

No.



201300469

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Wisconsin Alumni Research Foundation

Whereas, THERE HAS BEEN PRESENTED TO THE

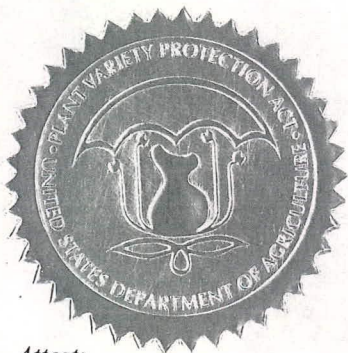
Secretary of Agriculture

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 purposes, 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.)

POTATO

'TUNDRA'



Attest:

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 eleventh day of September, in the year two thousand and fourteen.*

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

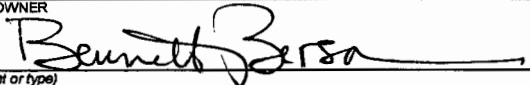
Secretary of Agriculture

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

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(Instructions and information collection burden statement on reverse)

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 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 WISCONSIN ALUMNI RESEARCH FOUNDATION		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME W2310-3	3. VARIETY NAME TUNDRA
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country) 614 WALNUT STREET P.O. BOX 7365 MADISON, WI 7365		5. TELEPHONE (include area code)	FOR OFFICIAL USE ONLY PVPO NUMBER 201300469 FILING DATE 8/12/2013
		6. FAX (include area code)	
7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) non-profit organization	8. IF INCORPORATED, GIVE STATE OF INCORPORATION	9. DATE OF INCORPORATION 1925	
10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. (First person listed will receive all papers) Bennett J. Berson Quarles & Brady LLP 33 East Main St; Suite 900 Madison, WI 53703			F E E S R E C D FILING AND EXAMINATION FEES: \$ 4,382 DATE 8/12/2013 CERTIFICATION FEE: \$ DATE
11. TELEPHONE (include area code) 608-251-5000	12. FAX (include area code) 608-251-9166	13. E-MAIL bennett.berson@quarles.com	
14. CROP KIND (Common Name) POTATO	16. FAMILY NAME (Botanical) SOLANACEAE	18. DOES THE VARIETY CONTAIN ANY TRANSGENES? (OPTIONAL) ☐ YES ☒ NO IF SO, PLEASE GIVE THE ASSIGNED USDA-APHIS REFERENCE NUMBER FOR THE APPROVED PETITION TO DEREGULATE THE GENETICALLY MODIFIED PLANT FOR COMMERCIALIZATION.	
15. GENUS AND SPECIES NAME OF CROP Solanum tuberosum L.	17. IS THE VARIETY A FIRST GENERATION HYBRID? ☐ YES ☒ NO	20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD ONLY AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act) ☒ YES (If "yes", answer items 21 and 22 below) ☐ NO (If "no", go to item 23)	
19. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse) a. ☒ Exhibit A. Origin and Breeding History of the Variety b. ☒ Exhibit B. Statement of Distinctness c. ☒ Exhibit C. Objective Description of Variety d. ☒ Exhibit D. Additional Description of the Variety (Optional) e. ☒ Exhibit E. Statement of the Basis of the Owner's Ownership f. ☐ Voucher Sample (3,000 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository) g. ☒ Filing and Examination Fee (\$4,382), made payable to "Treasurer of the United States" (Mail to the Plant Variety Protection Office)		21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES? ☒ YES ☐ NO IF YES, WHICH CLASSES? ☒ FOUNDATION ☐ REGISTERED ☒ CERTIFIED 22. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? ☒ YES ☐ NO IF YES, SPECIFY THE NUMBER 1,2,3, etc. FOR EACH CLASS. ☒ FOUNDATION ☐ REGISTERED ☒ CERTIFIED (If additional explanation is necessary, please use the space indicated on the reverse.)	
23. 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? ☐ YES ☒ 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.)		24. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT (PLANT BREEDER'S RIGHT OR PATENT)? ☐ YES ☒ NO IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. (Please use space indicated on reverse.)	
25. The owners declare that a viable sample of basic seed will be furnished directly to an acceptable depository in support of the variety within three months of filing. Basic seed includes all propagating material necessary for propagation of the variety. For first generation hybrids, this includes all parental lines. Seed will be replenished upon request in accordance with such regulations as may be applicable. For a tuber propagated variety or vegetatively propagated parent of the variety, a tissue culture, or vegetative sample will be deposited in a public repository within three months of the certificate fee request letter date. These will be 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) Bennett J. Berson		NAME (Please print or type) 2013 AUG 12 AM 10:07	
CAPACITY OR TITLE Owner's Representative	DATE Aug. 9, 2013	CAPACITY OR TITLE	DATE

GENERAL INSTRUCTIONS: To be effectively filed with the Plant Variety Protection Office (PVPO), **ALL** of the following items must be received in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E, F; (3) for a tuber reproduced variety, verification that a viable (in the sense that it will reproduce an entire plant) tissue culture will be deposited and maintained in an approved public repository; and (4) payment by credit card or check drawn on a U.S. bank for \$4,382 (\$518 filing fee and \$3,864 examination fee), payable to "Treasurer of the United States" (See Section 97.6 of the Regulations and Rules of Practice). **NEW:** With the application for a seed reproduced variety or by direct deposit soon after filing, the applicant must provide at least 3,000 viable untreated seeds of the variety *per se*, and for a hybrid variety at least 3,000 untreated seeds of each line necessary to reproduce the variety. Partial applications will be held in the PVPO for not more than 90 days; then returned to the applicant as un-filed. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA 1400 Independence Avenue, S.W., Room 4512 – South Building, Mail Stop 0274, Washington, DC 20250-0274. **Retain one copy for your files.** All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. **DO NOT** use masking materials to make corrections. If a certificate is allowed, you will be requested to send a payment by credit card or check payable to "Treasurer of the United States" in the amount of \$768 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

NOTES: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. The fees for filing a change of address; owner's representative; ownership or assignment; or any modification of owner's name is specified in Section 97.175 of the regulations. (See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)

Plant Variety Protection Office
 Telephone: 202-260-8983 FAX: 202-260-8976
 General E-mail: PVP@mail.usda.gov
 Homepage: <http://www.ams.usda.gov/pvpo>

SPECIFIC INSTRUCTIONS:

To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority and provide evidence that the permanent name of the application variety (even if it is a parental, inbred line) has been cleared by the appropriate recognized authority before the Certificate of Protection is issued. For example, for agricultural and vegetable crops, contact: U.S. Department of Agriculture, Agricultural Marketing Service, Livestock and Seed Programs, Seed Regulatory and Testing Branch, 801 Summit Crossing Place, Suite C, Gastonia, North Carolina 28054-2193 Telephone: (704) 810-8870. <http://www.ams.usda.gov/lsg/seed.htm>.

ITEM

- 19a. Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;
 (2) the details of subsequent stages of selection and multiplication;
 (3) evidence of uniformity and stability; and
 (4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified
- 19b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:
 (1) identify these varieties and state all differences objectively;
 (2) attach replicated statistical data for characters expressed numerically and demonstrate that these are clear differences; and
 (3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.
- 19c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.
- 19d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, etc.
- 19e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.
20. 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 this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. (See Regulations and Rules of Practice, Section 97.103).
23. See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.
24. See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.

22. CONTINUED FROM FRONT (Please provide a statement as to the limitation and sequence of generations that may be certified.)

23. CONTINUED FROM FRONT (Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)

24. CONTINUED FROM FRONT (Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 1.4 hours 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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program (Not all prohibited

bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

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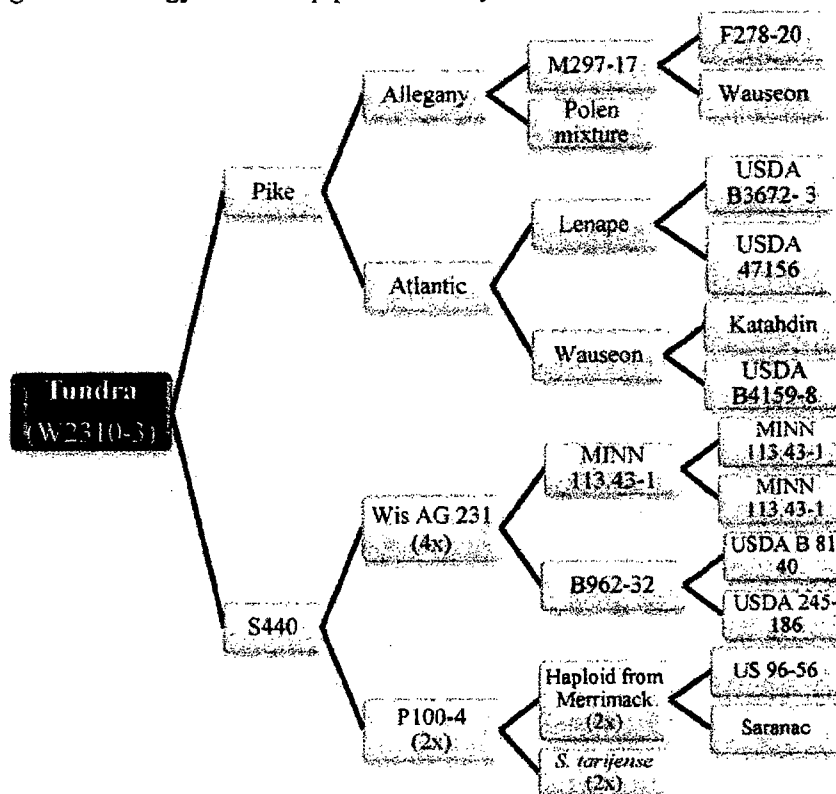
Exhibit A

