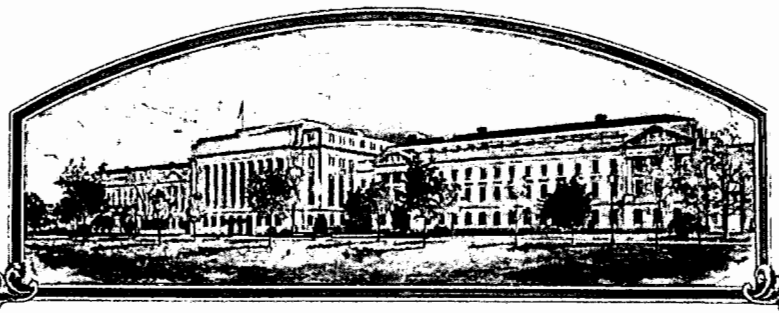

No. 201500493

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

University of Idaho

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 there from, to the extent provided by the PLANT VARIETY PROTECTION ACT. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

POTATO

'Mountain Gem Russet'

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 third day of June, in the year* ***two thousand and sixteen.***

Attest:

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secretary of Agriculture

201500493

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REPRODUCE LOCALLY. *Include form number and date on all reproductions* — Form Approved - OMB No. 0581-0055

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	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME	3. VARIETY NAME
University of Idaho	A03158-2TE	Mountain Gem Russet

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*	5. TELEPHONE *(include area code)*	FOR OFFICIAL USE ONLY
Office of Technology Transfer Morrill Hall PO Box 443003 Moscow ID 83844 -3003	208-885-4550 6. FAX *(include area code)* 208-885-6127	PVPO NUMBER: 201500493 FILING DATE: 9/9/2015

7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.)*	8. IF INCORPORATED, GIVE STATE OF INCORPORATION	9. DATE OF INCORPORATION
Land Grant University Not for Profit	Idaho	1947

10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. *(First person listed will receive all papers)*

Karen Stevenson and Jeffrey C. Stark
Office of Technology Transfer
Morrill Hall PO Box 443003
Moscow, ID 83844 -3003

FEES RECEIVED: FILING AND EXAMINATION FEES: $ 4,382 DATE 9/9/2015; CERTIFICATION FEE: $ DATE

11. TELEPHONE (Include area code)	12. FAX (Include area code)	13. E-MAIL
(208) 885-4550 or 529-8376	(208) 885-4551 or 522-2954	karens@uidaho.edu or jstark@uidaho.edu

14. CROP KIND *(Common Name)*	16. FAMILY NAME *(Botanical)*	18. DOES THE VARIETY CONTAIN ANY TRANSGENES? ***(OPTIONAL)***
Potato	Solanaceae	☐ YES ☑ NO
15. GENUS AND SPECIES NAME OF CROP	17. IS THE VARIETY A FIRST GENERATION HYBRID?	IF SO, PLEASE GIVE THE ASSIGNED USDA-APHIS REFERENCE NUMBER FOR THE APPROVED PETITION TO DEREGULATE THE GENETICALLY MODIFIED PLANT FOR COMMERCIALIZATION.
Solanum tuberosum	☐ YES ☑ NO	

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. ☑ Exhibit F. Declaration Regarding Deposit
- g. ☑ 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)*
- h. ☑ Filing and Examination Fee ($4,382), made payable to "Treasurer of the United States" *(Mail to the Plant Variety Protection Office)*

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)*
☐ UNDECIDED

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 of the variety has been 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	
Jeffrey C. Stark		Karen A Stevenson	
NAME *(Please print or type)*		NAME *(Please print or type)*	
Jeffrey C. Stark		Karen A Stevenson	
CAPACITY OR TITLE	DATE	CAPACITY OR TITLE	DATE
Research Professor	3 Sept 2015	Licensing Assoc.	9/Sept/2015

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(See reverse for instructions and information collection burden statement)

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, Room 401, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. 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: (301) 504-5518 **FAX:** (301) 504-5291
General E-mail: PVPOmail@usda.gov
Homepage: http://www.ams.usda.gov/science/pvpo/PVPindex.htm

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.)*

Application filed within one year of release date.

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.

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Exhibit A Form

1. Describe the genealogy (back to and including public and commercial varieties, lines, or clones used) and the breeding method(s).

Mountain Gem Russet was derived from a sexual hybridization made at the University of Idaho's Aberdeen Research and Extension Center in 2003. It resulted from a cross of A98292-2 (female parent) and A98104-4 (male parent). It was first selected in the field in 2004 at the Tetonia Research and Extension Center Tetonia, Idaho.

A four generation pedigree is attached.

2. Give the details of subsequent stages of selection and multiplication.

Year	Detail of Stage	Selection Criteria
2004	Field selection at Tetonia, Idaho 2004.	
2008-2010	Replicated yield trial evaluations and propagation.	Early yield, appearance, higher protein and vitamin C content, fresh and french fry processing market potential.
2011	In 2011 Mountain Gem Russet was evaluated in the Tri-State Potato Variety Trials.	
2012-2014	In 2012-2014 Mountain Gem Russet was entered and evaluated in the Western Regional Variety Trials. Mountain Gem Russet was selected for use in the early season russet tablestock and french fry processing markets.	
2012-present	Mountain Gem Russet in agronomic field trials Seed source maintained at UI Tetonia R&E Center	

3a. Is the variety uniform? X Yes No

How did you test for uniformity?

Mountain Gem Russet has been clonally propagated since the first year of selection. The variety has remained uniform during all subsequent years of maintenance and propagation.

3b. Is the variety stable? X Yes No

How did you test for stability? Over how many generations?

Mountain Gem Russet has been clonally propagated for seven years of evaluations. It has shown stability over seven generations and has not produced any recognizable variants.

4. Are genetic variants observed or expected during reproduction and multiplication? _____ Yes _X_ No

If yes, state how these variants may be identified, their type and frequency.

Continue on additional pages if necessary.

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Pedigree of Mountain Gem Russet (A03158-2TE)

