

No.



201500325

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

University of Idaho

Whereas, THERE HAS BEEN PRESENTED TO THE

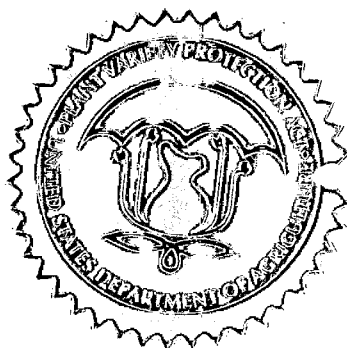
Secretary of Agriculture

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

'Northwest Norkotah 90'



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

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 University of Idaho | | 2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME IDRN 90, NWN 90 | 3. VARIETY NAME Northwest Norkotah 90 |
| 4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country) Office of Technology Transfer Morrill Hall PO Box 443003 Moscow ID 83844 -3003 | | 5. TELEPHONE (include area code) 208-885-4550 | FOR OFFICIAL USE ONLY PVPO NUMBER 201500325 FILING DATE 5/11/15 |
| | | 6. FAX (include area code) 208-885-6127 | |
| 7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) Land Grant University Not for Profit | 8. IF INCORPORATED, GIVE STATE OF INCORPORATION Idaho | 9. DATE OF INCORPORATION 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 | | FILING AND EXAMINATION FEES: \$ 4382.00 5/11/15 DATE CERTIFICATION FEE: \$ DATE |
|--|--|---|

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

| | | |
|--|--|--|
| 14. CROP KIND (Common Name) Potato | 16. FAMILY NAME (Botanical) Solanaceae | 18. DOES THE VARIETY CONTAIN ANY TRANSGENES? (OPTIONAL) <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
|--|--|--|

| | | |
|--|--|---|
| 15. GENUS AND SPECIES NAME OF CROP Solanum tuberosum | 17. IS THE VARIETY A FIRST GENERATION HYBRID? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | 19. 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) <input type="checkbox"/> YES (if "yes", answer items 21 and 22 below) <input checked="" type="checkbox"/> NO (if "no", go to item 23) <input type="checkbox"/> UNDECIDED |
|--|--|---|

| | | |
|---|--|--|
| 19. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse) | | 21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF YES, WHICH CLASSES? <input type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input type="checkbox"/> CERTIFIED |
| a <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety b <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness c <input checked="" type="checkbox"/> Exhibit C. Objective Description of Variety d <input checked="" type="checkbox"/> Exhibit D. Additional Description of the Variety (Optional) e <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Owner's Ownership f <input checked="" type="checkbox"/> Exhibit F. Declaration Regarding Deposit g <input checked="" type="checkbox"/> 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 <input checked="" type="checkbox"/> Filing and Examination Fee (\$4,382), made payable to "Treasurer of the United States" (Mail to the Plant Variety Protection Office) | | 22. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF YES, SPECIFY THE NUMBER 1,2,3, etc. FOR EACH CLASS <input type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input type="checkbox"/> 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? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. (Please use space indicated on reverse.) | 24. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT (PLANT BREEDER'S RIGHT OR PATENT)? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. (Please use space indicated on reverse.) |
|---|--|

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  | |
| NAME (Please print or type) Jeffrey C. Stark | | NAME (Please print or type) Karen A. Stevenson | |
| CAPACITY OR TITLE Research Professor | DATE 7 May 2015 | CAPACITY OR TITLE Licensing Associate | DATE 11 May 2015 |

201500325 Unofficial Copy

Exhibit A Form

201500325

Unofficial Copy

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

In August of 2002, 300 single-hill selections were made by the University of Idaho Plant Breeding Team, combining 100 selections from each of three commercial fields in southeast Idaho planted to standard Russet Norkotah. Selection of each hill was based on late-season vigor, late maturity, and large vine size. An attempt was made to identify clones fitting one of two categories: those with extreme expression of vigor (giant hills) that were obviously later than the surrounding plants; and those with a more subtle expression (intermediate types) of later maturity and larger size in comparison to surrounding plants. All tubers from the selected hills were harvested, bagged, and stored for planting the following year. In addition to the selections, four random plants expressing typical Russet Norkotah vine type were harvested from each of the 3 fields (for a total of 12) and stored to use as check clones.

