2	.001
PI592761	ERNEST	177.7	12	-2.1	-6.7	.000

Table 1. Cont.

PLANT HEIGHT (INCHES)

REFERENCE MEAN: SCHOLAR 34.2 (N= 12)

ID	NAME	ACTUAL MEAN	NO. OBS	MEAN DIFF	T-PAIRED VALUE	P-VALUE
CI 13596	FORTUNA	34.9	12	.7	1.4	.193
CI 17429	LEW	36.1	12	2.0	3.5	.005
CI 17430	NEWANA	28.9	12	-5.3	-7.4	.000
CI 17790	LEN	29.7	12	-4.5	-6.5	.000
PI549275	HI-LINE	28.2	12	-6.0	-8.6	.000
PI574642	MCNEAL	31.1	12	-3.1	-5.1	.000
PI527682	AMIDON	35.4	12	1.2	2.5	.027
PI592761	ERNEST	34.6	12	.4	1.3	.222

GRAIN PROTEIN (%)

REFERENCE MEAN: SCHOLAR 13.9 (N= 12)

ID	NAME	ACTUAL MEAN	NO. OBS	MEAN DIFF	T-PAIRED VALUE	P-VALUE
CI 13596	FORTUNA	13.7	12	-.2	-1.0	.353
CI 17429	LEW	13.4	12	-.5	-4.3	.001
CI 17430	NEWANA	12.6	12	-1.3	-9.3	.000
CI 17790	LEN	14.0	12	.1	.7	.510
PI549275	HI-LINE	13.7	12	-.2	-.7	.522
PI574642	MCNEAL	13.5	12	-.4	-2.2	.048
PI527682	AMIDON	13.3	12	-.6	-4.3	.001
PI592761	ERNEST	14.2	12	.3	2.2	.050

Table 2. Insect And Disease reactions of Scholar compared with five other spring wheats¹

	Wheat stem sawfly	Stem rust	Stripe rust	Leaf rust	Septoria
Scholar	MR	R	MS	MS	R
McNeal	S	MR	MS	MS	R
Amidon	MR	R	R	R	R
Ernest	R	R	R	R	R
Newana	S	R	MR	R	MS
Lew	S	R	MS	S	MS

¹ Legend: R = resistant; S = susceptible; M = moderately

Table 3. Grain yield (bu/ac) of Scholar compared with five other spring wheat varieties grown under dryland conditions across Montana (1995-1998)

	Bozeman ¹	Conrad	Havre	Huntley	Moccasin	Sidney	Average
Scholar	71.5	67.1	50.5	48.5	40.5	47.9	54.3
McNeal	72.7	70.7	51.1	50.8	45.6	49.5	56.7
Amidon	74.6	65.3	49.2	53.3	45.5	47.4	55.9
Ernest	69.5	66.6	45.7	45.9	41.5	44.1	52.2
Newana	70.5	69.1	49.6	50.4	42.1	45.9	54.6
Lew	66.4	63.1	43.3	42.8	38.2	46.0	50.0

Table 4. Grain yield (bu/ac) of Scholar compared with five other spring wheats grown under high rainfall or irrigated conditions across Montana (1995-1998)

	Kalsipell ¹	Huntley ²	Sidney ²	Average
Scholar	95.7	82.4	67.8	81.9
McNeal	97.2	81.9	72.3	83.8
Amidon	105.8	84.8	72.1	84.3
Ernest	96.2	83.7	69.3	79.4
Newana	95.8	83.3	60.5	77.5
Lew	88.4	72.9	57.9	71.4

¹= high rainfall area, ²= irrigated

Table 5. Grain test weight (lb/bu) of Scholar compared to five other spring wheats grown under dryland conditions across Montana (1995-1998).

	Bozeman	Conrad	Havre	Huntley	Moccasin	Sidney	Average
Scholar	60.4	61.2	62.1	60.8	60.0	61.3	61.0
McNeal	60.2	60.6	59.4	59.2	59.5	59.8	59.8
Amidon	59.5	60.7	61.0	59.7	59.3	60.2	60.1
Ernest	61.2	62.1	61.7	60.9	59.8	60.7	61.1
Newana	59.0	59.4	60.6	59.7	59.0	60.4	59.7
Lew	62.1	62.2	61.4	60.5	60.2	60.9	61.2

Table 6. Grain test weight (lb/bu) of Scholar compared with five other spring wheats grown under high rainfall or irrigated conditions across Montana (1995-1998).