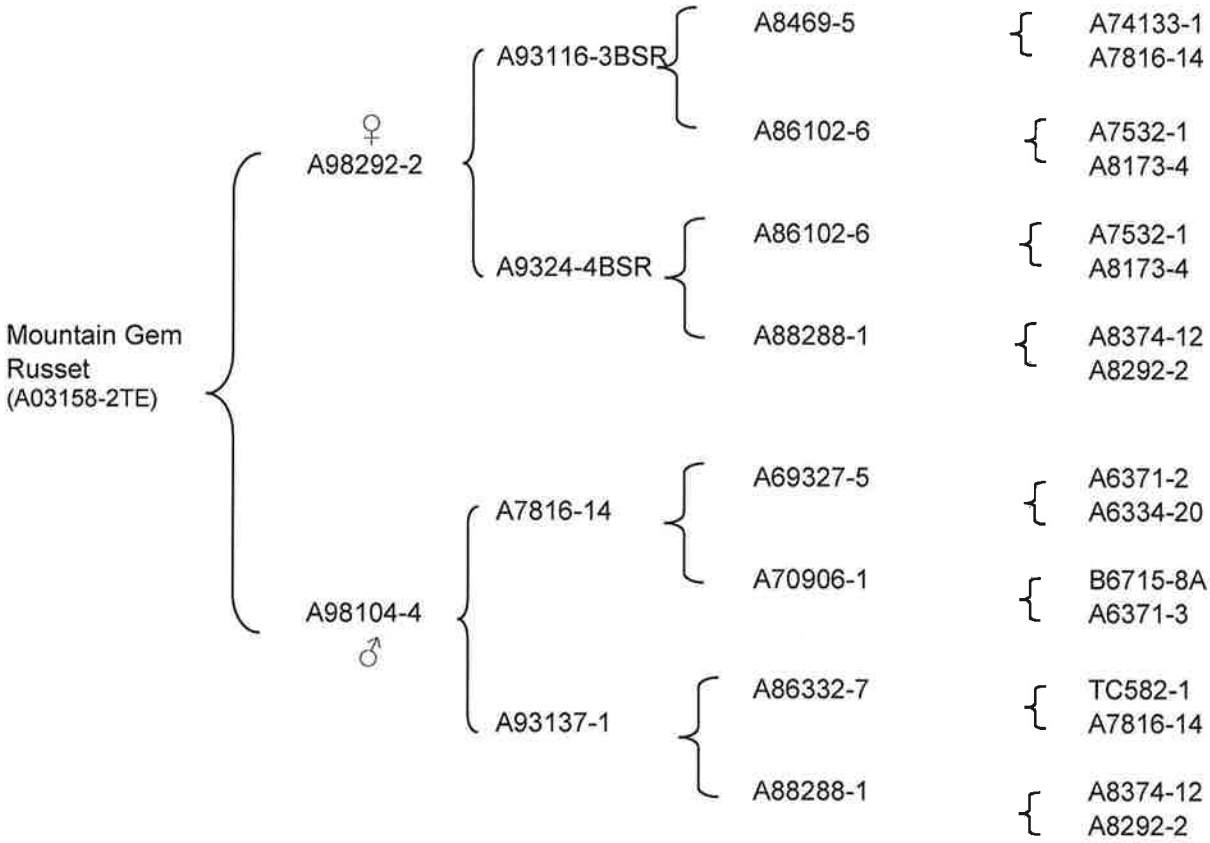

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Exhibit B Form

Based on overall morphology, 'Mountain Gem Russet' is most similar to 'Russet Burbank'
Applicant's new variety *Most similar comparison variety(ies)*

'Mountain Gem Russet' most clearly differs from ' Russet Burbank ' in the following traits:
Applicant's new variety *Most similar comparison variety(ies)*

Name the specific trait, and then list the value of that trait for each variety in the comparison. Attach appropriate supporting evidence (see the Guidelines for Presenting Evidence in Support of Variety Distinctness, available from the PVP Office or website).

	Applicant's New Variety 'Mountain Gem Russet'	1st Comparison Variety 'Russet Burbank'	Location of Evidence
1. Qualitative traits:			
Pollen production	Male Fertile	Sterile	Exhibit C and Photographs
Petiole Anthocyanin	Absent	Weak	
Leaf stipules size	Large	Medium	
2. Color traits: * measured using the Royal Horticultural Society Colour Chart (RHS)			
Leaf color*	Green (RHS 137A)	Olive green (RHS 146 A)	Exhibit C and photographs
3. Quantitative traits:			
2012 Protein 2014 Protein	Medium-high (5.8%) (5.6%)	Low (4.5%) (4.9%)	Table 1
Vitamin C content 2012 2014	High 24.65 mg/100g FWB 27.58 mg/100g FWB	Low 18.82 mg/100g FWB 19.03 mg/100g FWB	Table 2 - Exhibit D
4. Other:			
Fry color from 40°F** Fry color from 45°F** Percent Sugar ends**	Moderate (3.2) Low (0.84) Low (17%)	Dark (3.8) Low (0.99) High (52%)	Table 3 – Exhibit D

FWB= Fresh Weight Basis
**USDA color chart {00-4.0 (darkest)}. Samples stored at 40° or 45°F for approximately 3 months.

Use additional tables to present clear differences for additional comparison varieties. Use additional pages to present supporting evidence

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MOUNTAIN GEM RUSSET

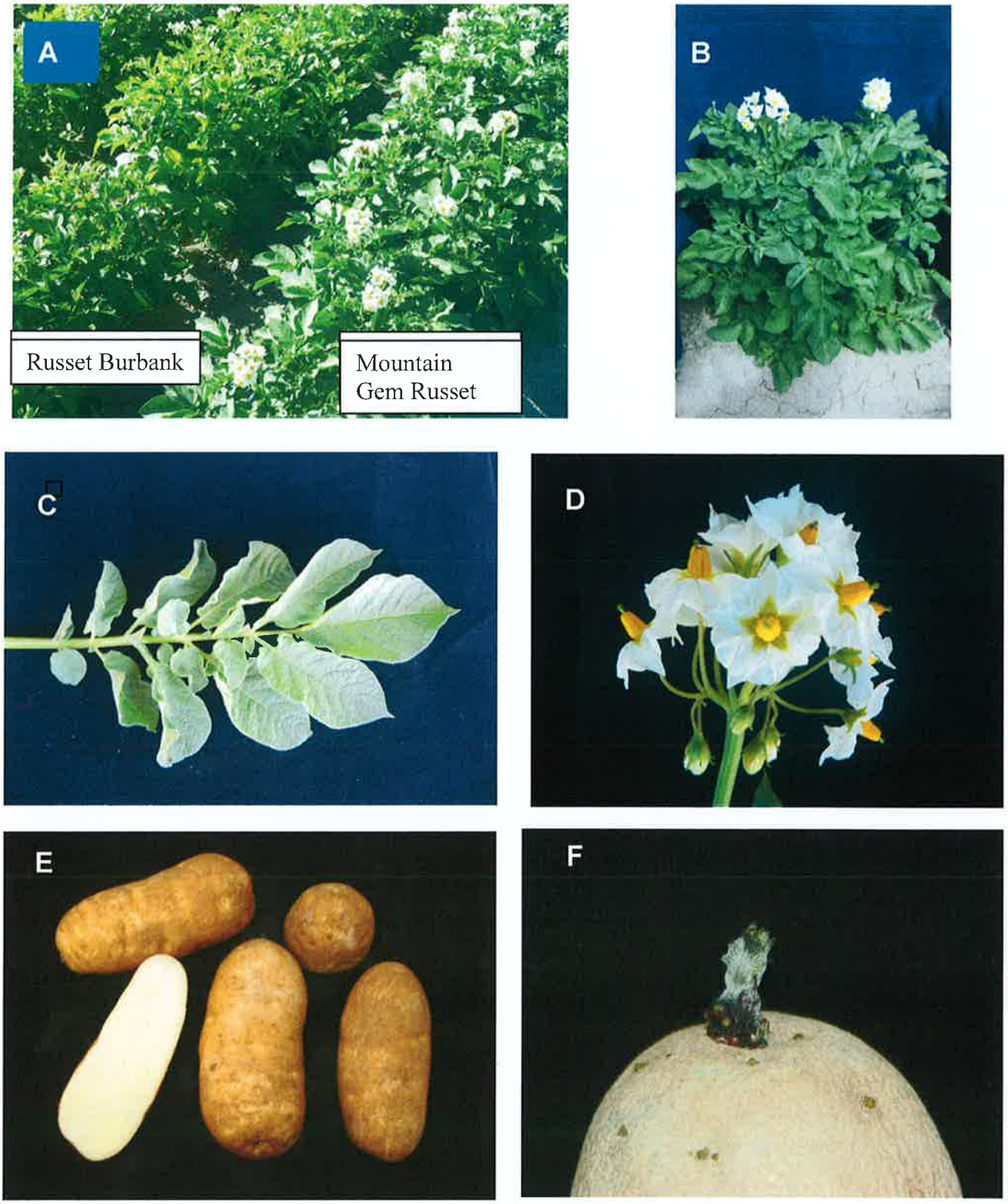

Figure 2. Photographs of Mountain Gem Russet (A0158-2TE) showing a) field plants compared to Russet Burbank, b) whole plant, c) compound leaf, d) flower, e) external tuber appearance and tuber flesh color, and f) light sprout.