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

| Year | Detail of Stage | Selection Criteria |
|-----------|---|--|
| 2003 | The 300 selected clones along with the 12 check clones were planted for evaluation at the University of Idaho Aberdeen R & E Center. The trial consisted of two replications of 10 hills each. The plots were planted in units of four hills and were aggressively rouged for PVY. | During the growing season, assessment was made of vine size, vine maturity, and early die symptoms. At season's end, the plots were harvest and tubers weighed and graded to determine yield and value. Of the 300 initial clones, 82 were selected for further evaluation based on greater vine vigor, disease resistance, and yield. |
| 2004 | Tubers of the selected lines were indexed for PVY and a small seed increased of disease free material was established and maintained by USDA/ARS cooperators (specifically Jonathan Whitworth). Using other tubers left over from the 2003 trial, a four replicate (20 hills each) trial of remaining clones was planted at the Aberdeen R & E Center | The process of evaluation describe for 2003 was repeated. Following data assessment, 14 clones were advanced into 2005 evaluations. Of the 14 clones, seven expressed giant hill type while the other seven were more intermediate in expression of vine size and maturity. |
| 2005 | Seed derived from the ARS increases were used to plant a four replicate field trial (24 hills each) in Riverton, Idaho and a single replicate trial near Bliss, Idaho. | Based on the data from the two trials, five clones were identified that expressed a combination of high yield, good tuber appearance, and good resistance to early dying symptoms. Two of the clones, including NWN 90 expressed extreme giant hill type, vigor and lateness, and had higher yield than the check clones. |
| 2006-2011 | Seed of the five clones was increased by several grower cooperators and the clones were evaluated in multiple field trials each year across southern Idaho. | The clones again were evaluated for high yield, tuber quality and appearance, and resistance to early dying. |
| 2012-2014 | Two of the clones, including NWN 90, were selected as having the greatest potential for commercial production and were evaluated in replicated field trials in Rupert, Parma, Kimberly, Aberdeen and Rexburg, Idaho. | Evaluations were conducted on the two clones in comparison with standard Russet Norkotah obtained from seed growers. In addition to yield and quality, a detailed analysis of seasonal vine and tuber growth, vine senescence, disease resistance and biochemical properties of the tubers were performed. |

3a. Is the variety uniform? Yes No
 How did you test for uniformity?
 Northwest Norkotah 90 has been clonally propagated since the first year of selection. The variety has remained uniform during all of the subsequent years of maintenance and propagation.

3b. Is the variety stable? Yes No
 How did you test for stability? Over how many generations?
 Northwest Norkotah 90 has been clonally propagated for 13 years of evaluations. It has shown stability over 13 generations and has not produced any recognizable variants.

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

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

Exhibit B Form

Based on overall morphology, 'Northwest Norkotah 90' is most similar to 'Russet Norkotah'
Applicant's new variety *Most similar comparison variety(ies)*