	Kalsipell ¹	Huntley ²	Sidney ²	Average
Scholar	61.3	60.3	60.7	60.8
McNeal	61.3	59.8	60.4	60.5
Amidon	61.2	60.4	59.9	60.5
Ernest	61.4	61.5	61.0	61.3
Newana	60.9	59.9	59.4	60.1
Lew	62.1	60.9	60.3	61.1

¹= high rainfall area, ²= irrigated

Table 7. Heading Date, plant height, lodging and shattering data for Scholar compared to five other spring wheats (1985-1998). Total of X locations.

	Heading date		Plant height (in.)		Lodging ³	Shattering ³
	I ¹	D ²	I ¹	D ²		
Scholar	6-27	7-01	36.8	34.2	MR	R
McNeal	6-27	6-30	34.1	31.3	R	R
Amidon	6-26	6-30	39.7	35.7	MR	R
Ernest	6-25	6-30	39.1	35.4	MR	R
Newana	6-28	7-02	33.2	29.4	R	R
Lew	6-28	7-03	38.2	36.0	S	MR

¹ = 3 total high rainfall and irrigated locations

² = 6 dryland locations

³ Legend: R = resistant; S = susceptible; M = moderately

Table 8. Grain protein (%) of Scholar compared to five other spring wheat varieties grown under dryland conditions across Montana (1995-1998)

	Bozeman	Conrad	Havre	Huntley	Moccasin	Sidney	Average
Scholar	15.4	12.6	14.7	16.1	14.6	14.3	14.6
McNeal	15.2	12.3	13.9	15.9	14.0	14.2	14.3
Amidon	15.2	12.1	13.8	15.1	13.8	13.9	14.0
Ernest	15.6	12.9	14.9	16.3	14.1	14.9	14.8
Newana	14.3	11.5	13.3	14.9	13.5	13.0	13.4
Lew	14.5	12.0	14.1	15.6	14.1	14.2	14.1

Table 9. Grain protein (%) of Scholar compared to five other spring wheats grown under high rainfall or irrigation across Montana (1995-1998)

	Kalispell ¹	Huntley ²	Sidney ²	Average
Scholar	13.3	14.9	13.9	14.0
McNeal	13.2	14.4	14.0	13.9
Amidon	13.2	14.1	13.9	13.7
Ernest	13.3	14.7	14.5	14.2
Newana	11.9	14.0	13.2	13.0
Lew	12.5	15.1	14.3	14.0

¹= high rainfall area, ²= irrigated

Table 10. Milling and baking quality data for Scholar compared to five other spring wheat varieties grown across Montana (1985-1997).

	Flour Protein (%)	Flour yield (%)	Flour Ash (%)	Mixograph Absorption (%)	Mixograph time (min.)	Bake absorption (%)	Bake time (min.)	Loaf volume (CC)	Milling Score 1=poor 5=excellent	Baking Score 1=poor 5=excellent
Scholar	12.8	69.2	.48	66.0	3.0	74.9	3.6	1036	4	4
McNeal	12.5	66.3	.46	65.1	4.9	78.4	8.0	1064	3	5
Amidon	12.5	69.7	.46	65.1	3.2	73.6	3.7	1035	5	4
Ernest	13.0	69.2	.42	66.4	3.4	74.3	5.6	1070	4	5
Newana	11.8	65.3	.43	63.7	2.9	73.2	3.9	1071	2	5
Lew	12.7	69.9	.47	65.1	4.1	74.9	5.8	1076	5	5

Attached please find some additional information in support of our PVP application for Scholar wheat (no. 200000144). Below is data from a 1997 stripe rust epidemic in Bozeman, where we obtained data on for two replications. Note that Amidon and Scholar are similar, thus this may not be a reliable characteristic for distinguishing the two varieties. I understand that the higher protein of Scholar is also not repeatable in some environments. Thus, we also conducted storage protein electrophoresis in order to distinguish among the varieties. This experiment is attached, and clearly shows that the high molecular weight glutenins of Scholar and Amidon are different, and can be used to easily distinguish between these varieties. The diagnostic bands are starred.