Origin and Breeding History of the Variety Tundra (W2310-3)

1. Genealogy and Breeding Method

1a. Genealogy

Fig. 1. Genealogy of the chip potato variety Tundra



1b. Breeding Method:

As observed in Fig. 1, Tundra (W2310-3) was selected from a population created from the cross of Pike x S440. Pike is a chip processing potato variety that was used due its desirable tuber shape, shallow eyes and tuber size and also for its tolerance to common scab caused by *Streptomyces scabies*. S440 was used as a parental line to increase longer cold storage ability beyond what is observed in Pike and with the objective of selecting a potato chipping variety with longer cold storage ability than what is observed in Snowden, the standard long storage chipping variety. Thus, the objective was to select a clone that may combine the longer storage ability that can be inherited from S440 and the common scab tolerance observed in Pike.

2. Subsequent Stages of Selection

The cross Pike x S440 was made in 1995 and a population of 550 seedling tubers were generated. In 1996, 302 clones were planted as single plants (single hills) in the field at the Rhinelander Agricultural Research Station. The clone was increased in 4 hills plots in 1997, 8 hills in 1998, 20 hills in 1999, 40 hills in 2000 and 40 hills or more since 2001. In 2001, 02, 04 and 05, W2310-3 was further evaluated in replicated yield trials at the Hancock and Rhinelander Agricultural Research Stations. It was also evaluated in the Wisconsin State Variety Trial in 2003 and 2006, in the common scab trials in WI 2002,03, 05, 06 and Alliston, Canada:06, in the SpudPro Candidate trial: 2004 and 2005, Quad State Trial: 2005, North Central Potato Variety Trial: 2006 and 2008, Agronomic Trials: 2006, WI Vegetable and Pathology Trials: 2006 and the National Chip Processing Trial: 2008 and 2010. W2310-3 was named as "Tundra" in December of 2010 by Wisconsin Potato and Vegetable Growers Association SpudPro committee.

Uniformity and Stability and Variants of Tundra (W2310-3)

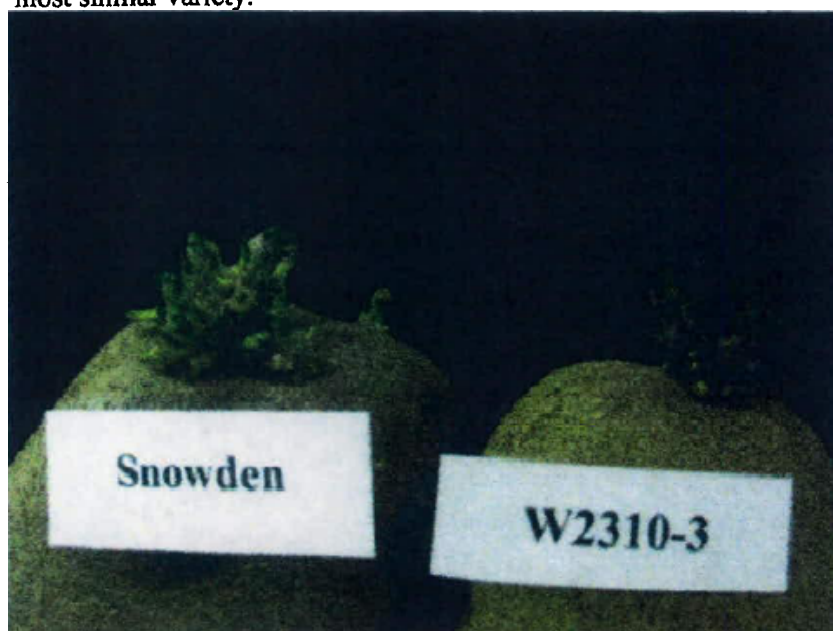
Tundra has been observed from 1997-2010, most closely in replicated trials from 2001-05 in Wisconsin locations including Rhinelander, Hancock and Antigo and out of states collaborative trials conducted during 2006-10 over nine U.S. locations including CA, FL, ID, MI, MN, NC, ND, OR, PA, and three locations in the Canadian provinces of MB, NB and ON. Over these locations, and the corresponding seed multiplication lots in Wisconsin, Tundra has been determined to be genetically uniform and stable from year to year and location to location with no evidence of variants with respects to the traits described in Exhibit C of this application.

Exhibit B
Statement of Distinctness
Tundra (W2310-3)

Based on observations and research data from of Tundra as specified in Exhibit A, Tundra is most similar to Snowden, a standard long storage chip potato variety, however, Tundra differs from Snowden with respect to the following traits:

1. Tundra is most similar to Snowden; however, Tundra produces light sprouts with strong anthocyanin coloration (4 on a 1-5 scale, see Fig. 2), whereas Snowden produces light sprouts with medium anthocyanin pigmentation 3 in a 1-5 scale, see Fig. 2).

Fig. 2. Comparison of the shape and pigmentation of light sprouts of Tundra (W2310-3) vs the shape and pigmentation of Snowden, its most similar variety.



2. Tundra is most similar to Snowden; however, Tundra produces 3-4 primary leaves whereas Snowden produces 2-3 leaflet pairs.
3. Tundra is most similar to Snowden; however, Tundra produces 8-11 secondary and tertiary leaves, whereas Snowden produces only between 1-4 secondary and tertiary leaves.

4. Tundra is most similar to Snowden; however, Tundra produces 7-11 inflorescences/plant whereas Snowden produces 2-7 inflorescences/plant.
5. Tundra is most similar to Snowden; however, Tundra produces flowers with predominant grayish pink inner and outer surface corolla color (inner corolla color = 2.5R 8/2, outer corolla color 5R 8/2, Munsell table) whereas Snowden inner and outer corolla color is predominantly white (5GY 9/1).

Fig. 3. Comparison of the corolla color of Tundra (left) and Snowden (right)



6. Tundra is most similar to Snowden; however, Tundra produces tubers with shallow to intermediate eyes in the stem and bud ends as shallow to intermediate lateral eyes whereas Snowden produces tubers with deep eyes in stem bud ends, as well as deep lateral eyes.

REPRODUCE LOCALLY. Include form number and date on all reproductions.

Form Approved OMB NO 0581-0055

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 8.5 hours 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.

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

Exhibit C

OBJECTIVE DESCRIPTION OF VARIETY
Potato (*Solanum tuberosum* L.)

INSTRUCTIONS

The Objective Description Form:

The objective description form lists characteristics to be used as the basis for developing the description of potato varieties. It is designed to guide the applicant in describing a variety in detail so a meaningful comparison with other potato varieties can be accomplished. It is recommended that this form be completed in as much detail as possible to ensure an accurate description. Please fill in the requested data and place the appropriate number that describes the varietal characters typical of this potato variety and the reference varieties in the respective boxes.

Test Guidelines:

Any statistical and trial (field test) data that may be necessary to support the variety description should be attached to this form. Please include for trial data the plot size, number of replications, number of plants, plant spacing, trial locations and growing periods. Trials should normally be conducted at one place, in the region that the variety has been adapted for, with a minimum of one growing period in the United States. All comparative data should be determined from varieties entered in the same trials. The size of the plots should be such that plants or parts of plants may be removed for measuring and counting without prejudice to the observations which must be made at the end of the growing period. As a minimum, each test should include a total of 60 plants which should be divided between two or more replicates. Separate plots for observation and measuring can only be used if they have been subject to similar environmental conditions. To determine color for a plant or plant parts a recognized standard color chart must be used such as the Royal Horticultural Society (RHS) Color Chart or Munsell Color Chart (MCC).

Reference Varieties:

The application variety should be compared to at least one reference variety preferably a set of reference varieties. The reference varieties should be market class standard varieties currently grown in the United States and or the variety (ies) most similar. The following varieties are recommended as market class standards to be used as reference varieties:

Yellow-flesh table-stock.....	Yukon Gold
Round-white table-stock.....	Superior
Chip-processing.....	Atlantic, Snowden, Norchip
Frozen-processing.....	Russet Burbank
Russet table-stock.....	Russet Burbank, Russet Norkotah, Goldrush
Red table-stock.....	Red Pontiac, Red Norland, Red Lasoda

If the applicant does not use one of the recommended reference varieties by the PVP office, a complete description of the reference variety should be submitted by the applicant (Exhibit C).

Characteristics:

Light sprout characteristics are supplied in **Figure 1**. The plant type and growth habit characteristics are collected at early first bloom. **Figure 2** is supplied to help visualize the growth habit. For this descriptor, look at the stems rather than the stems and foliage. Plant maturity is measured at natural vine senescence.