'Northwest Norkotah 90' most clearly differs from 'Russet Norkotah' 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 'Northwest Norkotah 90' | 1 st Comparison Variety 'Russet Norkotah' | Location of Evidence |
|--|--|---|----------------------------------|
| 1. Qualitative traits: | | | |
| Full Flowering | ~65 Days after planting | ~50 Days after planting | Photographs |
| Inflorescence/plant Florets/inflorescence | Medium (2.86) Medium(9.82) | Few (1.47) Few (6.20) aborts | Exhibit C Table 1 - Exhibit D |
| Plant Height | Medium tall | Short | Table 2a & 2b |
| 2. Color traits: * measured using the Royal Horticultural Society Colour Chart (RHS) | | | |
| tuber skin color* | grayed-orange (RHS 165 B) | grayed-orange (RHS 165 C) | Exhibit C and photographs |
| 3. Quantitative traits: | | | |
| Protein | Medium (5.04%) at Aberdeen, (5.27%) at Rexburg, Idaho | Low (4.59%) at Aberdeen, (5.08%) at Rexburg, Idaho | Table 3 |
| Sucrose Sugars | Med-high (0.144% FWB) at Aberdeen, (0.156% FWB) at Rexburg, Idaho | Medium (0.095% FWB) at Aberdeen, (0.126% FWB) at Rexburg, Idaho | Table 4 - Exhibit D |
| 4. Other: | | | |
| Plant Vigor 0-100%; 0= dead, 100% =lush and vigorously growing | 48% at Aberdeen, 64% at Rexburg, ID (103 days after planting (DAP)) | 13% at Aberdeen, 5% at Rexburg, ID (103 DAP) | Table 5a & 5b |
| Green Vine (g/m ²) | 87 g/m ² at Aberdeen, 134 g/m ² at Rexburg, ID (88/89 DAP) | 17 g/m ² at Aberdeen, 35 g/m ² at Rexburg, ID (88/89 DAP) | Table 6a & 6b – Exhibit D |