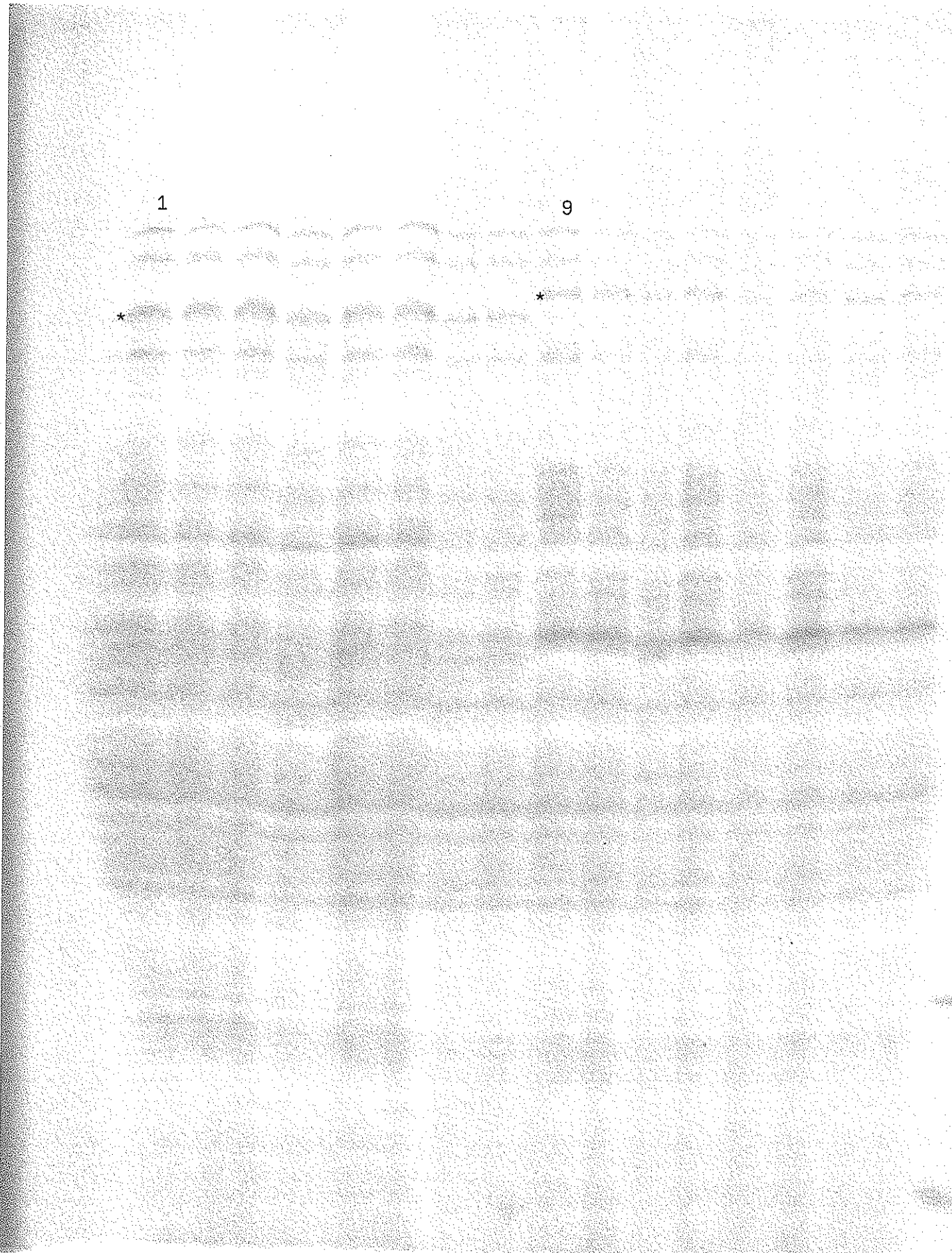
The procedure used to conduct storage protein electrophoresis was that of Laemmli (1970) as modified by Payne et al. (1981).

Laemmli, U. K. 1970. Cleavage of structural proteins during the assembly of the head of bacteriophage T4. Nature 22:680.