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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.

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.)

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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).

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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).

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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.

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NAME OF APPLICANT (S)	TEMPORARY OR EXPERIMENTAL DESIGNATION	VARIETY NAME
University of Idaho	A03158-2TE	Mountain Gem Russet

ADDRESS *(Street and No. or RD No., City, State, Zip Code, and Country)*

Office of Technology Transfer
Morrill Hall 414
PO Box 443003
Moscow ID 83844-3003

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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)
Mountain Gem Russet	Russet Burbank			

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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	R1	R2	R3	R4
4-5	4-5			

2. LIGHT SPROUT CHARACTERISTICS: (See Figure 1)

***LIGHT SPROUT: GENERAL SHAPE**
1 = Spherical 2 = Ovoid 3 = Conica 4 = Broad cylindrica 5 = Narrow cylindrical 6 = Other _____

V	R1	R2	R3	R4
2	2			

***LIGHT SPROUT BASE: PUBESCENCE OF BASE**
1 = Absent 2 = Weak 3 = Medium 4 = Strong 5 = Very Strong

V	R1	R2	R3	R4
3	3			

***LIGHT SPROUT BASE: ANTHOCYANIN COLORATION**
1 = Green 2 = Red-violet 3 = Blue-violet 4 = Other(describe) _____

V	R1	R2	R3	R4
2	2			

***LIGHT SPROUT BASE: INTENSITY OF ANTHOCYANIN COLORATION (IF PRESENT)**
1 = Absent 2 = Weak 3 = Medium 4 = Strong 5 = Very Strong

V	R1	R2	R3	R4
4	3			

* **LIGHT SPROUT TIP: HABIT**
1 = Closed 2 = Intermediate 3 = Open

V	R1	R2	R3	R4
2	2			

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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		R3		R4	

LIGHT SPROUT TIP ANTHOCYANIN COLORATION
1 = Green 2 = Red-violet 3 = Blue-violet 4 = Other(describe) _____

V	2	R1	2	R2		R3		R4	

LIGHT SPROUT TIP: INTENSITY OF ANTHOCANIN COLORATION (IF PRESENT)
1 = Absent 2 = Weak 3 = Medium 4 = Strong 5 = Very Strong

V	3	R1	2	R2		R3		R4	

LIGHT SPROUT ROOT INITIALS: FREQUENCY
1 = Absent 2 = Some 3 = Abundant

V	3	R1	2	R2		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	3	R1	5	R2		R3		R4	

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

V	3	R1	2	R2		R3		R4	

MATURITY: Days after planting (DAP) at vine senescence

V	125	R1	125	R2		R3		R4	

PLANTING DATE:

V	04-29-2013,05-01-2014	R1	04-29-2013,05-01-2014	R2		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 Erect (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	1 Aberdeen, ID	R1	1 Aberdeen, ID	R2		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	4	R1	4	R2		R3		R4	

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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	3	R2		R3		R4	

STEM WINGS: (See Figure 3)
1 = Absent 3 = Weak 5 = Medium 7 = Strong 9 = Very Strong

V	5	R1	3	R2		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	2	R2		R3		R4	

LEAF COLOR CHART VALUE: Royal Horticulture Society Color Chart or Munsell Color Chart
(*Observe fully developed leaves located on middle 1/3 of plant and circle the appropriate color chart)*

V	137 B	R1	146 A	R2		R3		R4	

LEAF PUBESCENCE DENSITY:
1 = Absent 2 = Sparse 3 = Medium 4 = Thick 5 = Heavy

V	3	R1	3	R2		R3		R4	

LEAF PUBESCENCE LENGTH:
1 = None 2 = Short 3 = Medium 4 = Long 5 = Very Long

V	2	R1	2	R2		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	5	R2		R3		R4	

PETIOLES ANTHOCYANIN COLORATION:
1 = Absent 3 = Weak 5 = Medium 7 = Strong 9 = Very Strong

V	1	R1	3	R2		R3		R4	

LEAF STIPULES SIZE: (Se Figure 5)
1 = Absent 3 = Small 5 = Medium 7 = Large

V	7	R1	5	R2		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	3	R1	2	R2		R3		R4	

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5. LEAF CHARACTERISTICS: (continued)

TERMINAL LEAFLET TIP SHAPE: (See Figures 6 and 8)
1 = Acute 2 = Cuspidate 3 = Acuminate 4 = Obtuse 5 = Other _____

V	2	R1	3	R2		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		R3		R4	

TERMINAL LEAFLET MARGIN WAVINESS:
1 = Absent 2 = Slight 3 = Weak 4 = Medium 5 = Strong

V	2	R1	3	R2		R3		R4	

NUMBER OF PRIMARY LEAFLET PAIRS: (See Figure 6)

AVERAGE:

V	4.0	R1	3.4	R2		R3		R4	

RANGE:

V	3 to 5	R1	2 to 4	R2	to	R3	to	R4	to

PRIMARY LEAFLET TIP SHAPE: (See Figures 6 and 8)
1 = Acute 2 = Cuspidate 3 = Acuminate 4 = Obtuse 5 = Other _____

V	2	R1	3	R2		R3		R4	

PRIMARY LEAFLET SIZE:
1 = Very Small 2 = Small 3 = Medium 4 = Large 5 = Very Large

V	4	R1	3	R2		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	2	R2		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		R3		R4	

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

AVERAGE:

V	7.2	R1	6.1	R2		R3		R4	

RANGE:

V	4 to 9	R1	2 to 11	R2	to	R3	to	R4	to

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5. LEAF CHARACTERISTICS: (continued)

NUMBER OF INFLORESCENCE/PLANT:

AVERAGE:

V	6.4	R1	4.2	R2		R3		R4	

RANGE:

V	4 to 9	R1	1 to 9	R2	to	R3	to	R4	to

NUMBER OF FLORETS/INFLORESCENCE:

AVERAGE:

V	16.0	R1	12.0	R2		R3		R4	

RANGE:

V	12 to 21	R1	5 to 18	R2	to	R3	to	R4	to

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

V	155 A	R1	155 A	R2		R3		R4	

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

V	155 A	R1	155 B	R2		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	1	R1	1	R2		R3		R4	

COROLLA SHAPE: (See Figure 10)
1 = Very rotate 2 = Rotate 3 = Pentagonal 4 = Semi-stellate 5 = Stellate

V	3	R1	4	R2		R3		R4	

6. INFLORESCENCE CHARACTERISTICS:

CALYX ANTHOCYANIN COLORATION:
1 = Absent 3 = Weak 5 = Medium 7 = Strong 9 = Very strong

V	3	R1	3	R2		R3		R4	

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

V	14 A	R1	15 A	R2		R3		R4	

ANTHER SHAPE: (See Figure 11)
1 = Broad cone 2 = Narrow cone 3 = Pear-shaped cone 4 = Loose 5 = Other

V	2	R1	3	R2		R3		R4	

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6. INFLORESCENCE CHARACTERISTICS: (continued)