FWB= Fresh Weight Basis

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

NORTHWEST NORKOTAH 90

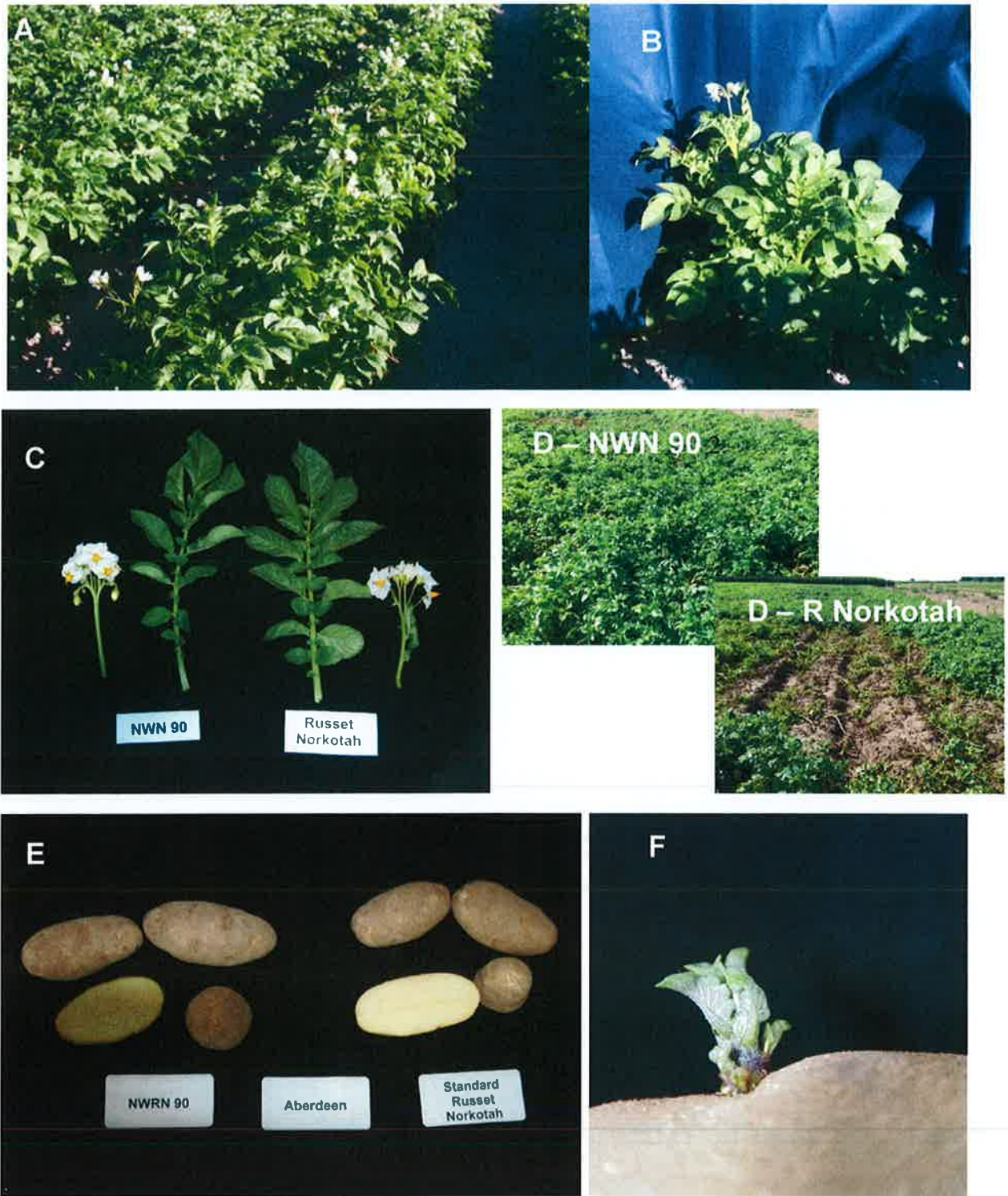


Figure 1. Photographs of NWN 90 showing a) field plants, b) whole plant, c) compound leaf and flower compared to Russet Norkotah, d) vine maturity of NWN 90 and Russet Norkotah on August 15, 2014, e) external tuber appearance and tuber flesh color, and f) light sprout.



Figure 2. Plants in bloom at Aberdeen, Idaho approximately 68 days after planting. Russet Norkotah plants in front and Northwest Norkotah 90 in back.

Northwest Norkotah 90

Russet Norkotah



Plant Senescence August 15, 2014 Kimberly, Idaho



Plant Senescence August 19, 2014 Aberdeen, Idaho



Plant Senescence August 21, 2014 Rexburg, Idaho

Figure 3. Northwest Norkotah 90 (left) plant senescence compared to Russet Norkotah (right) at Kimberly, Aberdeen, and Rexburg, Idaho.

Application for Plant Variety Protection Certificate

Exhibit D: Additional Description Information

Variety: Northwest Norkotah 90

Owner: Idaho Agricultural Experiment Station

Northwest Norkotah 90 (NWN 90) flowers about 65 days after planting (DAP) and Standard Russet Norkotah (RN) flowers earlier at ~ 50 DAP. NWN 90 produces more inflorescence per plant with more florets per inflorescence than Russet Norkotah (Table 1).

At Aberdeen and Rexburg, Idaho data was collected weekly on a 2 plant sample with in each of 4 replications, starting ~75 days after planting. Plant height was measured in cm (Tables 2a and 2b). Plant vigor was determined on a scale of 0-100% (Tables 5a and 5b). The entire plant including vines and tubers were collected and vines were separated into green and lush vines, yellow chlorotic vines, and dead vines. Fresh weight of each vine category and tubers were measured and samples were dried and reweighed. The total amount of green vines grams per meter² were then calculated (Tables 6a and 6b).

In direct comparison with Russet Norkotah, NWN 90 tubers have higher protein content (5.2% protein for Northwest Norkotah 90 vs. 4.8% protein for Russet Norkotah averaged over 2 locations) Table 3. Mean protein content for individual years were 5.04% for NWN 90 and 4.59% for Russet Norkotah at Aberdeen, Idaho (p=0.05) and 5.27% for NWN 90 and 5.08% for RN at Rexburg, Idaho (p=0.05).

Two location average sucrose sugar contents were 0.150% FWB for Norwest Norkotah 90 vs. 0.105% FWB for Russet Norkotah Table 4. Mean total sucrose sugar contents for individual locations were 0.144% FWB for NWN 90 and 0.095% FWB for Russet Norkotah at Aberdeen, (p=0.05) and 0.156% FWB for NWN 90 and 0.126% FWB for RN at Rexburg, Idaho (p=0.05).