Payne, P. I., L. M. Holt, and C. N. Law. 1981. Structural and genetic studies on the high molecular weight subunits of wheat glutenin. I. Allelic variation in subunits amongst varieties of wheat (*Triticum aestivum*). Theor. Appl. Genet. 55:153-157.

Stripe Rust Scores, Bozeman MT 1997 (1-5, where 1 is no symptoms)

<u>Variety</u>	<u>Rep 1</u>	<u>Rep 2</u>
Scholar	1	1
Amidon	2	2
McNeal	3	3
Ernest	5	4



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 Officer, OIRM, AG Box 7630, Jamie L. Whitten Building, Washington, D.C. 20250. When replying, refer to OMB No. 0581-0055 and form number in your letter. Under the PRA of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

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U.S. DEPARTMENT OF AGRICULTURE
 AGRICULTURAL MARKETING SERVICE
 SCIENCE AND TECHNOLOGY
 PLANT VARIETY PROTECTION OFFICE
 BELTSVILLE, MD 20705

EXHIBIT C
 (Wheat)

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

NAME OF APPLICANT(S) Montana Agriculture Experiment Station ADDRESS (Street and No. or RD No., City, State, and Zip Code) 202 Linfield Hall Montana State University Bozeman MT 59717	FOR OFFICIAL USE ONLY
	PVPO NUMBER 200000144
	VARIETY NAME Scholar
	TEMPORARY OR EXPERIMENTAL DESIGNATION MT9433

PLEASE READ ALL INSTRUCTIONS CAREFULLY: Place the appropriate number that describes the varietal character of this variety in the boxes below. Place a zero in the first box (e.g. or) when number is either 99 or less or 9 or less respectively. Data for quantitative plant characters should be based on a minimum of 100 plants. Comparative data should be determined from varieties entered in the same trial. Royal Horticultural Society or any recognized color standard may be used to determine plant colors; designate system used: Please answer all questions for your variety; lack of response may delay progress of your application.

1. KIND:

1=Common 2=Durum 3=Club 4=Other (SPECIFY): _____

2. VERNALIZATION:

1=Spring 2=Winter 3=Other (SPECIFY): _____

3. COLEOPTILE ANTHOCYANIN:

1=Absent 2=Present

4. JUVENILE PLANT GROWTH:

1=Prostrate 2=Semi-erect 3=Erect

5. PLANT COLOR (boot stage):

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

6. FLAG LEAF (boot stage):

1 = Erect 2 = Recurved 1 = Not Twisted 2 = Twisted

7. EAR EMERGENCE:

Number of Days Earlier Than McNeal *

Number of Days Later Than Amidon *

8. ANTHOR COLOR:

1 = Yellow 2 = Purple

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

0 7 cm Taller Than McNeal

0 4 cm Shorter Than Amidon

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

10. STEM:

A. ANTHOCYANIN

1 = Absent 2 = Present

B. WAXY BLOOM

1 = Absent 2 = Present

C. HAIRINESS (last internode of rachis)

1 = Absent 2 = Present

D. INTERNODE (SPECIFY NUMBER)

2 = Hollow 2 = Semi-solid 3 = Solid

E. PEDUNCLE

2 = Absent 2 = Present

25 cm Length

11. HEAD (at Maturity):

A. DENSITY

2 = Lax 2 = Middense
 3 = Dense

B. SHAPE

1 = Tapering 2 = Strap
 3 = Clavate 4 = Other (SPECIFY):

C. CURVATURE

2 = Erect 2 = Inclined 3 = Recurved

D. AWNEDNESS

4 = Awnless 2 = Apically Awnletted
 3 = Awnletted 4 = Awned

12. GLUMES (at Maturity):

A. COLOR

1 = White 2 = Tan
 3 = Other (SPECIFY): Tan on edges

C. BEAK

3 = Obtuse 2 = Acute
 3 = Acuminate

B. SHOULDER

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

D. LENGTH

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

12. GLUMES (at Maturity) *Continued*:

200000144

E. WIDTH

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

13. SEED:

A. SHAPE

- 3 = 1 = Ovate 2 = Oval 3 = Elliptical

B. CHEEK

- 2 = 1 = Rounded 2 = Angular

E. Color

- 3 = 1 = White 2 = Amber 3 = Red
 4 = OTHER (Specify)