Stem characteristics are also collected at early bloom. Stem anthocyanin coloration is divided into two descriptors: Location and intensity. **Figure 3** is supplied to give an example of stem wings.

Leaf characteristics are observed at early first bloom. Fully-developed leaves located on the middle third of the plant should be used. Leaf pubescence refers to general trichomes. **Figure 4** is supplied for examples of leaf silhouette. Leaf stipules are shown in **Figure 5** for visual definition. **Figure 6** is supplied to define leaf characteristics. **Figure 7** should be used to describe terminal and primary leaflet shape. **Figures 8 and 9** are used to describe the terminal and primary leaflet shape of tip and base, respectively. To measure the total number of primary leaflets pairs, collect 10 fully developed petioles (with leaves attached from each replication) and take the average number of secondary and tertiary leaflets. Glandular trichomes should be described in the Additional Comments and Characteristics (Descriptor 15).

Inflorescence characteristics should be measured at early first bloom. **Figures 10, 11 and 12** are supplied to describe anther and stigma shape, respectively. Corolla, calyx, anther, stigma, and pollen should be observed on newly opened flowers. Berry production should be based on field-grown plants rather than greenhouse plants.

Tuber characteristics should be observed following harvest. **Figures 13 and 14** are available to describe distribution of secondary color and tuber shape, respectively.

Disease and pest reactions should be based upon specific tests or statistical analysis rather than just field observations, rating 1 as Highly Resistance and 9 as Highly Susceptible, please follow the scale on each descriptor. Other diseases or pests reactions not requested can be described if it is felt that it would be helpful to determine novelty of the variety.

Quality characteristics should be described according to the market use.

If the plant is transgenic, this gene insertion(s) should be described.

Chemical identification and any other characteristics can be described if they are helpful in distinguishing the variety.

Legend:

V = Application Variety

R1-R4 = Reference Varieties

* = Both the reference variety (ies) and application variety must be described for characteristics designated with an asterisk.

NAME OF APPLICANT (S) WISCONSIN ALUMNI RESEARCH FOUNDATION	TEMPORARY OR EXPERIMENTAL DESIGNATION W2310-3	VARIETY NAME TUNDRA
ADDRESS (Street and No. or RD No., City, State, Zip Code, and Country) 614 WALNUT STREET P.O. BOX 7365 MADISON, WI 53707-7365, USA		FOR SPECIAL USE ONLY PVPO NUMBER

REFERENCE VARIETIES: Enter the reference variety name in the appropriate box.

Application Variety (V)	Reference Variety 1 (R1)	Reference Variety 2 (R2)	Reference Variety 3 (R3)	Reference Variety 4 (R4)
TUNDRA	SNOWDEN	ATLANTIC		

PLEASE READ ALL INSTRUCTIONS CAREFULLY:

1. MARKET CHARACTERISTICS:

***MARKET CLASS:**

1 = Yellow-flesh Tablestock 2 = Round-white Tablestock 3 = Chip-processing 4 = Frozen-processing
 5 = Russet Tablestock 6 = Other _____

V	3	R1	3	R2	3	R3		R4	
---	---	----	---	----	---	----	--	----	--

2. LIGHT SPROUT CHARACTERISTICS: (See Figure 1)

***LIGHT SPROUT: GENERAL SHAPE**

1 = Spherical 2 = Oval 3 = Conical 4 = Broad cylindrical 5 = Narrow cylindrical 6 = Other _____

V	1	R1	1	R2	1	R3		R4	
---	---	----	---	----	---	----	--	----	--

***LIGHT SPROUT BASE: PUBESCENCE OF BASE**

1 = Absent 2 = Weak 3 = Medium 4 = Strong 5 = Very Strong

V	2	R1	2	R2	3	R3		R4	
---	---	----	---	----	---	----	--	----	--

***LIGHT SPROUT BASE: ANTHOCYANIN COLORATION**

1 = Green 2 = Red-violet 3 = Blue-violet 4 = Other(describe) _____

V	3	R1	2	R2	2	R3		R4	
---	---	----	---	----	---	----	--	----	--

***LIGHT SPROUT BASE: INTENSITY OF ANTHOCYANIN COLORATION (IF PRESENT)**

1 = Absent 2 = Weak 3 = Medium 4 = Strong 5 = Very Strong

V	4	R1	3	R2	3	R3		R4	
---	---	----	---	----	---	----	--	----	--

***LIGHT SPROUT TIP: HABIT**

1 = Closed 2 = Intermediate 3 = Open

V	3	R1	2	R2	2	R3		R4	
---	---	----	---	----	---	----	--	----	--

2. LIGHT SPROUT CHARACTERISTICS: (continued)

LIGHT SPROUT TIP: PUBESCENCE

1 = Absent 2 = Weak 3 = Medium 4 = Strong 5 = Very Strong

V	3	R1	3	R2	4	R3		R4	
---	---	----	---	----	---	----	--	----	--

LIGHT SPROUT TIP ANTHOCYANIN COLORATION

1 = Green 2 = Red-violet 3 = Blue-violet 4 = Other(describe) _____

V	3	R1	1	R2	2	R3		R4	
---	---	----	---	----	---	----	--	----	--

LIGHT SPROUT TIP: INTENSITY OF ANTHOCYANIN COLORATION (IF PRESENT)

1 = Absent 2 = Weak 3 = Medium 4 = Strong 5 = Very Strong

V	3	R1	1	R2	3	R3		R4	
---	---	----	---	----	---	----	--	----	--

LIGHT SPROUT ROOT INITIALS: FREQUENCY

1 = Absent 2 = Some 3 = Abundant

V	2	R1	2	R2	2	R3		R4	
---	---	----	---	----	---	----	--	----	--

3. PLANT CHARACTERISTICS:

GROWTH HABIT: (See Figure 2)

3 = Erect (>45° with ground) 5 = Semi-erect (30-45° with ground) 7 = Spreading

V	5	R1	5	R2	5	R3		R4	
---	---	----	---	----	---	----	--	----	--

TYPE:

1 = Stem (Foliage open, stems clearly visible) 2 = Intermediate 3 = Leaf (Foliage closed, stems hardly visible)

V	2	R1	2	R2	2	R3		R4	
---	---	----	---	----	---	----	--	----	--

MATURITY: Days after planting (DAP) at vine senescence

V	120	R1	124	R2	115	R3		R4	
---	-----	----	-----	----	-----	----	--	----	--

PLANTING DATE:

V	April 23	R1	April 23	R2	April 23	R3		R4	
---	----------	----	----------	----	----------	----	--	----	--

*REGIONAL AREA:

1 = Pacific North West (WA, OR, ID, CO, CA) 2 = North Central (ND, WI, MI, MN, OH) 3 = North East (ME, NY, PA, NJ, MD, MA, RI.)
 4 = Mid-Atlantic East (VI, NC, SC, South NJ, FL) 5 = South (LA, TX, AZ, NE) 6 = Canada
 7 = Europe 8 = England 9 = Latin America 10 = Brazil 11 = Other _____

V	2	R1	2	R2	2	R3		R4	
---	---	----	---	----	---	----	--	----	--

MATURITY CLASS:

1 = Very Early (<100 DAP) 2 = Early (100-110 DAP) 3 = Mid-season (111-120 DAP) 4 = Late (121-130 DAP) 5 = Very Late (>130 DAP).

V	3	R1	4	R2	3	R3		R4	
---	---	----	---	----	---	----	--	----	--

4. STEM CHARACTERISTICS: Measure at early first bloom*** STEM ANTHOCYANIN COLORATION:**

1 = Absent 3 = Weak 5 = Medium 7 = Strong 9 = Very Strong

V	3	R1	1	R2	3	R3		R4	
---	---	----	---	----	---	----	--	----	--

STEM WINGS: (See Figure 3)

1 = Absent 3 = Weak 5 = Medium 7 = Strong 9 = Very Strong

V	5	R1	7	R2	1	R3		R4	
---	---	----	---	----	---	----	--	----	--

5. LEAF CHARACTERISTICS:**LEAF COLOR:** (Observe fully developed leaves located on middle 1/3 of plant)

1 = Yellowing-green 2 = Olive-green 3 = Medium Green 4 = Dark Green 5 = Grey-green 6 = Other _____

V	3	R1	3	R2	3	R3		R4	
---	---	----	---	----	---	----	--	----	--

LEAF COLOR CHART VALUE: Royal Horticulture Society Color Chart of Munsell Color Chart

(Observe fully developed leaves located on middle 1/3 of plant and circle the appropriate color chart)

V	5G4/2	R1	2.5G4/2	R2	2.5G4/2	R3		R4	
---	-------	----	---------	----	---------	----	--	----	--

LEAF PUBESCENCE DENSITY:

1 = Absent 2 = Sparse 3 = Medium 4 = Thick 5 = Heavy

V	2	R1	2	R2	2	R3		R4	
---	---	----	---	----	---	----	--	----	--

LEAF PUBESCENCE LENGTH:

1 = None 2 = Short 3 = Medium 4 = Long 5 = Very Long

V	3	R1	2	R2	3	R3		R4	
---	---	----	---	----	---	----	--	----	--

(Note Descriptor #15 can be used to describe the type and length of the glandular trichomes observed.)