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

Protocols used for comparisons between Northwest Norkotah 90 and Russet Norkotah.

Protocol used for Northwest 90 and Russet Norkotah comparisons

Variety Yield trials were conducted using a randomized complete block design of 20' plots using 4 replications. Trials were planted on May 1, 2014 at Aberdeen, Idaho, and April 24 at Kimberly, Idaho, and May 15 at Rexburg, Idaho.

At Aberdeen and Rexburg, Idaho data was collected weekly on a 2 plant sample within each replication, starting ~75 days after planting. Plant height was measured in cm. Plant vigor was determined on a scale of 0-100%. Plants were collected vines were separated into green and lush vines, yellow chlorotic vines, dead vines, and tubers. Fresh weight was measured and samples were dried and reweighed. Green vines grams per meter² were then calculated.

Protocol used for inflorescence and florets

Plants were grown at Aberdeen, Idaho in variety yield trials. Counts were taken on 80 plants in full bloom in early July at about 60 days after planting (DAP). Inflorescence per plant and florets per inflorescence counted.

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 Sucrose.

Statistical analysis was preformed using SAS proc GLM.

Table 1. Northwest Norkotah 90 and Russet Norkotah Comparisons for Inflorescence per plant and Florets per inflorescence using the GLM Procedure for Potatoes grown at Aberdeen, Idaho in 2014.

| Anova | | Inflorescence | | Florets | |
|--------------|----|----------------------|--------|----------------|--------|
| Source | DF | F Value | PR > F | F Value | PR > F |
| Variety | 1 | 20.46 | <.0001 | 21.97 | <.0001 |
| Replication | 72 | 0.53 | 0.9964 | 0.59 | 0.9859 |

| Variety | | Inflorescence | Florets |
|------------------------------|---------|----------------------|----------------|
| Northwest Norkotah 90 | Mean | 2.86 | 9.82 |
| | Minimum | 0 | 0 |
| | Maximum | 8 | 18 |
| | Stdev | 1.847 | 2.621 |
| Russet Norkotah | Mean | 1.47 | 6.20 |
| | Minimum | 0 | 0 |
| | Maximum | 5 | 15 |
| | Stdev | 1.149 | 4.224 |
| LSD =0.05 | | 0.616 | 1.537 |

Counts were collected on 73 plants grown at Aberdeen, Idaho in 2014.

Table 2a. Northwest Norkotah 90 and Russet Norkotah Comparisons for plant height over time using the GLM Procedure for Potatoes grown at Aberdeen, Idaho in 2014.

| Days After Planting Plant Height (cm) | | | | | | | | | | | | | |
|--|----|-------------|--------|-------------|--------|-------------|--------|-------------|--------|-------------|--------|-------------|--------|
| Anova | | 74 | | 83 | | 88 | | 103 | | 111 | | 116 | |
| Source | DF | F Value | PR > F | F Value | PR > F | F Value | PR > F | F Value | PR > F | F Value | PR > F | F Value | PR > F |
| Variety | 1 | 13.4 | 0.035 | 21.9 | 0.019 | 10.2 | 0.049 | 93.7 | 0.002 | 29.9 | 0.012 | 4.62 | 0.120 |
| Rep | 3 | 0.08 | 0.969 | 0.81 | 0.568 | 1.70 | 0.337 | 1.92 | 0.303 | 1.07 | 0.479 | 0.40 | 0.764 |
| Variety | | | | | | | | | | | | | |
| NWN 90 | | | | | | | | | | | | | |
| Mean | | 49.0 | | 65.0 | | 65.3 | | 64.5 | | 41.5 | | 13.7 | |
| Minimum | | 46 | | 50 | | 59 | | 52 | | 25 | | 5 | |
| Maximum | | 54 | | 74 | | 70 | | 72 | | 57 | | 18 | |
| Stdev | | 3.46 | | 10.89 | | 5.19 | | 8.66 | | 13.7 | | 6.13 | |
| Russet Norkotah | | | | | | | | | | | | | |
| Mean | | 35.3 | | 35.0 | | 41.5 | | 20.3 | | 4.5 | | 5.5 | |
| Minimum | | 29 | | 28 | | 30 | | 15 | | 3 | | 4 | |
| Maximum | | 38 | | 41 | | 66 | | 30 | | 6 | | 8 | |
| Stdev | | 4.27 | | 5.48 | | 16.52 | | 6.85 | | 1.29 | | 1.91 | |
| LSD =0.05 | | 11.9 | | 20.4 | | 23.7 | | 14.5 | | 21.5 | | NS | |