F. TEXTURE

- 1 = 1 = Hard 2 = Soft

C. BRUSH

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

D. CREASE

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

G. PHENOL REACTION (*see instructions*):

- 4 = 1 = Ivory 2 = Fawn
 3 = Light Brown 4 = Dark Brown
 5 = Black

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

PLEASE INDICATE THE SPECIFIC RACE OR STRAIN TESTED

- | | |
|--|---|
| <input type="checkbox"/> 2 Stem Rust (<i>Puccinia graminis</i> f. sp. <i>tritici</i>)
A mixture from eastern MT | <input checked="" type="checkbox"/> Leaf Rust (<i>Puccinia recondita</i> f. sp. <i>tritici</i>)
unk. |
| <input type="checkbox"/> 3 Stripe Rust (<i>Puccinia striiformis</i>) | <input type="checkbox"/> 0 Loose Smut (<i>Ustilago tritici</i>) |
| <input checked="" type="checkbox"/> Tan Spot (<i>Pyrenophora tritici-repentis</i>) | <input type="checkbox"/> 0 Flag Smut (<i>Urocystis agropyri</i>) |
| <input type="checkbox"/> 0 Halo Spot (<i>Selenophoma donacis</i>) | <input type="checkbox"/> 0 Common Bunt (<i>Tilletia tritici</i> or <i>T. laevis</i>) |
| <input type="checkbox"/> 0 <i>Septoria nodorum</i> (Glume Blotch) | <input type="checkbox"/> 0 Dwarf Bunt (<i>Tilletia controversa</i>) |
| <input type="checkbox"/> 0 <i>Septoria avenae</i> (Speckled Leaf Disease) | <input type="checkbox"/> 0 Karnal Bunt (<i>Tilletia indica</i>) |
| <input type="checkbox"/> 0 <i>Septoria tritici</i> (Speckled Leaf Blotch) | <input type="checkbox"/> 0 Powdery Mildew (<i>Erysiphe graminis</i> f. sp. <i>tritici</i>) |
| <input type="checkbox"/> 0 Scab (<i>Fusarium</i> spp.) | <input type="checkbox"/> 0 "Snow Molds" |

PLEASE INDICATE THE SPECIFIC RACE OR STRAIN TESTED

- | | |
|--|---|
| <input type="checkbox"/> 0 "Black Point" (Kernel Smudge) | <input type="checkbox"/> 0 Common Root Rot (<i>Fusarium</i> , <i>Cochliobolus</i> and <i>Bipolaris</i> spp.) |
| <input type="checkbox"/> 0 Barley Yellow Dwarf Virus (BYDV) | <input type="checkbox"/> 0 Rhizoctonia Root Rot (<i>Rhizoctonia solani</i>) |
| <input type="checkbox"/> 0 Soilborne Mosaic Virus (SBMV) | <input type="checkbox"/> 0 Black Chaff (<i>Xanthomonas campestris</i> pv. <i>translucens</i>) |
| <input type="checkbox"/> 0 Wheat Yellow (Spindle Streak) Mosaic Virus | <input type="checkbox"/> 0 Bacterial Leaf Blight (<i>Pseudomonas syringae</i> pv. <i>syringae</i>) |
| <input type="checkbox"/> 3 Wheat Streak Mosaic Virus (WSMV)
An isolate from Conrad MT | <input type="checkbox"/> Other (SPECIFY) |
| <input type="checkbox"/> Other (SPECIFY) | <input type="checkbox"/> Other (SPECIFY) |
| <input type="checkbox"/> Other (SPECIFY) | <input type="checkbox"/> Other (SPECIFY) |
| <input type="checkbox"/> Other (SPECIFY) | <input type="checkbox"/> Other (SPECIFY) |

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

PLEASE SPECIFY BIOTYPE (where needed)