POLLEN PRODUCTION:
1 = None 3 = Some 5 = Abundant

V	3	R1	1	R2		R3		R4	

STIGMA SHAPE: (See Figure 12)
1 = Capitate 2 = Clavate 3 Bi-lobed

V	1	R1	1	R2		R3		R4	

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

V	146 A	R1	146 B	R2		R3		R4	

BERRY PRODUCTION: (Under field conditions)
1 = Absent 3 = Low 5 = Moderate 7 = Heavy 9 = Very Heavy

V	1	R1	1	R2		R3		R4	

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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	5	R1	5	R2		R3		R4	

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

V	164 B	R1	164 B	R2		R3		R4	

SECONDARY SKIN COLOR:
1 = Absent 2 = Present (please describe)

V	1	R1	1	R2		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 = Netled 4 = Russetted 5 = Heavily russetted 6 = Other _____

V	4	R1	4	R2		R3		R4	

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7. TUBER CHARACTERISTICS: (continued)

*** TUBER SHAPE**: (See Figure 14)
1 = Compressed 2 = Round 3 = Oval 4 = Oblong 5 = Long 6 = Other _____

V	5	R1	5	R2		R3		R4	

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

V	2	R1	3	R2		R3		R4	

TUBER LENGTH (mm):

AVERAGE:

V	119	R1	135	R2		R3		R4	

RANGE:

V	87 to 160	R1	85 to 180	R2	to	R3	to	R4	to

STANDARD DEVIATION:

V	12.7	R1	18.6	R2		R3		R4	

AVERAGE WEIGHT OF SAMPLE TAKEN:

V	249	R1	236	R2		R3		R4	

TUBER WIDTH (mm)

AVERAGE:

V	60.8	R1	61	R2		R3		R4	

RANGE:

V	44 to 75	R1	49 to 79	R2	to	R3	to	R4	to

STANDARD DEVIATION:

V	4.28	R1	5.82	R2		R3		R4	

AVERAGE WEIGHT OF SAMPLE TAKEN (g):

V	249	R1	236	R2		R3		R4	

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7. TUBER CHARACTERISTICS: (continued)

TUBER THICKNESS (mm):

AVERAGE:

V	53.8	R1	53	R2		R3		R4	

RANGE:

V	43 to 70	R1	43 to 72	R2	to	R3	to	R4	to

STANDARD DEVIATION:

V	4.65	R1	5.56	R2		R3		R4	

AVERAGE WEIGHT OF SAMPLE TAKEN (g):

V	249	R1	236	R2		R3		R4	

TUBER EYE DEPTH:

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

V	5	R1	5	R2		R3		R4	

TUBER LATERAL EYES:

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

V	5	R1	5	R2		R3		R4	

NUMBER EYE/TUBER:

AVERAGE:

V	25.4	R1	26.6	R2		R3		R4	

RANGE:

V	16 to 34	R1	19 to 42	R2	to	R3	to	R4	to

DISTRIBUTION OF TUBER EYES:

1 = Predominantly apical 2 = Evenly distributed

V	2	R1	2	R2		R3		R4	

PROMINENCE OF TUBER EYEBROWS:

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

V	2	R1	2	R2		R3		R4	

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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		R3		R4	

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

V	158 D	R1	158 C	R2		R3		R4	

SECONDARY TUBER FLESH COLOR:

1 = Absent 2 = Present, please describe: _____

V	1	R1	1	R2		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	1	R1	1	R2		R3		R4	

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8. DISEASES CHARACTERISTICS:

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

LATE BLIGHT: (Phytophthora)

V	7	R1	7	R2		R3		R4	

EARLY BLIGHT: (Alternaria)

V	7	R1	6	R2		R3		R4	

SOFT ROT (Erwinia)

V	4	R1	7	R2		R3		R4	

COMMON SCAB (Streptomyces)

V	3	R1	4	R2		R3		R4	

POWDERY SCAB (Spongospora)

V	0	R1	0	R2		R3		R4	

DRY ROT (Fusarium)

V	7	R1	7	R2		R3		R4	

POTATO LEAF ROLL VIRUS (PLRV)

V	9	R1	9	R2		R3		R4	

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8. DISEASES CHARACTERISTICS: (continued)

POTATO VIRUS X (PVX)

V	9	R1	9	R2		R3		R4	

POTATO VIRUS Y (PVY)

V	9	R1	7	R2		R3		R4	

POTATO VIRUS M (PVM)

V	0	R1	0	R2		R3		R4	

POTATO VIRUS A (PVA)

V	0	R1	0	R2		R3		R4	

GOLDEN NEMATODE (Globodera)

V	0	R1	0	R2		R3		R4	

ROOT – KNOT NEMATODE (Meloidogyne)

V	0	R1	0	R2		R3		R4	

OTHER DISEASE Corky Ringspot (Tobacco rattle Virus)

V	5	R1	9	R2		R3		R4	

PHYSIOLOGICAL DISORDER

1 = Malformed shape 2 = Tuber cracking 3 = Feathering 4 = Hollow heart 5 = Internal necrosis
6 = Blackheart 7 = Internal sprouting 8 = Other _____

V	4	R1	4	R2		R3		R4	

9. PESTS CHARACTERISTICS:

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

COLORADO POTATO BEETLE (CPB) (*Leptinotarsa*)

V	0	R1	0	R2		R3		R4	

GREEN PEACH APHID *(Myzus*)

V	0	R1	0	R2		R3		R4	

OTHER:

V	0	R1	0	R2		R3		R4	

OTHER:

V	0	R1	0	R2		R3		R4	

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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	3-4	R1	3-4	R2		R3		R4	

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

V	3.72	R1	3.76	R2		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.

Mountain Gem Russet has lighter fry color at 40F (3.20) and 45F (0.84),than Russet Burbank 40F(3.81),and 45 F(0.99)

Mountain Gem Russet produces lower percentage of sugar ends (17%) compared to Russet Burbank at (52%).

See attached Exhibit D for protocol.

12. CHEMICAL IDENTIFICATION:

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

Mountain Gem Russet has higher percent protein content (5.84%) than Russet Burbank (4.74%).

Mountain Gem Russet has higher Vitamin C content (26.1mg/100g Fresh weight basis FWB) than Russet Burbank (18.9 mg/100 g FWB).

See protocol in attached Exhibit D

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. ADDDITIONAL COMMENTS AND CHARACTERISTICS:

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

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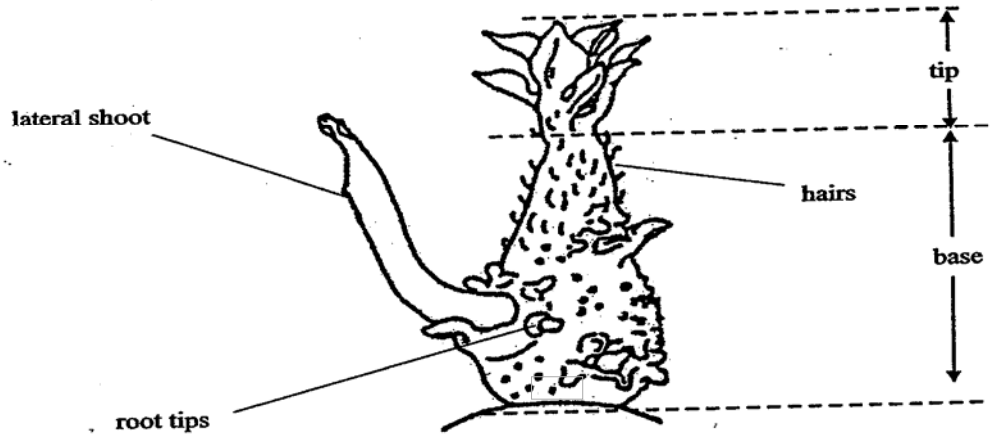
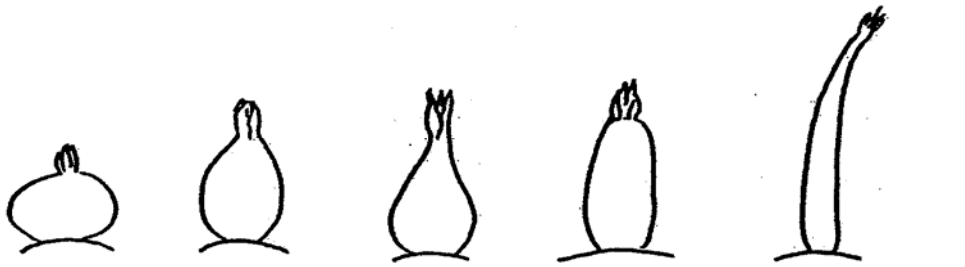
Figure 1: Light sprout