Table 2b. Northwest Norkotah 90 and Russet Norkotah Comparisons for plant height over time using the GLM Procedure for Potatoes grown at Rexburg, Idaho in 2014.

| Days After Planting Plant Height (cm) | | | | | | | | | | | | | |
|--|----|-------------|--------|-------------|--------|-------------|--------|-------------|--------|-------------|--------|-------------|--------|
| Anova | | 75 | | 83 | | 89 | | 96 | | 103 | | 110 | |
| Source | DF | F Value | PR > F | F Value | PR > F | F Value | PR > F | F Value | PR > F | F Value | PR > F | F Value | PR > F |
| Variety | 1 | 13.9 | 0.065 | 4.74 | 0.161 | 49.1 | 0.019 | 22.19 | 0.042 | 64.0 | 0.015 | 69.9 | 0.014 |
| Rep | 3 | 0.37 | 0.787 | 0.20 | 0.889 | 0.99 | 0.537 | 0.79 | 0.602 | 1.27 | 0.469 | 1.02 | 0.529 |
| Variety | | | | | | | | | | | | | |
| NWN 90 | | | | | | | | | | | | | |
| Mean | | 64.3 | | 66.3 | | 80.7 | | 74.2 | | 76.3 | | 70.0 | |
| Minimum | | 58 | | 50 | | 71 | | 66 | | 70 | | 65 | |
| Maximum | | 73 | | 82 | | 90 | | 83 | | 82 | | 80 | |
| Stdev | | 6.70 | | 13.94 | | 7.76 | | 7.37 | | 5.68 | | 6.45 | |
| Russet Norkotah | | | | | | | | | | | | | |
| Mean | | 43.3 | | 39.8 | | 43.3 | | 40.4 | | 41.8 | | 33.0 | |
| Minimum | | 39 | | 29 | | 38 | | 30 | | 35 | | 25 | |
| Maximum | | 47 | | 47 | | 48 | | 51 | | 50 | | 40 | |
| Stdev | | 3.50 | | 7.72 | | 4.11 | | 9.06 | | 6.24 | | 6.27 | |
| LSD =0.05 | | 23.39 | | NS | | 22.41 | | 12.53 | | 18.78 | | 18.92 | |

Table 3. Norwest Norkotah 90 and Russet Norkotah Comparisons for Percent Protein using the GLM Procedure for Potatoes grown at Aberdeen, and Rexburg, Idaho in 2014.

| Anova | | Aberdeen Percent Protein | | Rexburg Percent Protein | |
|--------------|----|---------------------------------|---------|--------------------------------|--------|
| Source | DF | F Value | PR > F | F Value | PR > F |
| Variety | 1 | 46.87 | <0.0001 | 8.38 | 0.0146 |
| Replication | 11 | 7.34 | 0.0013 | 5.85 | 0.0034 |

| Variety | | Aberdeen Protein (%) | Rexburg Protein (%) |
|------------------------|---------|-----------------------------|----------------------------|
| Northwest 90 | Mean | 5.04 | 5.27 |
| | Minimum | 4.53 | 4.86 |
| | Maximum | 5.58 | 5.79 |
| | Stdev | 0.31 | 0.20 |
| Russet Norkotah | Mean | 4.59 | 5.08 |
| | Minimum | 4.07 | 4.59 |
| | Maximum | 5.11 | 5.74 |
| | Stdev | 0.26 | 0.32 |
| LSD =0.05 | | 0.146 | 0.141 |