- | | |
|--|--|
| <input type="checkbox"/> 0 Hessian Fly (<i>Mayetiola destructor</i>) | <input type="checkbox"/> Other (SPECIFY) |
| <input type="checkbox"/> 3 Stem Sawfly (<i>Cephus</i> spp.) | <input type="checkbox"/> Other (SPECIFY) |
| <input type="checkbox"/> 0 Cereal Leaf Beetle (<i>Oulema melanopa</i>) | <input type="checkbox"/> Other (SPECIFY) |
| <input type="checkbox"/> 1 Russian Aphid (<i>Diuraphis noxia</i>) | <input type="checkbox"/> Other (SPECIFY) |
| <input type="checkbox"/> 0 Greenbug (<i>Schizaphis graminum</i>) | <input type="checkbox"/> Other (SPECIFY) |
| <input type="checkbox"/> 0 Aphids | <input type="checkbox"/> Other (SPECIFY) |

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

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Appended Table 1.

Grain Yield (bu/ac) of Scholar compared to other spring wheats grown at Havre, Montana in 1995-1998

	1995	1996	1997	1998
Scholar	69.5	38.5	52.1	45.5
McNeal	73.0	36.6	54.4	44.9
Amidon	70.5	35.3	47.6	47.3
Ernest	64.3	35.7	47.1	35.7
Hi-Line	63.9	35.8	45.0	40.0
Newana	69.2	39.0	52.1	38.4
Len	58.9	33.4	47.7	41.0
Fortuna	46.3	33.6	44.0	40.1
Lew	59.9	33.7	41.6	38.3
C.V. (S/Mean)	5.86	6.09	6.30	10.41
LSD (.05)	6.49	3.77	5.23	7.43

Appended Table 2.

Grain Test Weight (lb/bu) of Scholar compared to other spring wheats grown at Havre, Montana in 1995-1998

	1995	1996	1997	1998
Scholar	62.9	61.8	61.3	62.3
McNeal	62.3	57.8	58.7	59.1
Amidon	61.9	61.2	61.0	60.9
Ernest	62.0	62.0	61.4	61.9
Hi-Line	61.2	60.3	59.5	61.6
Newana	61.1	61.0	60.2	60.5
Len	60.9	59.9	59.8	60.4
Fortuna	62.0	62.2	60.4	62.6
Lew	63.2	60.9	60.0	61.3
C.V. (S/Mean)	.45	1.50	.79	1.92
LSD (.05)	.48	1.57	.83	2.04

Appended Table 3.

Heading date of Scholar compared to other spring wheats grown at Havre, Montana in 1995-1998

	1995	1996	1997	1998
Scholar	6-26	6-28	6-26	6-23
McNeal	6-27	6-29	6-26	6-23
Amidon	6-24	6-27	6-24	6-22
Ernest	6-24	6-28	6-24	6-20
Hi-Line	6-24	6-27	6-21	6-22
Newana	6-28	6-30	6-27	6-23
Len	6-25	6-29	6-25	6-23
Fortuna	6-24	6-28	6-23	6-22
Lew	6-28	6-30	6-27	6-24
C.V. (S/Mean)	.52	.57	.28	.57
LSD (.05)	1.60	1.77	.84	1.72

Appended Table 4.

Plant height (inches) of Scholar compared to other spring wheats grown at Havre, Montana in 1995-1998

	1995	1996	1997	1998
Scholar	39.4	28.4	32.8	29.6
McNeal	38.1	27.7	28.7	30.0
Amidon	42.2	29.7	30.9	33.8
Ernest	39.8	28.7	31.7	30.2
Hi-Line	31.0	24.7	25.3	27.6
Newana	32.2	25.1	27.4	26.4
Len	32.2	26.3	28.7	27.3
Fortuna	37.7	31.5	31.5	31.2
Lew	42.8	28.3	32.9	29.3
C.V. (S/Mean)	5.07	3.32	4.31	8.78
LSD (.05)	3.27	1.60	2.24	4.48

Appended Table 5.

Grain protein (%) of Scholar compared to other spring wheats grown at Havre, Montana in 1995-1998

	1995	1996	1997	1998
Scholar	12.2	15.7	15.2	15.7
McNeal	11.1	14.7	14.8	15.0
Amidon	12.1	14.8	13.6	14.7
Ernest	12.4	15.1	15.3	16.7
Hi-Line	12.8	15.3	14.5	16.0
Newana	11.2	13.6	13.9	14.5
Len	12.7	15.2	14.9	15.6
Fortuna	12.3	14.6	14.4	14.3
Lew	12.3	14.8	14.6	14.8
	1 rep	1 rep	1 rep	1 rep

Appended Table 6.