Light sprout dissection

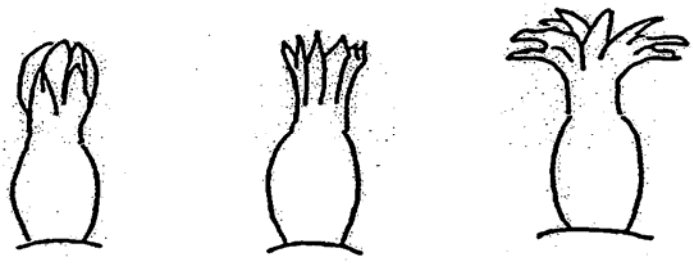


Light sprout shape



1 spherical | 2 ovoid | 3 conical | 4 broad cylindrical | 5 narrow cylindrical

Light sprout tip habit



1 closed | 2 intermediate | 3 open

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

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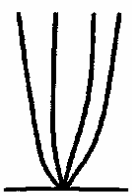
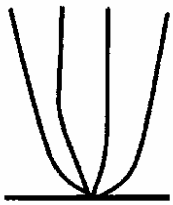
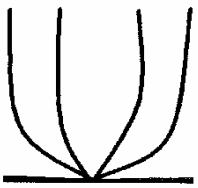
Figure 2: Growth Habit



Erect



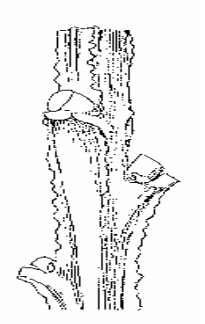
Semi Erect



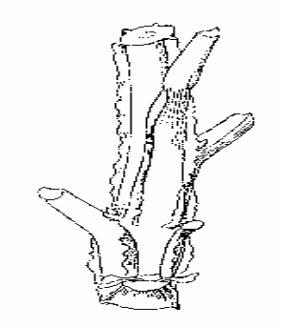
Spreading

Figure 3: Stem Wings

Weak



Medium



Strong

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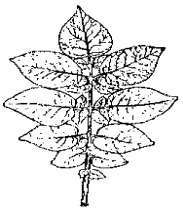
Figure 4: Leaf Sillhouette

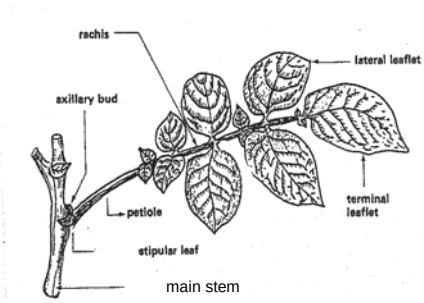
Closed



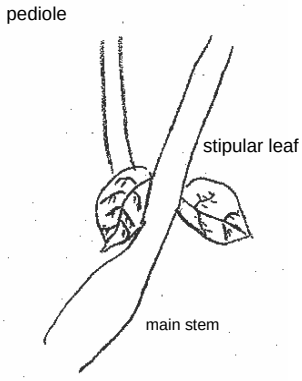
Medium

Open

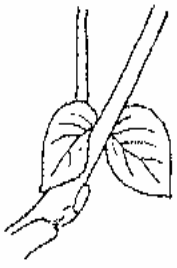
Figure 5: Leaf Stipules



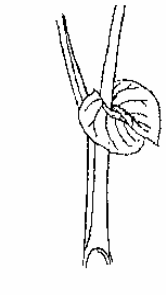
General structures



Small stipular leaf



Medium stipular leaf



Large stipular leaf

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Figure 6: Leaf Dissection

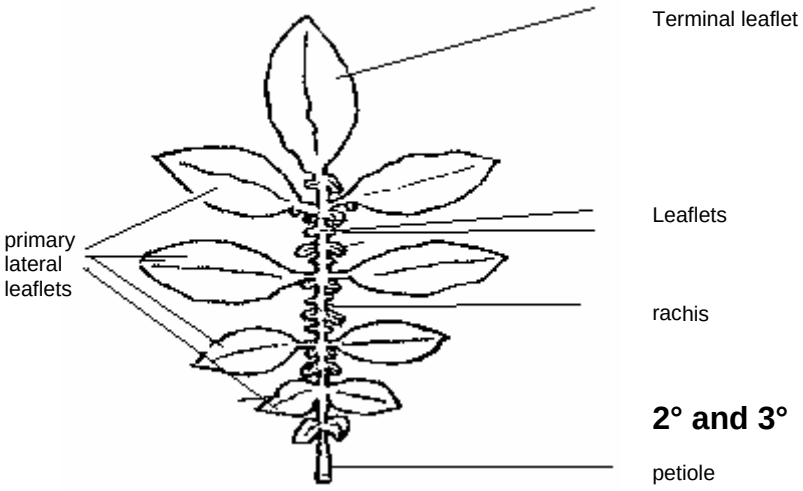

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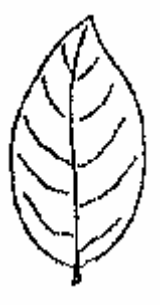
Figure 7: Terminal Leaflet Shape/Primary Leaflet Shape

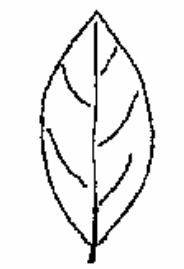


Narrowly Ovate

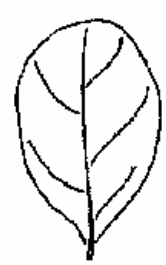
Medium Ovate

Broadly Ovate

Lanceolate



Elliptical



Obovate

Oblong

Figure 8: Terminal Leaflet Shape of Tip/Primary Leaflet Shape of Tip

Acute

Cuspidate

Acuminate

Obtuse

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Figure 9: Terminal Leaflet Shape of Base/Primary Leafelet Shape of Base