*** LEAF SILHOUETTE:** (See Figure 4)

1 = Closed 3 = Medium 5 = Open

V	3	R1	2	R2	3	R3		R4	
---	---	----	---	----	---	----	--	----	--

PETIOLES ANTHOCYANIN COLORATION:

1 = Absent 3 = Weak 5 = Medium 7 = Strong 9 = Very Strong

V	3	R1	1	R2	3	R3		R4	
---	---	----	---	----	---	----	--	----	--

LEAF STIPULES SIZE: (See Figure 5)

1 = Absent 3 = Small 5 = Medium 7 = Large

V	3	R1	7	R2	5	R3		R4	
---	---	----	---	----	---	----	--	----	--

TERMINAL LEAFLET SHAPE (See Figures 6 and 7)

1 = Narrowly ovate 2 = Medium Ovate 3 = Broadly Ovate 4 = Lanceolate 5 = Elliptical 6 = Obovate 7 = Oblong 8 = Other _____

V	2	R1	2	R2	2	R3		R4	
---	---	----	---	----	---	----	--	----	--

5. LEAF CHARACTERISTICS: (continued)

TERMINAL LEAFLET TIP SHAPE: (See Figures 6 and 8)

1 = Acute 2 = Cuspidate 3 = Acuminate 4 = Obtuse 5 = Other _____

V	3	R1	3	R2	3	R3		R4	
---	---	----	---	----	---	----	--	----	--

* TERMINAL LEAFLET BASE SHAPE: (See Figure 9)

1 = Cuneate 2 = Acute 3 = Obtuse 4 = Cordate 5 = Truncate 6 = Lobed 7 = Other _____

V	4	R1	3	R2	4	R3		R4	
---	---	----	---	----	---	----	--	----	--

TERMINAL LEAFLET MARGIN WAVINESS:

1 = Absent 2 = Slight 3 = Weak 4 = Medium 5 = Strong

V	2	R1	3	R2	2	R3		R4	
---	---	----	---	----	---	----	--	----	--

NUMBER OF PRIMARY LEAFLET PAIRS: (See Figure 6)

AVERAGE:

V	3.14	R1	2.85	R2	7.2	R3		R4	
---	------	----	------	----	-----	----	--	----	--

RANGE:

V	3 to 4	R1	2 to 3	R2	7 to 9	R3	to	R4	to
---	--------	----	--------	----	--------	----	----	----	----

PRIMARY LEAFLET TIP SHAPE: (See Figures 6 and 8)

1 = Acute 2 = Cuspidate 3 = Acuminate 4 = Obtuse 5 = Other _____

V	3	R1	3	R2	3	R3		R4	
---	---	----	---	----	---	----	--	----	--

PRIMARY LEAFLET SIZE:

1 = Very Small 2 = Small 3 = Medium 4 = Large 5 = Very Large

V	3	R1	3	R2	4	R3		R4	
---	---	----	---	----	---	----	--	----	--

PRIMARY LEAFLET SHAPE: (See Figures 6 and 7)

1 = Narrowly ovate 2 = Medium ovate 3 = Broadly ovate 4 = Lanceolate 5 = Elliptical 6 = Ovate 7 = Oblong 8 = Other _____

V	2	R1	1	R2	2	R3		R4	
---	---	----	---	----	---	----	--	----	--

PRIMARY LEAFLET BASE SHAPE: (See Figures 6 and 9)

1 = Cuneate 2 = Acute 3 = Obtuse 4 = Cordate 5 = Truncate 6 = Lobed 7 = Other _____

V	4	R1	3	R2	4	R3		R4	
---	---	----	---	----	---	----	--	----	--

NUMBER OF SECONDARY AND TERTIARY LEAFLET PAIRS: (See Figure 6)

AVERAGE:

V	9.5	R1	2.64	R2	9.15	R3		R4	
---	-----	----	------	----	------	----	--	----	--

RANGE:

V	8 to 11	R1	1 to 4	R2	7 to 11	R3	to	R4	to
---	---------	----	--------	----	---------	----	----	----	----

5. LEAF CHARACTERISTICS: (continued)

NUMBER OF INFLORESCENCE/PLANT:

AVERAGE:

V	8.4	R1	3.38	R2	6.6	R3		R4	
---	-----	----	------	----	-----	----	--	----	--

RANGE:

V		to	9	R1	2	to	7	R2	5	to	9	R3		to		R4		to	
---	--	----	---	----	---	----	---	----	---	----	---	----	--	----	--	----	--	----	--

NUMBER OF FLORETS/INFLORESCENCE:

AVERAGE:

V	9	R1	9.8	R2	8.8	R3		R4	
---	---	----	-----	----	-----	----	--	----	--

RANGE:

V	7	to	11	R1	8	to	12	R2	6	to	13	R3		to		R4		to	
---	---	----	----	----	---	----	----	----	---	----	----	----	--	----	--	----	--	----	--

* COROLLA INNER SURFACE COLOR CHART VALUE: Royal Horticulture Society Color Chart of Munsell Color Chart (Measure predominant color of newly open flower and circle the appropriate color chart)

V	2.5R8/2	R1	5GY9/1	R2	2.5R8/2	R3		R4	
---	---------	----	--------	----	---------	----	--	----	--

* COROLLA OUTER SURFACE COLOR CHART VALUE: Royal Horticulture Society Color Chart of Munsell Color Chart (Measure predominant color of newly open flower and circle the appropriate color chart)

V	5R8/2	R1	5GY9/1	R2	5R8/2	R3		R4	
---	-------	----	--------	----	-------	----	--	----	--

* COROLLA INNER SURFACE COLOR: (Measure predominant color of newly open flower, if flowers are bi-color please use the ratio codes)

1 = White 2 = Red-violet 3 = Blue-violet 4 = Cream 5 = Red-purple 6 = Blue 7 = Pink 8 = Pink-white 9 = Purple 10 = Violet 11 = Purple-violet 13 = Violet-White 1:1 14 = Violet-White 1:3 15 = Violet-White 3:1 16 = Violet-White Halo 17 = Pink-White 1:1 18 = Pink-White 1:3 19 = Pink-White 3:1 20 = Pink-White Halo 21 = RedViolet-White 1:1 22 = RedViolet-White 1:3 23 = RedViolet-White 3:1 24 = RedViolet-White Halo 25 = BlueViolet-White 1:1 26 = BlueViolet-White 1:3 27 = BlueViolet-White 3:1 28 = BlueViolet-White Halo 12 = Other

V	9	R1	1	R2	9	R3		R4	
---	---	----	---	----	---	----	--	----	--

COROLLA SHAPE: (See Figure 10)

1 = Very rotate 2 = Rotate 3 = Pentagonal 4 = Semi-stellate 5 = Stellate

V	2	R1	3	R2	3	R3		R4	
---	---	----	---	----	---	----	--	----	--

6. INFLORESCENCE CHARACTERISTICS:

CALYX ANTHOCYANIN COLORATION:

1 = Absent 3 = Weak 5 = Medium 7 = Strong 9 = Very strong

V	2	R1	1	R2	3	R3		R4	
---	---	----	---	----	---	----	--	----	--

ANTHER COLOR CHART VALUE: Royal Horticulture Society Color Chart of Munsell Color Chart (Measure when newly opened flower is fully expanded and circle the appropriate color chart)

V	2.5Y8/10	R1	2.5Y8/10	R2	2.5Y8/10	R3		R4	
---	----------	----	----------	----	----------	----	--	----	--

ANTHER SHAPE: (See Figure 11)

1 = Broad cone 2 = Narrow cone 3 = Pear-shaped cone 4 = Loose 5 = Other

V	2	R1	2	R2	2	R3		R4	
---	---	----	---	----	---	----	--	----	--

6. INFLORESCENCE CHARACTERISTICS: (continued)

POLLEN PRODUCTION:

1 = None 3 = Some 5 = Abundant

V	2	R1	2	R2	3	R3		R4	
---	---	----	---	----	---	----	--	----	--

STIGMA SHAPE: (See Figure 12)

1 = Capitate 2 = Clavate 3 = Bi-lobed

V	1	R1	2	R2	1	R3		R4	
---	---	----	---	----	---	----	--	----	--

STIGMA COLOR CHART VALUE: Royal Horticulture Society Color Chart or Munsell Color Chart (Circle the appropriate color chart)

V	5G5/6	R1	5G5/6	R2	5G5/6	R3		R4	
---	-------	----	-------	----	-------	----	--	----	--

BERRY PRODUCTION: (Under field conditions)

1 = Absent 3 = Low 5 = Moderate 7 = Heavy 9 = Very Heavy

V	5	R1	3	R2	3	R3		R4	
---	---	----	---	----	---	----	--	----	--

7. TUBER CHARACTERISTICS:

* PREDOMINANT SKIN COLOR:

1 = White 2 = Light Yellow 3 = Yellow 4 = Buff 5 = Tan 6 = Brown 7 = Pink 8 = Red 9 = Purplish-red
10 = Purple 11 = Dark purple-black 12 = Other _____

V	2	R1	2	R2	2	R3		R4	
---	---	----	---	----	---	----	--	----	--

PREDOMINANT SKIN COLOR CHART VALUE: Royal Horticulture Society Color Chart or Munsell Color Chart (Circle the appropriate color chart)

V	2.5Y7/4	R1	2.5Y7/4	R2	2.5Y7/4	R3		R4	
---	---------	----	---------	----	---------	----	--	----	--

SECONDARY SKIN COLOR:

1 = Absent 2 = Present (please describe)

V	1	R1	1	R2	1	R3		R4	
---	---	----	---	----	---	----	--	----	--

SECONDARY SKIN COLOR CHART VALUE: Royal Horticulture Society Color Chart or Munsell Color Chart (Circle the appropriate color)

V		R1		R2		R3		R4	
---	--	----	--	----	--	----	--	----	--

SECONDARY SKIN COLOR DISTRIBUTION: (See Figure 13)

1 = Eyes 2 = Eyebrows 3 = Splashed 4 = Scattered 5 = Spectacled 6 = Stippled 7 = Other _____

V		R1		R2		R3		R4	
---	--	----	--	----	--	----	--	----	--

SKIN TEXTURE:

1 = Smooth 2 = Rough (flaky) 3 = Netted 4 = Russetted 5 = Heavily russetted 6 = Other _____

V	2	R1	3	R2	3	R3		R4	
---	---	----	---	----	---	----	--	----	--

7. TUBER CHARACTERISTICS: (continued)

* TUBER SHAPE: (See Figure 14)

1 = Compressed 2 = Round 3 = Oval 4 = Oblong 5 = Long 6 = Other _____

V	2	R1	2	R2	2	R3		R4	
---	---	----	---	----	---	----	--	----	--

TUBER THICKNESS:

1 = Round 2 = Medium thick 3 = Slightly flattened 4 = Flattened 5 = Other _____

V	2	R1	2	R2	2	R3		R4	
---	---	----	---	----	---	----	--	----	--

TUBER LENGTH (mm):

AVERAGE:

V	66.6	R1	79.9	R2	66.3	R3		R4	
---	------	----	------	----	------	----	--	----	--

RANGE:

V	47 to 111	R1	52 to 130	R2	42 to 103	R3	to	R4	to
---	-----------	----	-----------	----	-----------	----	----	----	----

STANDARD DEVIATION:

V	12.35	R1	15.5	R2	11.1	R3		R4	
---	-------	----	------	----	------	----	--	----	--

AVERAGE WEIGHT OF SAMPLE TAKEN:

V	238	R1	198	R2	211	R3		R4	
---	-----	----	-----	----	-----	----	--	----	--

TUBER WIDTH (mm)

AVERAGE:

V	59.1	R1	72.4	R2	62.3	R3		R4	
---	------	----	------	----	------	----	--	----	--

RANGE:

V	42 to 82	R1	48 to 107	R2	42 to 82	R3	to	R4	to
---	----------	----	-----------	----	----------	----	----	----	----

STANDARD DEVIATION:

V	7.53	R1	14.3	R2	8.7	R3		R4	
---	------	----	------	----	-----	----	--	----	--

AVERAGE WEIGHT OF SAMPLE TAKEN (g):

V	238	R1	198	R2	211	R3		R4	
---	-----	----	-----	----	-----	----	--	----	--

7. TUBER CHARACTERISTICS: (continued)**TUBER THICKNESS (mm):****AVERAGE:**

V 46.1

R1 56.3

R2 48.7

R3

R4

RANGE:

V 28 to 88

R1 32 to 83

R2 39 to 73

R3 to

R4 to

STANDARD DEVIATION:

V 6.59

R1 10.6

R2 5.3

R3

R4

AVERAGE WEIGHT OF SAMPLE TAKEN (g):

V 238

R1 198

R2 211

R3

R4

TUBER EYE DEPTH:

1 = Protruding 3 = Shallow 5 = Intermediate 7 = Deep 9 = Very deep

V 3

R1 5

R2 4

R3

R4

TUBER LATERAL EYES:

1 = Protruding 3 = Shallow 5 = Intermediate 7 = Deep 9 = Very deep

V 3

R1 5

R2 4

R3

R4

NUMBER EYE/TUBER:**AVERAGE:**

V 7.5

R1 8.8

R2 10.1

R3

R4

RANGE:

V 4 to 13

R1 4 to 16

R2 6 to 18

R3 to

R4 to

DISTRIBUTION OF TUBER EYES:

1 = Predominantly apical 2 = Evenly distributed

V 2

R1 2

R2 2

R3

R4

PROMINENCE OF TUBER EYEBROWS:

1 = Absent 2 = Slight prominence 3 = Medium prominence 4 = Very prominent 5 = Other _____

V 1

R1 1

R2 1

R3

R4

7. TUBER CHARACTERISTICS: (continued)

PREDOMINANT TUBER FLESH COLOR

1 = White 2 = Light Yellow 3 = Yellow 4 = Buff 5 = Tan 6 = Brown 7 = Pink 8 = Red 9 = Purplish-red
 10 = Purple 11 = Dark purple-black 12 = Other _____

V	1	R1	1	R2	1	R3		R4	
---	---	----	---	----	---	----	--	----	--

PRIMARY TUBER FLESH COLOR CHART VALUE: Royal Horticulture Society Color Chart or Munsell Color Chart (Circle the appropriate color chart)

V	2.5Y8/4	R1	2.5Y8/4	R2	2.5Y8/4	R3		R4	
---	---------	----	---------	----	---------	----	--	----	--

SECONDARY TUBER FLESH COLOR:

1 = Absent 2 = Present, please describe: _____

V	1	R1	1	R2	1	R3		R4	
---	---	----	---	----	---	----	--	----	--

SECONDARY TUBER FLESH COLOR CHART VALUE: Royal Horticulture Society Color Chart or Munsell Color Chart (Circle the appropriate color chart)

V		R1		R2		R3		R4	
---	--	----	--	----	--	----	--	----	--

NUMBER OF TUBERS/PLANT:

1 = Low (<8) 2 = Medium (8-15) 3 = High (>15)

V	2	R1	2	R2	2	R3		R4	
---	---	----	---	----	---	----	--	----	--

8. DISEASES CHARACTERISTICS:

DISEASES REACTION: 0 = Not Tested 1 = Highly Resistant 2 = Resistant Few Symptoms 3 = Resistance Few Lesions in Number and Size
 4 = Moderately Resistance 5 = Intermedia Susceptible 6 = Moderate Susceptible
 7 = Susceptible 9 = Highly Susceptible

LATE BLIGHT: (Phytophthora)

V	7	R1	5	R2	7	R3		R4	
---	---	----	---	----	---	----	--	----	--

EARLY BLIGHT: (Alternaria)

V	6	R1	4	R2	6	R3		R4	
---	---	----	---	----	---	----	--	----	--

SOFT ROT (Erwinia)

V	0	R1	0	R2	0	R3		R4	
---	---	----	---	----	---	----	--	----	--

COMMON SCAB (Streptomyces)

V	4	R1	7	R2	6	R3		R4	
---	---	----	---	----	---	----	--	----	--

POWDERY SCAB (Spongospora)

V	0	R1	0	R2	0	R3		R4	
---	---	----	---	----	---	----	--	----	--

DRY ROT (Fusarium)

V	0	R1	0	R2	0	R3		R4	
---	---	----	---	----	---	----	--	----	--

POTATO LEAF ROLL VIRUS (PLRV)

V	0	R1	0	R2	0	R3		R4	
---	---	----	---	----	---	----	--	----	--

8. DISEASES CHARACTERISTICS: (continued)**POTATO VIRUS X (PVX)**

V	0	R1	0	R2	0	R3		R4	
---	---	----	---	----	---	----	--	----	--

POTATO VIRUS Y (PVY)

V	9	R1	6	R2	7	R3		R4	
---	---	----	---	----	---	----	--	----	--

POTATO VIRUS M (PVM)

V	0	R1	0	R2	0	R3		R4	
---	---	----	---	----	---	----	--	----	--

POTATO VIRUS A (PVA)

V	0	R1	0	R2	0	R3		R4	
---	---	----	---	----	---	----	--	----	--

GOLDEN NEMATODE (Globodera)

V	0	R1	0	R2	0	R3		R4	
---	---	----	---	----	---	----	--	----	--

ROOT - KNOT NEMATODE (Meloidogyne)

V	0	R1	0	R2	0	R3		R4	
---	---	----	---	----	---	----	--	----	--

OTHER DISEASE

V		R1		R2		R3		R4	
---	--	----	--	----	--	----	--	----	--

PHYSIOLOGICAL DISORDER1 = Malformed shape
6 = Blackheart2 = Tuber cracking
7 = Internal sprouting3 = Feathering
8 = Other4 = Hollow heart
Black Spot Impact Bruise