Grain Yield (bu/ac) of Scholar compared to other spring wheats grown at Sidney, Montana in 1995-1998

	1995	1996	1997	1998
Scholar	38.4	41.1	46.4	65.0
McNeal	45.3	42.3	41.7	65.1
Amidon	39.7	40.6	47.9	62.6
Ernest	36.5	38.1	46.5	57.9
Hi-Line	42.8	43.5	40.0	64.2
Newana	47.0	39.7	40.9	58.7
Len	38.2	39.5	35.6	60.9
Fortuna	35.0	40.1	32.5	59.3
Lew	37.0	39.1	42.4	64.6
C.V. (S/Mean)	6.45	7.50	9.23	6.46
LSD (.05)	4.48	5.25	6.64	6.94

Appended Table 7.

Grain Test Weight (lb/bu) of Scholar compared to other spring wheats grown at Sidney, Montana in 1995-1998

	1995	1996	1997	1998
Scholar	61.0	62.5	61.0	60.5
McNeal	60.3	60.0	59.5	59.3
Amidon	61.3	61.5	59.5	59.2
Ernest	61.5	61.8	59.7	60.0
Hi-Line	60.8	62.0	59.0	60.3
Newana	61.7	62.0	60.2	58.3
Len	60.5	61.0	60.2	58.3
Fortuna	59.7	61.5	59.2	60.5
Lew	60.7	61.8	60.0	60.7
C.V. (S/Mean)	.86	.88	1.33	1.20
LSD (.05)	.90	.94	1.38	1.24

Appended Table 8.

Heading date of Scholar compared to other spring wheats grown at Sidney, Montana in 1995-1998

	1995	1996	1997	1998
Scholar	6-26	6-28	6-20	6-21
McNeal	6-26	6-28	6-20	6-21
Amidon	6-25	6-27	6-20	6-18
Ernest	6-23	6-27	6-19	6-18
Hi-Line	6-22	6-26	6-18	6-17
Newana	6-26	6-29	6-21	6-22
Len	6-25	6-28	6-20	6-20
Fortuna	6-24	6-27	6-19	6-20
Lew	6-27	6-29	6-22	6-22
C.V. (S/Mean)	.38	.18	.31	.45
LSD (.05)	1.15	.56	.90	1.33

Appended Table 9.

Plant height (inches) of Scholar compared to other spring wheats grown at Sidney, Montana in 1995-1998

	1995	1996	1997	1998
Scholar	32.4	30.4	24.1	35.4
McNeal	30.1	25.7	20.5	33.9
Amidon	35.4	32.8	24.1	37.5
Ernest	33.9	29.5	23.1	37.3
Hi-Line	26.1	24.5	18.6	32.3
Newana	30.3	24.5	19.0	32.3
Len	30.3	25.0	19.4	34.0
Fortuna	31.6	30.7	22.0	38.3
Lew	35.6	29.6	23.4	40.0
C.V. (S/Mean)	3.47	2.91	5.65	2.47
LSD (.05)	4.84	3.6	5.37	3.87

Appended Table 10.

Grain protein (%) of Scholar compared to other spring wheats grown at Sidney, Montana in 1995-1998

	1995	1996	1997	1998
Scholar	14.0	14.1	15.0	15.3
McNeal	13.1	13.1	15.9	14.6
Amidon	13.6	13.6	14.4	14.9
Ernest	14.3	14.3	16.3	16.1
Hi-Line	12.6	12.6	17.1	14.8
Newana	12.1	12.1	14.4	13.7
Len	15.0	13.3	16.1	15.2
Fortuna	14.2	14.2	16.3	15.5
Lew	13.8	13.8	14.9	15.0
	1 rep	1 rep	1 rep	1 rep

Appended Table 11.