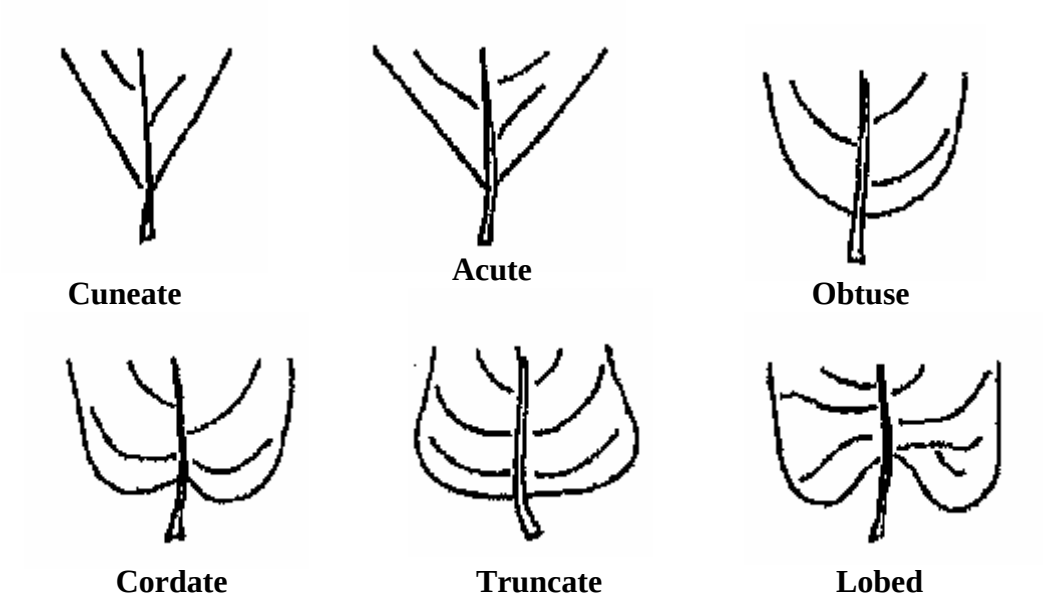

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Figure 10: Corolla Shape

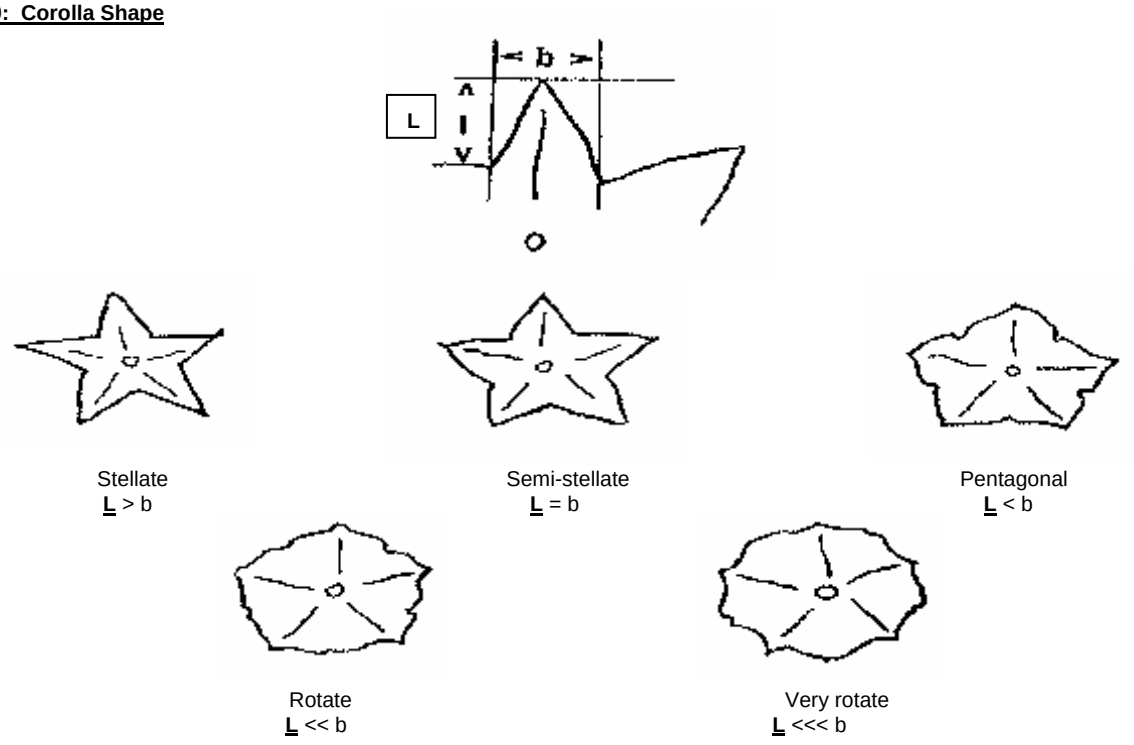

Figure 11: Anther Shape

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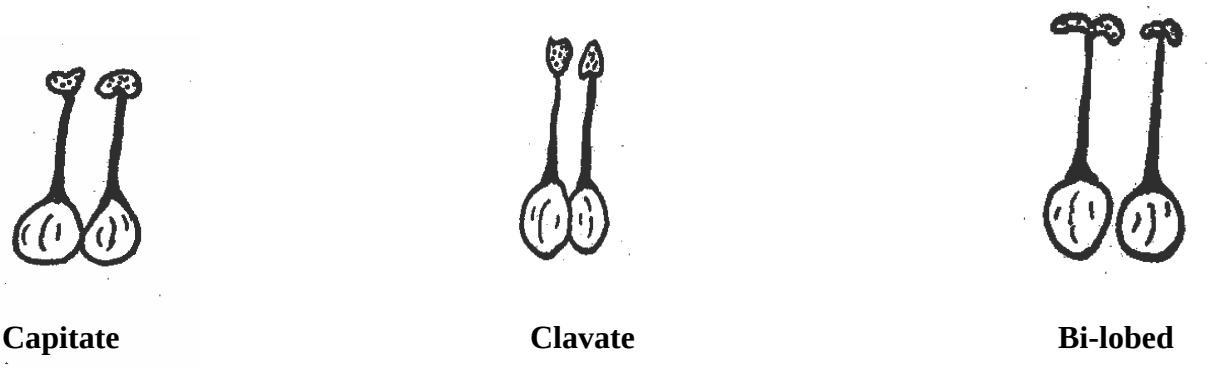
Figure 12: Stigma Shape



Capitate **Clavate** **Bi-lobed**

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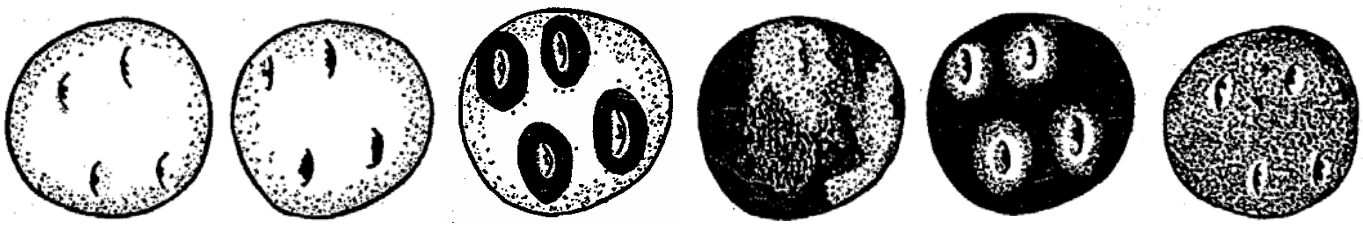
Figure 13: Distribution of Secondary Skin Tuber Color



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.

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Application for Plant Variety Protection Certificate

Exhibit D: Additional Description Information
Variety: Mountain Gem Russet
Owner: Idaho Agricultural Experiment Station

In direct comparison with Russet Burbank, Mountain Gem Russet tubers have higher protein content (5.8% protein for Mountain Gem Russet vs. 4.7% protein for Russet Burbank averaged over 2 years) Table 1. Mean protein content for individual years were 5.83% for Mountain Gem Russet and 4.57% for Russet Burbank in 2012 (p=0.05) and 5.85% for Mountain Gem Russet and 4.90% for Russet Burbank in 2014 (p=0.05).