Table 4. Norwest Norkotah 90 and Russet Norkotah Comparisons for Percent Sucrose using the GLM Procedure for Potatoes grown at Aberdeen, and Rexburg, Idaho in 2014.

| Anova | | Aberdeen Percent Sucrose | | Rexburg Percent Sucrose | |
|--------------|----|---------------------------------|--------|--------------------------------|--------|
| Source | DF | F Value | PR > F | F Value | PR > F |
| Variety | 1 | 44.12 | 0.0003 | 6.02 | 0.0439 |
| Replication | 7 | 0.90 | 0.5527 | 0.87 | 0.5685 |

| Variety | | Aberdeen Sucrose (% Fresh weight basis) | Rexburg Sucrose (% Fresh weight basis) |
|------------------------|---------|--|---|
| Northwest 90 | Mean | 0.144 | 0.156 |
| | Minimum | 0.111 | 0.118 |
| | Maximum | 0.162 | 0.227 |
| | Stdev | 0.017 | 0.031 |
| Russet Norkotah | Mean | 0.095 | 0.126 |
| | Minimum | 0.086 | 0.106 |
| | Maximum | 0.117 | 0.145 |
| | Stdev | 0.009 | 0.014 |
| LSD =0.05 | | 0.017 | 0.029 |

Table 5a. Northwest Norkotah 90 and Russet Norkotah Comparisons for plant vigor over time using the GLM Procedure for Potatoes grown at Aberdeen, Idaho in 2014.

| Days After Planting Plant Vigor | | | | | | | | | | | | | |
|--|----|-------------|--------|-------------|--------|-------------|--------|-------------|--------|-------------|--------|-------------|--------|
| (0-100%; 0=dead, 100=lush and vigorously growing) | | | | | | | | | | | | | |
| Anova | | 74 | | 83 | | 88 | | 103 | | 111 | | 116 | |
| Source | DF | F Value | PR > F | F Value | PR > F | F Value | PR > F | F Value | PR > F | F Value | PR > F | F Value | PR > F |
| Variety | 1 | 4.76 | 0.117 | 625.0 | 0.000 | 4.84 | 0.115 | 29.4 | 0.012 | 147.0 | 0.001 | 121.0 | 0.002 |
| Rep | 3 | 0.22 | 0.880 | 9.00 | 0.052 | 0.36 | 0.788 | 0.40 | 0.764 | 1.00 | 0.500 | 1.00 | 0.500 |
| Variety | | | | | | | | | | | | | |
| NWN 90 | | | | | | | | | | | | | |
| Mean | | 97.5 | | 88.8 | | 77.5 | | 47.5 | | 35.0 | | 27.5 | |
| Minimum | | 95 | | 85 | | 70 | | 40 | | 30 | | 20 | |
| Maximum | | 100 | | 90 | | 80 | | 60 | | 40 | | 30 | |
| Stdev | | 2.89 | | 2.50 | | 5.00 | | 9.57 | | 5.77 | | 5.00 | |
| Russet Norkotah | | | | | | | | | | | | | |
| Mean | | 86.3 | | 57.5 | | 50.0 | | 12.5 | | 0.0 | | 0.0 | |
| Minimum | | 80 | | 50 | | 40 | | 10 | | 0 | | 0 | |
| Maximum | | 95 | | 60 | | 80 | | 20 | | 0 | | 0 | |
| Stdev | | 7.50 | | 5.00 | | 20.00 | | 5.00 | | 0.00 | | 0.00 | |
| LSD =0.05 | | NS | | 3.9 | | NS | | 20.5 | | 9.2 | | 7.9 | |

Table 5b. Northwest Norkotah 90 and Russet Norkotah Comparisons for plant vigor over time using the GLM Procedure for Potatoes grown at Rexburg, Idaho in 2014.