5 = Internal necrosis

V	None	R1	8	R2	4	R3		R4	
---	------	----	---	----	---	----	--	----	--

9. PESTS CHARACTERISTICS:

PEST REACTION: 0 = Not Tested 1 = Highly Resistant 2 = Resistant Few Symptoms 3 = Resistance Few Lesions in Number and Size
4 = Moderately Resistance 5 = Intermediate Susceptible 6 = Moderate Susceptible
7 = Susceptible 9 = Highly Susceptible

COLORADO POTATO BEETLE (CPB) (*Leptinotarsa*)

V	0	R1	0	R2	0	R3		R4	
---	---	----	---	----	---	----	--	----	--

GREEN PEACH APHID (*Myzus*)

V	0	R1	0	R2	0	R3		R4	
---	---	----	---	----	---	----	--	----	--

OTHER:

V		R1		R2		R3		R4	
---	--	----	--	----	--	----	--	----	--

OTHER:

V		R1		R2		R3		R4	
---	--	----	--	----	--	----	--	----	--

10. GENE TRAITS:INSERTION OF GENES: 1 = YES 2 = NO ☒

IF YES, describe the gene(s) introduced or attach information:

11. QUALITY CHARACTERISTICS:**CHIEF MARKET:**

SPECIFIC GRAVITY (wt. air/wt. air - wt. water)

1 = <1.060 2 = 1.060-1.069 3 = 1.070-1.079 4 = 1.080-1.089 5 = >1.090

V 4

R1 4

R2 4

R3

R4

TOTAL GLYCOALKALOID CONTENT (mg./100 g. fresh tuber)

V 11.0

R1 28.0

R2 18.1

R3

R4

OTHER QUALITY CHARACTERISTICS: Describe any other quality characteristics that may aid in identification, (e.g., chip-processing, french fry processing, baking, boiling, after-cooking darkening). Please attach data and corresponding protocol.

Chip processing, for data and protocol please see 'Exhibit D'

12. CHEMICAL IDENTIFICATION:

Describe chemical traits of the candidate variety that aid in its identification (e.g., protein or DSN electrophoresis). Please attach data and the corresponding protocol.

13. FINGER PRINTING MARKERS:ISOZYMES 1 = YES 2 = NO ☒

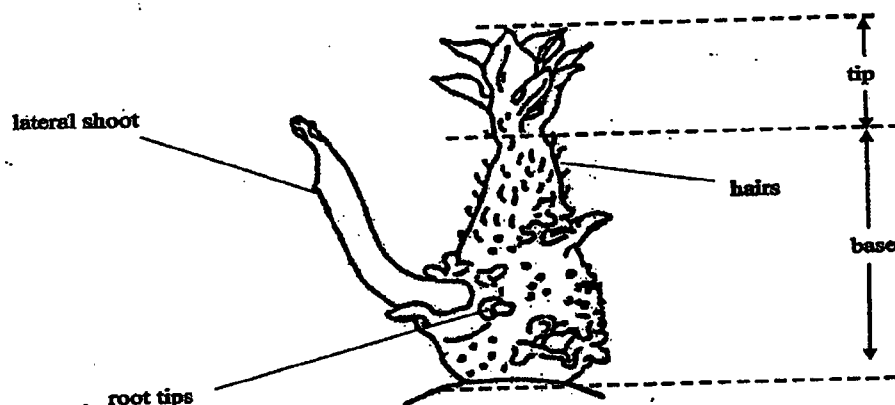
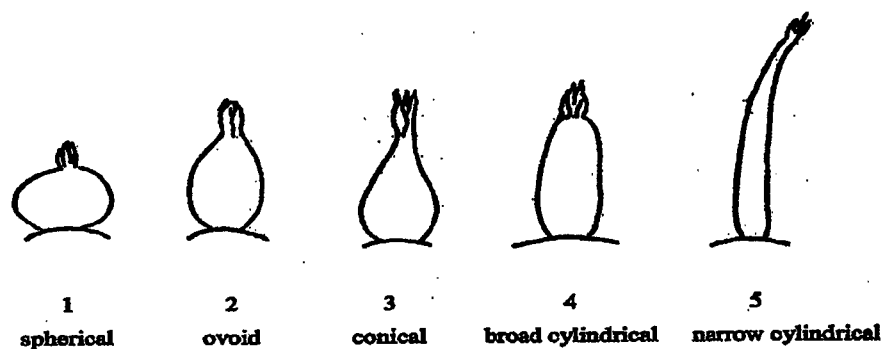
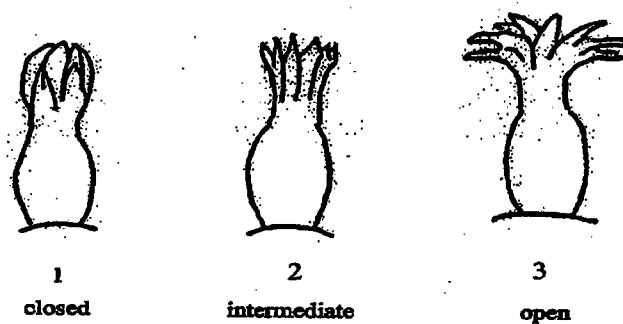
IF YES, attach information

14. DNA PROFILE: 1 = YES 2 = NO ☒

IF YES, attach information

15. ADDITIONAL COMMENTS AND CHARACTERISTICS:

Include any additional descriptors that would be useful in distinguishing the candidate variety.

Figure 1: Light sprout**Light sprout dissection****Light sprout shape****Light sprout tip habit**

The characteristic should be observed after about 10 weeks to obtain a good differentiation in the collection.

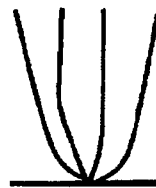
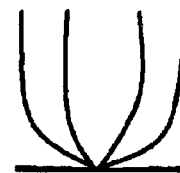
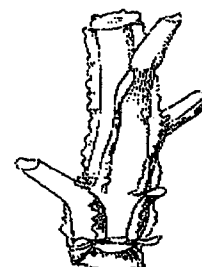
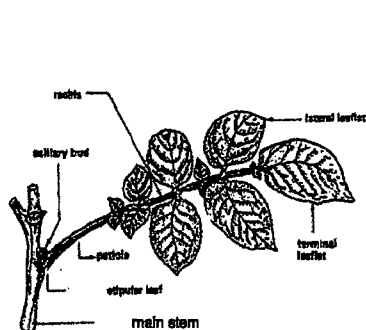
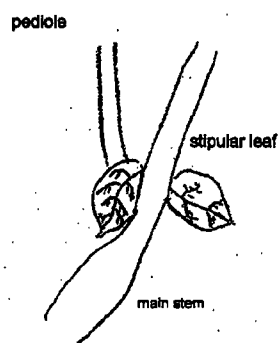
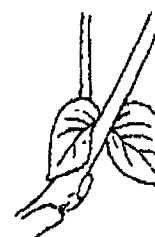
Figure 2: Growth Habit**Erect****Semi Erect****Spreading****Figure 3: Stem Wings****Weak****Medium****Strong****Figure 4: Leaf Silhouette****Closed****Medium****Open****Figure 5: Leaf Stipules****General structures****Small stipular leaf****Medium stipular leaf****Large stipular leaf**