Mountain Gem Russet tubers have higher Vitamin C content (26.1mg/100g Fresh Weight Basis (FWB) vs. 18.9mg/100g FWB for Russet Burbank averaged over 2 years) Table 2. Mean total Vitamin C contents for individual years were 24.65 mg/100g FWB for Mountain Gem Russet and 18.82 mg/100g FWB for Russet Burbank in 2012, (p=0.05) and 27.58 mg/100g FWB for Mountain Gem Russet and 19.03 mg/100g FWB for Russet Burbank in 2014 (p=0.05).

Mountain Gem Russet tubers produced lighter French fry color when stored for 3 months at 40° F (3.20) and 45° F (0.8) than Russet Burbank tubers stored at 40° F (3.80) and 45° F (1.0). Mountain Gem Russet also had lower percentage of sugar ends (17%) than Russet Burbank (52%). Using data collected from six trials grown at Aberdeen and Kimberly, Idaho in 2012-2014 Table 3.

Protocols are attached. Statistical analysis was performed using the GLM procedure within SAS.

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Table 1. Mountain Gem Russet and Russet Burbank Comparisons for Percent Protein using the GLM Procedure for Potatoes grown at Aberdeen, Idaho in 2012 and 2014.

Anova		2012 Percent Protein		2014 Percent Protein	
Source	DF	F Value	PR > F	F Value	PR > F
Variety	1	10.69	0.0137	24.54	0.0004
Replication	7	0.26	0.9515	1.04	0.4132

Variety		2012 Protein (%)	2014 Protein (%)
Mountain Gem Russet	**Mean**	**5.83**	**5.85**
	Minimum	4.28	5.49
	Maximum	6.76	6.61
	Stdev	0.78	0.36
Russet Burbank	**Mean**	**4.57**	**4.90**
	Minimum	3.86	4.42
	Maximum	5.13	5.43
	Stdev	0.38	0.41
LSD =0.05		0.912	0.419

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Table 2. Mountain Gem Russet and Russet Burbank Comparisons for Vitamin C content using the GLM Procedure for Potatoes grown at Aberdeen, Idaho in 2012 and 2014.

Anova		2012 Vitamin C (mg/g FWB)		2014 Vitamin C (mg/g FWB)	
Source	DF	F Value	PR > F	F Value	PR > F
Variety	1	55.88	0.0001	21.45	0.0007
Replication	7	4.26	0.0375	0.16	0.9223

Variety		2012 Vitamin C (mg/g FWB)	2014 Vitamin C (mg/g FWB)
Mountain Gem Russet	**Mean**	**24.65**	**27.58**
	Minimum	20.26	22.56
	Maximum	27.47	32.06
	Stdev	2.65	3.61
Russet Burbank	**Mean**	**18.82**	**19.03**
	Minimum	15.83	14.28
	Maximum	22.70	21.95
	Stdev	2.41	3.06
LSD =0.05		1.84	4.06

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Table 3. Mountain Gem Russet and Russet Burbank Comparisons for French fry color stored at 40 or 45°F and percent sugar end using the GLM Procedure for Potatoes grown at Aberdeen and Kimberly, Idaho in 2012-2014.

Anova		Fry Color 40°F		Fry Color 45°F		Sugar Ends	
Source	DF	F Value	PR > F	F Value	PR > F	F Value	PR > F
Variety	1	6.04	0.0010	7.11	0.0003	11.49	<0.0001
Replication	23	3.45	<0.0001	2.35	0.0034	2.75	0.0006

Variety		Fry Color 40°F (USDA 00-4.0)	Fry Color 45°F (USDA 00-4.0)	Sugar Ends (%)
Mountain Gem Russet	**Mean**	**3.20**	**0.84**	**16.7**
	Minimum	0.83	0.30	0.00
	Maximum	4.00	2.00	66.7
	Stdev	0.97	0.40	19.7
Russet Burbank	**Mean**	**3.81**	**0.99**	**51.7**
	Minimum	1.67	0.50	0
	Maximum	4.00	1.67	100
	Stdev	0.54	0.41	29.1
LSD =0.05		0.3505	0.1813	12.79

USDA color chart {00-4.0 (darkest)}. Samples stored at 40 or 45° F for approximately 3 months. Sugar end determined when end of fry is >1.0 darker than remaining fry.

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Protocols used for comparisons between Mountain Gem Russet and Russet Burbank.

Protocol used for chemical composition

Tubers were harvested from trials in late September (~140-145 DAP). A five tuber sample from 4 replications was freeze dried and ground to use in assays. Standard Operating Procedures are attached for Protein and Vitamin C.

Protocol used for fry color and sugar ends

After harvest samples were taken from 4 replications, and slowly cooled to 40°F or 45°F where they were stored for approximately 3 months. Fry color was determined when a three tuber sample was cut into 3/8" strips and fried at 375°F for 3.5 minutes and compared to the USDA color chart (00-4.0, 4.0 darkest).

The presence or absence of sugar end was recorded for each strip. A strip was considered to have a sugar end if a predominant color of number 3 or darker, when compared with the USDA Color Chart for French Fried Potatoes, was seen on any 2 sides extending ½ inch or more from the end of the fried strip.

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PROTEIN
Standard Operating Procedure

Title: Determination of Protein Content of Freeze-dried Tuber Powder
Coomassie Blue Protein Assay.

Reagents:

1. Dye Reagent: Dissolve 100mg Coomassie Blue G-250 (Sigma) in 50ml of 95% Methanol; Add several hundred ml Ultra Purified Water (UPH_2O) , mix, slowly add 100ml of 85% Phosphoric Acid, bring to 1 liter final volume with UPH_2O. Protect from light. Discard after 2 weeks.
2. 0.5 N Sodium Hydroxide: Disolve 20g NaOH in about 500ml UPH_2O, cool, make up to 1 liter.
3. Protein standard (100ug/ml): Make up solution of Bovine Gamma Globulin (BGG) 5 mg/50ml 0.5N NaOH. BGG dissolves best in 1N NaOH, therefore, Dissolve 5mg BGG in 25 ml 1N NaOH then add 25ml UPH_2O. Should be made up fresh daily.

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Procedure:

1. Weigh sample of about 15mg of freeze dried and ground tuber tissue into a test tube. Record exact weight. Duplicate each sample.
2. Add 5ml of 0.5N NaOH, gently mix (with vortex) with minimum foaming.
3. Let stand at room temperature for 2.5 hours.
4. Transfer a 0.2ml aliquote of the sample extract into a clean test tube and add 0.8ml of 0.5N NaOH.
5. Add 5ml dye reagent, mix well, read absorbance at 595nm after 5 minutes but within ½ hour of dye addition.
6. For standards add 0.1, 0.2, 0.3, 0.4 and 0.5ml to test tubes, bring to 1 ml volume with 0.5N NaOH, add 5ml of dye reagent, mix and read absorbance after 5 minutes but within ½ hr of dye addition.
7. Blank 1 ml 0.5N NaOH and 5ml dye reagent.