Grain Yield (bu/ac) of Scholar compared to other spring wheats grown at Conrad, Montana in 1995-1998

	1995	1996	1997	1998
Scholar	73.4	60.6	66.4	68.5
McNeal	76.8	67.5	66.0	76.6
Amidon	65.7	66.6	63.7	66.5
Ernest	77.1	64.1	56.7	65.5
Hi-Line	74.1	63.8	59.1	72.4
Newana	79.6	62.8	59.8	71.4
Len	69.2	63.9	65.2	67.1
Fortuna	73.6	57.6	59.6	62.0
Lew	74.3	57.0	63.6	62.2
C.V. (S/Mean)	8.82	8.20	9.89	5.00
LSD (.05)	11.26	8.92	10.65	5.89

Appended Table 12.

Grain test weight (lb/bu) of Scholar compared to other spring wheats grown at Conrad, Montana in 1995-1998

	1995	1996	1997	1998
Scholar	58.6	61.4	62.2	62.4
McNeal	60.2	60.5	59.9	61.7
Amidon	59.3	61.3	61.4	60.7
Ernest	61.9	61.0	62.8	62.8
Hi-Line	62.7	61.3	62.7	62.5
Newana	55.1	60.5	61.4	60.7
Len	58.7	60.9	61.4	61.3
Fortuna	62.1	62.4	63.2	63.3
Lew	61.3	61.4	62.8	63.1
	1 rep	1 rep	1 rep	1 rep

Appended Table 13.

Heading date of Scholar compared to other spring wheats grown at Conrad, Montana in 1995-1998

	1995	1996	1997	1998
Scholar	7-10	7-8	7-9	6-30
McNeal	7-9	7-8	7-7	6-26
Amidon	7-10	7-7	7-9	6-28
Ernest	7-8	7-7	7-8	6-26
Hi-Line	7-8	7-6	7-5	6-24
Newana	7-10	7-10	7-11	6-29
Len	7-9	7-7	7-9	6-26
Fortuna	7-8	7-7	7-7	6-30
Lew	7-11	7-11	7-11	6-29
	1 rep	1 rep	1 rep	1 rep

Appended Table 14.

Plant height (inches) of Scholar compared to other spring wheats grown at Conrad, Montana in 1995-1998

	1995	1996	1997	1998
Scholar	43.0	36.8	38.0	41.7
McNeal	36.0	32.4	33.0	37.7
Amidon	43.0	37.4	39.0	40.3
Ernest	44.0	36.4	38.0	42.3
Hi-Line	33.0	29.0	33.0	33.7
Newana	34.0	30.3	30.0	34.7
Len	34.0	30.7	32.0	36.3
Fortuna	44.0	38.6	41.0	42.7
Lew	46.0	38.5	43.0	44.0
	1 rep	1 rep	1 rep	1 rep

Appended Table 15.

Grain protein (%) of Scholar compared to other spring wheats grown at Conrad, Montana in 1995-1998

	1995	1996	1997	1998
Scholar	10.9	14.8	12.3	12.4
McNeal	10.9	13.8	12.5	12.3
Amidon	9.9	13.9	12.5	12.2
Ernest	11.1	14.9	12.9	12.5
Hi-Line	10.5	14.1	12.7	11.5
Newana	10.4	13.2	11.2	11.5
Len	11.8	13.8	12.1	12.7
Fortuna	11.0	14.1	12.7	12.0
Lew	10.3	13.8	12.0	12.1
	1 rep	1 rep	1 rep	1 rep

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).

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

1. NAME OF APPLICANT(S) Montana Agricultural Experiment Station	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER MT9433	3. VARIETY NAME Scholar
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP, and Country) 202 Linfield Hall Montana State University Bozeman MT 59717	5. TELEPHONE (include area code) 406 994 3683	6. FAX (include area code) 406 994 6579
7. PVPO NUMBER 200000144		

8. Does the applicant own all rights to the variety? Mark an "X" in appropriate block. If no, please explain. YES NO

9. Is the applicant (individual or company) a U.S. national or U.S. based company?
If no, give name of country YES NO

10. Is the applicant the original owner? YES NO If no, please answer one of the following:

a. If original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. national(s)?

YES NO If no, give name of country

b. If original rights to variety were owned by a company(ies), is(are) the original owner(s) a U.S. based company?

YES NO If no, give name of country

11. Additional explanation on ownership (if needed, use reverse for extra space):

PLEASE NOTE:

Plant variety protection can be afforded only to owners (not licensees) who meet one of the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definition.

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