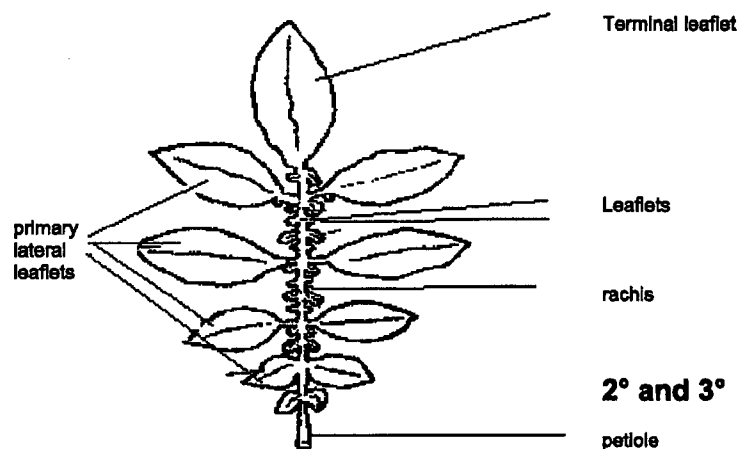
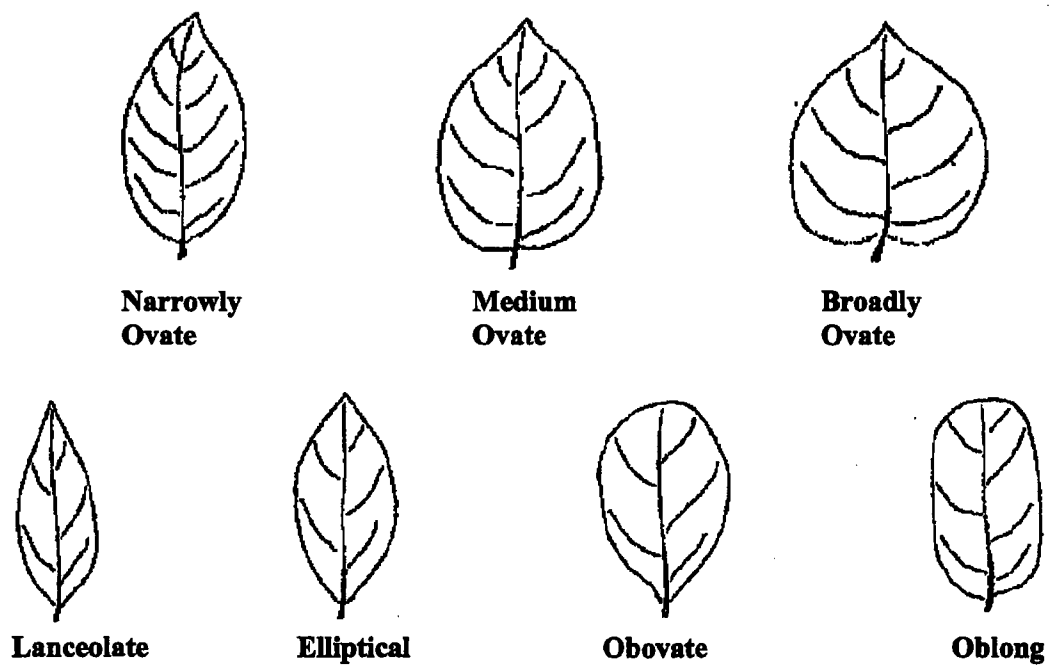
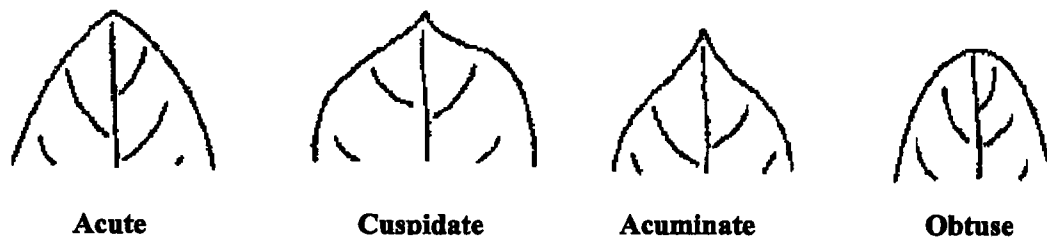
Figure 6: Leaf Dissection**Figure 7: Terminal Leaflet Shape/Primary Leaflet Shape****Figure 8: Terminal Leaflet Shape of Tip/Primary Leaflet Shape of Tip**

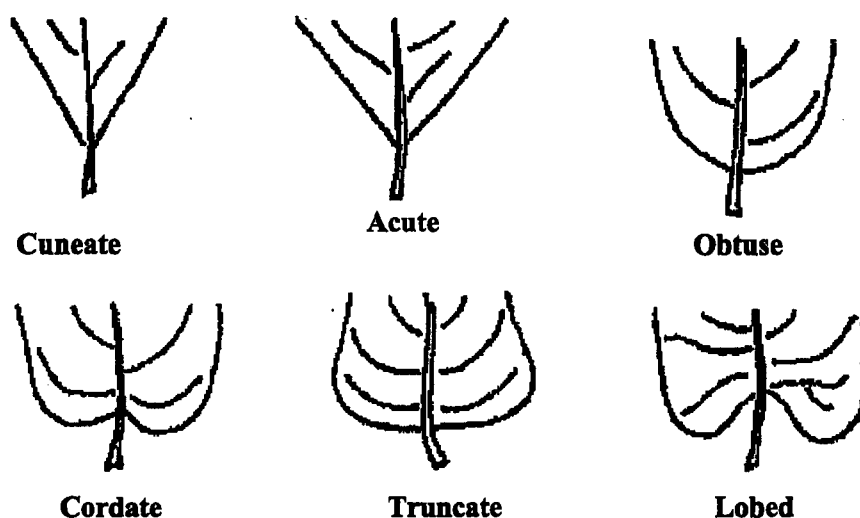
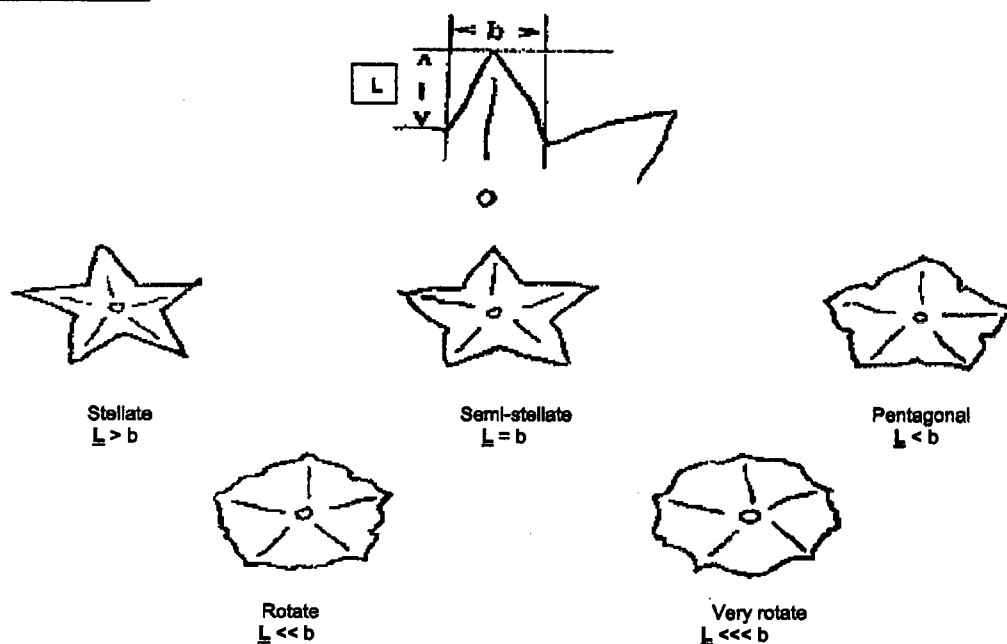
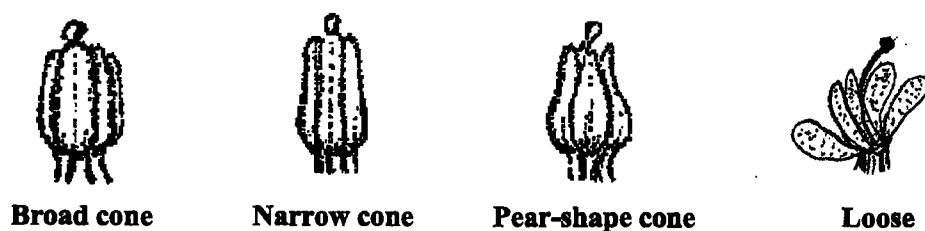
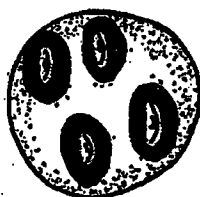
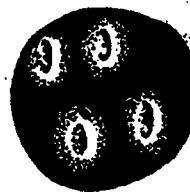
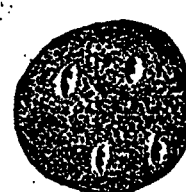
Figure 9: Terminal Leaflet Shape of Base/Primary Leaflet Shape of Base**Figure 10: Corolla Shape****Figure 11: Anther Shape**

Figure 12: Stigma Shape**Capitate****Clavate****Bi-lobed****Figure 13: Distribution of Secondary Skin Tuber Color****Eyes****Eyebrows****Splashed****Scattered****Spectacled****Stippled****Figure 14: Tuber Shape****Compressed****Round****Oval****Oblong****Long****References:**

Huaman, Z. 1986. Systematic botany and morphology of the potato. Technical information Bulletin 6. International Potato Center, Lima, Peru.

Huaman, Z., Williams, J.T., Salhuana, W. and Vincent, L. Descriptors for the cultivated potato and the maintenance and distribution of germplasm collections. 1977. International Board for Plant Genetic Resources. Rome, Italy.

Potato (*Solanum tuberosum* L.) Guidelines for the conduct of tests for distinctness, uniformity and stability. International union for the protection of new varieties of plants (UPOV). 2004-03-31.

Exhibit D
Additional Descriptive Information

Table 1. Specific Gravity of Tundra compared to Snowden: Tundra is most similar to Snowden; however, data from 37 replicated trials conducted between 2001 and 2011 indicated that Tundra differs from Snowden by having consistently higher specific gravity. According to a t-paired test of the 37 locations the probability of error in concluding this difference = 0.0000091. Specific gravity was recorded as weight of the tuber in air compared to the weight of the same tubers in water.