Calculations:

1. Determine average μg protein per OD unit from standards.
2. Unknown OD x μg protein/OD unit = μg protein in unknown per 0.2 aliquot.
3. μg protein per 0.2 ml aliquot x 5ml total extract volume – total μg
4. Total microgram protein υ mg tissue extracted =μg /mg (or mg/g)

-- or total microgram protein $\sum$ μg tissue extracted x 100 - % protein

--actual protein* = $\frac{\text{coomassie blue protein estimate using BGG (mg/G)} - 5.6}{0.86}$

*Actual protein determined from microkjeldahl anaysis of 80% ethanol extracted freeze dried powder compared with coomassie blue estimate using BGG standard (linear regression analysis 1989).

Reference: Bradford N.M. (1975) A rapid and sensitive method for the quantitation of microgram quantities of protein using the principle of protein dye binding. Anal. Biochem. 73:248-254

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VITAMIN C
Standard Operating Procedure

Title: Determination of Vitamin C Content of Freeze-dried Tuber Powder
Total Ascorbic Acid Microfluorometric Method.

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Reagents:

1. Extracting solution: Dissolve with shaking 15g. Meta-phosphoric Acid in 200ml Ultra Purified H_2O (UPH_2O) and 40ml. Glacial Acetic Acid; dilute to 500ml and filter rapidly through fluted paper into glass bottle with stopper; store in refrigerator – good for 1 week.
2. O-Phenylenediamine Solution: For each 100ml solution, weigh 20 mg O-Phenylenedine-2HCL; Dilute to volume with UPH_2O immediately before use.
3. Sodium Acetate Solution: Dissolve 500g Sodium Acetate Tri-hydrate in UPH_2O and dilute to 1 liter.
4. Boric Acid – Sodium Acetate Solution: Dissolve 3g boric acid in 100ml. Sodium Acetate Solution; Prepare fresh for each assay.
5. Activated Charcoal

Procedure:

1. Preparation of Standard Curve: Dissolve 10mg L-Ascorbic Acid in 100ml extraction solution; dilute 10ml, 20ml, and 30ml aliquots to 100ml with extracting solution. Proceed with these standard solutions in the ascorbic acid determination. Final concentrations of standard solutions are 10μg /ml, 20μg /ml and 30μg /ml.
2. Sample Preparation: Use 1.5 grams freeze dried material per 50ml extracting solution (25g fresh tuber tissue per 150ml) Place in 125 ml flask; allow to sit at least 5 minutes; filter through a Whatman #4 filter paper folded and placed in a funnel. Proceed with ascorbic acid determination.
3. Weigh 50 grams Acid-washed Norit (Charcoal) into 50ml flasks. Pour 25ml extract into Norit, shake vigorously and pour through clean Whatman #4 filter paper, discarding first few ml.
4. Transfer 5ml of this filtrate to a 100ml volumetric flask containing 5ml boric acid-sodium acetate solution. Let stand 15 minutes swirling occasionally. This is the blank determination since the H3BO3-dehydroascorbate complex will not produce a fluorophor with phenylenediamine. After 15 minutes dilute to volume with UPH_2O.
5. During the 15 minute period during which the blank is sitting, transfer a second 5ml of filtrate to a 100ml volumetric containing 5ml sodium acetate solution and 75ml of UPH_2O, dilute to volume with UPH_2O.
6. Transfer 2ml of each solution to a test tube. Add 5ml O-Phenylenediamine solution to each tube; mix well; let stand 35 minutes at room temp protected from the light (i.e. in closed cabinet).
7. Measure fluorescence of each tub at 1X setting in a Turner fluorometer primary filter 7-60 secondary filter 2A. Net fluorescence in the difference between the borate treated and non-treated extract. Unknown samples are determined by comparison with known reading as defined by the standard curve.

Reference: AOAC Handbook 12th Edition 43.056**3.**

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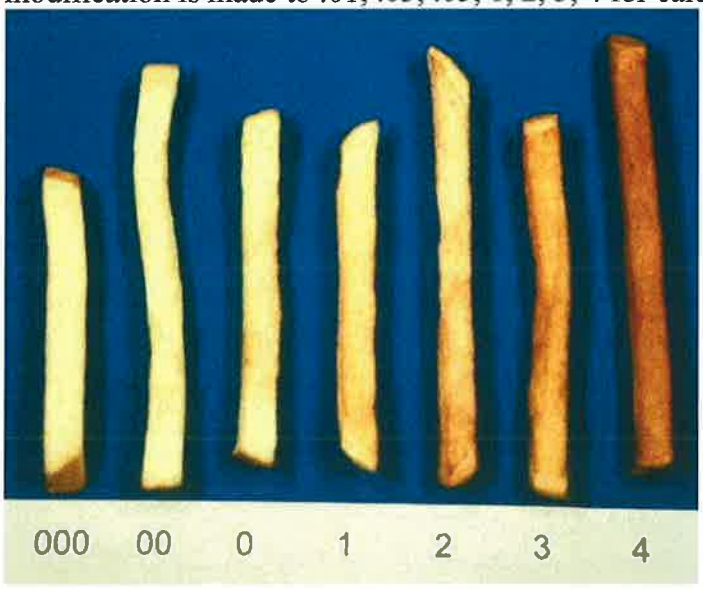
Protocol for frying russet variety potatoes at the University of Idaho

After harvest, potatoes are graded sized and weighed. A three-tuber sample is used for two temperature regimes. Tubers are gradually cooled to approximately 45-50° F during a 4-6 week period. The samples are then moved to 40° or 45° storage unit, where they remained for 6 weeks.

Tubers are cut stem to bud end using a Shaver Specialty Co Cutter (20608 Earl Street Torrance, CA 90503. Phone (310) 370-6941). Four 3/8" fry strips are cut from the center of each of three tubers. Oil temperature is 375° F and fry time is 3.5 minutes. A creamy liquid frying shortening made from soybean oil is used in frying. (Purchased from the local grocery/bakery). Frying is done in a Hobart commercial fryer.

The presence or absence of sugar end was recorded for each strip. A strip was considered to have a sugar end if a predominant color of number 3 or darker, when compared with the USDA Color Chart for French Fried Potatoes, was seen on any 2 sides extending ½ inch or more from the end of the fried strip.

Color is rated visually using the USDA fry color chart with a scale of 000-4. A scale modification is made to .01, .03, .05, 1, 2, 3, 4 for calculating averages.



.01 .03 .05

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U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

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)*.

1. NAME OF APPLICANT(S)	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME
University of Idaho	A03158-2TE	Mountain Gem Russet

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP, and Country)*	5. TELEPHONE *(Include area code)*	6. FAX *(Include area code)*
Office of Technology Transfer Morrill Hall 414 PO Box 44003 Moscow, Idaho 83844-3003	208-885-4550	208-885-4551

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

EXHIBIT F
DECLARATION REGARDING DEPOSIT

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NAME OF OWNER (S)	ADDRESS *(Street and No. or RD No., City, State, and Zip Code and Country)*	TEMPORARY OR EXPERIMENTAL DESIGNATION
University of Idaho	Morrill Hall 414 PO Box 443003 Moscow, ID 83844-3003	A03158-2TE
		VARIETY NAME Mountain Gem Russet
NAME OF OWNER REPRESENTATIVE (S)	ADDRESS *(Street and No. or RD No., City, State, and Zip Code and Country)*	FOR OFFICIAL USE ONLY
Karen Stevenson Jeffrey C. Stark	Morrill Hall 414 PO Box 443003 Moscow, ID 83844-3003	PVPO NUMBER

I do hereby declare that during the life of the certificate a viable sample of propagating material of the subject variety will be deposited, and replenished as needed periodically, in a public repository in the United States in accordance with the regulations established by the Plant Variety Protection Office.

Jeffrey C. Stark
Signature

3 Sept. 2015
Date