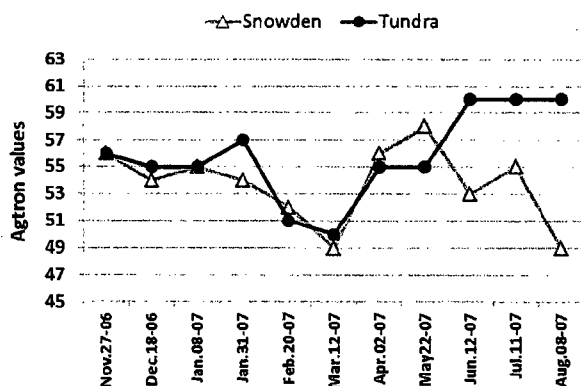
$$SG = \frac{\text{Weight of tubers in air}}{(\text{weight in air}) - (\text{weight in water})}$$

Year	Trial	Location	Tundra (W2310-3)	Snowden
2011	USPB/SFA	Howard City, MI	1.083	1.075
2011	USPB/SFA	CA	1.099	1.090
2011	USPB/SFA	Florida	1.089	1.076
2011	USPB/SFA	Mo	1.076	1.064
2011	USPB/SFA	NC	1.099	1.094
2011	USPB/SFA	ID	1.099	1.093
2011	USPB/SFA	ME	1.087	1.085
2011	USPB/SFA	MI	1.083	1.075
2011	USPB/SFA	ND	1.091	1.096
2011	USPB/SFA	OR	1.074	1.079
2011	USPB/SFA	PA	1.084	1.075
2011	USPB/SFA	WI	1.085	1.081
2010	USPB/SFA	Florida	1.075	1.073
2010	USPB/SFA	Aberdeen, ID	1.093	1.094
2010	USPB/SFA	Presque Isle, ME	1.094	1.094
2010	USPB/SFA	Howard City, MI	1.082	1.077
2010	USPB/SFA	Charleston, Mo	1.074	1.074
2010	USPB/SFA	Chest Spring, PA	1.090	1.085
2010	USPB/SFA	Red River Valley, ND	1.081	1.079
2010	USPB/SFA	Hancock, WI	1.087	1.088
2010	USPB/SFA	Tyrrell County, NC	1.075	1.074
2008	NCR	Montcalm, MI	1.092	1.091
2008	NCR	Becker, MN	1.086	1.092
2008	USPB/SFA	Tyrrell County, NC	1.094	1.094
2008	NCR	Scottsbluff, NE	1.086	1.075
2008	NCR	Tappen, ND	1.100	1.096
2008	NCR	Howard City, MI	1.079	1.071
2008	NCR	Hopple, ND-dry	1.099	1.101
2007	USPB/SFA	Tyrrell County, NC	1.084	1.083
2006	SPP	Hancock, WI	1.090	1.084
2006	SPP	Rhineland, WI	1.090	1.081
2006	NCR	Montcalm, MI	1.087	1.080
2003	WVT	Hancock, WI	1.089	1.087
2002	Han2	Hancock, WI	1.092	1.081
2002	Rh11	Rhineland, WI	1.099	1.089
2001	Han1	Hancock, WI	1.081	1.075
2001	Rh11	Rhineland, WI	1.091	1.081
8 years	37 Trials	Minimum	1.074	1.064
		Maximum	1.100	1.101
		Average Specific Gravity	1.0875	1.0833
		Standard Deviation	0.0076	0.0087
		T paired-test (Probability)	0.0000091***	

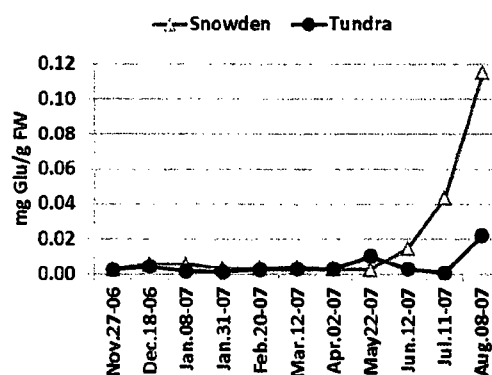
Note: USPB/SFA= United States Potato Board/Snack Food Association Trial. NCR= North Central Potato Regional Trial.
SPP = Wisconsin SpudPro Trial. WVT= Wisconsin Variety Trial. Han1, Han2 and Rh11 = Wisconsin Breeding Trials
conducted at the Hancock and Rhineland Agricultural Research Stations.

Chip Color and Glucose Values of Tundra compared to Snowden (Long Storage Tests): Tundra is most similar to Snowden; however, data from storage tests conducted over three years and two locations indicate that Tundra fry color is consistently lighter than Snowden (higher Agtron values and lower USPB chip scores), when potatoes are fried from cold (42 and 45°F storage) after seven month of storage. Similarly, glucose values are lower. Chipping scores were read using an Agtron M30 reflectance color meter. The instrument was standardized using the red mode, with the black reference disc (00) at 0 and the white disk at 90. The chips, 20-25 were crushed by hand to provide an even distribution of the sample and then placed in a 16 cm diameter sample cup and positioned on the viewer. Samples were read in triplicate and the mean of the measurements calculated. Tuber glucose content was evaluated using an YSI 2700 Industrial Analyzer and an YSI 2365 glucose membrane kit (Yellow Spring Instrument Co., Inc., Yellow Spring, OH) following Sowokinos et al. (2000) procedures.

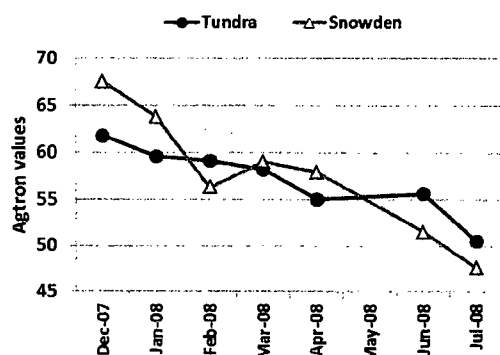
NB Chip Color, 45°F Storage Test, 2006-07



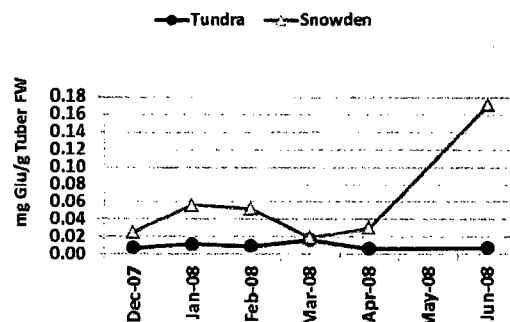
Glucose NB Trial, 45°F Storage, 2006-07



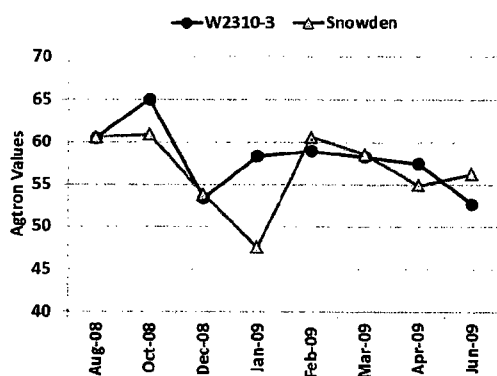
Ontario Fry Color from 50°F Storage, 2007-08



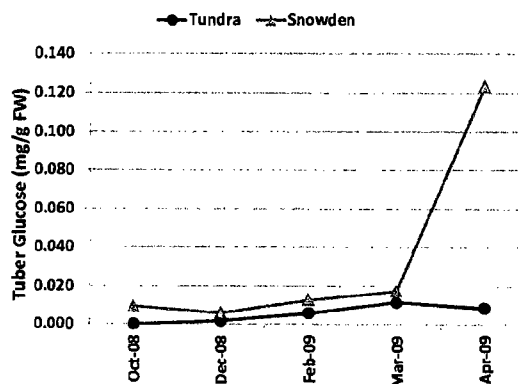
Glucose, Ontario storage trial 2007-08, from 50°F Storage



Ontario Fry Color from 50°F Storage, 2008-09



Glucose content (mg/g FW), Ontario storage trials, 50°F, 2008-09



Literature cited

Sowokinos, J.R., C.C. Shock, T.D. Stieber, and E.P. Eldredge. 2000. Compositional and enzymatic changes associated with sugar-end defects in Russet Burbank potatoes. *Amer. J. Pot. Res.* 77:47-56.

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U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

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

**EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP**

1. NAME OF APPLICANT(S) WISCONSIN ALUMNI RESEARCH FOUNDATION	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER W2310-3	3. VARIETY NAME TUNDRA
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP, and Country) 614 WALNUT STREET P.O. BOX 7365 MADISON, WI 53707-7365, US	5. TELEPHONE (Include area code)	6. FAX (Include area code)
	7. PVPO NUMBER	

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



YES



NO

9. Is the applicant a U.S. national or a U.S. based entity? 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 the 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 the 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 (Trace ownership from original breeder to current owner. Use the reverse for extra space if needed):

PLEASE NOTE:

Plant variety protection can only be afforded to the owners (not licensees) who meet 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 the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 0.1 hour per response, including the time for reviewing the instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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ST470-E (07-09) designed by the Plant Variety Protection Office