| Days After Planting Plant Vigor | | | | | | | | | | | | | |
|--|----|-------------|--------|-------------|--------|-------------|--------|-------------|--------|-------------|--------|-------------|--------|
| (0-100%; 0=dead, 100=lush and vigorously growing) | | | | | | | | | | | | | |
| Anova | | 75 | | 83 | | 89 | | 96 | | 103 | | 110 | |
| Source | DF | F Value | PR > F | F Value | PR > F | F Value | PR > F | F Value | PR > F | F Value | PR > F | F Value | PR > F |
| Variety | 1 | 96.0 | 0.002 | 243.0 | 0.001 | 200.0 | 0.001 | 458.4 | 0.000 | 129.9 | 0.001 | 93.4 | 0.002 |
| Rep | 3 | 1.00 | 0.500 | 1.00 | 0.500 | 1.00 | 0.500 | 1.00 | 0.500 | 0.68 | 0.618 | 1.00 | 0.500 |
| Variety | | | | | | | | | | | | | |
| NWN 90 | | | | | | | | | | | | | |
| Mean | | 80.0 | | 70.0 | | 67.5 | | 56.3 | | 63.7 | | 36.3 | |
| Minimum | | 80 | | 70 | | 60 | | 50 | | 55 | | 25 | |
| Maximum | | 80 | | 70 | | 75 | | 60 | | 70 | | 40 | |
| Stdev | | 0.00 | | 0.00 | | 6.45 | | 4.79 | | 7.50 | | 7.50 | |
| Russet Norkotah | | | | | | | | | | | | | |
| Mean | | 40.0 | | 25.0 | | 17.5 | | 5.0 | | 5.0 | | 0 | |
| Minimum | | 30 | | 20 | | 15 | | 5 | | 0 | | 0 | |
| Maximum | | 50 | | 30 | | 20 | | 5 | | 10 | | 0 | |
| Stdev | | 8.16 | | 5.77 | | 2.89 | | 0.00 | | 5.77 | | 0.00 | |
| LSD =0.05 | | 12.9 | | 9.2 | | 11.3 | | 7.6 | | 16.4 | | 11.9 | |

Table 6a. Northwest Norkotah 90 and Russet Norkotah Comparisons for plant green vine over time using the GLM Procedure for Potatoes grown at Aberdeen, Idaho in 2014.

| Days After Planting Plant Green Vine (g/m²) | | | | | | | | | | | | | |
|---|----|-------------|--------|-------------|--------|-------------|--------|-------------|--------|-------------|--------|-------------|--------|
| Anova | | 74 | | 83 | | 88 | | 103 | | 111 | | 116 | |
| Source | DF | F Value | PR > F | F Value | PR > F | F Value | PR > F | F Value | PR > F | F Value | PR > F | F Value | PR > F |
| Variety | 1 | 19.4 | 0.021 | 17.7 | 0.024 | 106.1 | 0.002 | 20.72 | 0.019 | 12.9 | 0.037 | 1.39 | 0.328 |
| Rep | 3 | 0.42 | 0.754 | 0.35 | 0.796 | 3.06 | 0.191 | 1.04 | 0.487 | 1.00 | 0.500 | 1.00 | 0.500 |
| Variety | | | | | | | | | | | | | |
| NWN 90 | | | | | | | | | | | | | |
| Mean | | 61.5 | | 83.7 | | 86.7 | | 35.4 | | 34.2 | | 10.0 | |
| Minimum | | 51.6 | | 61.1 | | 60.9 | | 16.10 | | 6.2 | | 0 | |
| Maximum | | 73.5 | | 110.5 | | 104.9 | | 51.6 | | 48.3 | | 35.5 | |
| Stdev | | 10.82 | | 22.30 | | 18.50 | | 15.6 | | 19.05 | | 17.13 | |
| Russet Norkotah | | | | | | | | | | | | | |
| Mean | | 30.9 | | 22.5 | | 17.0 | | 0.22 | | 0.0 | | 0.0 | |
| Minimum | | 29.0 | | 15.9 | | 10.1 | | 0.0 | | 0 | | 0 | |
| Maximum | | 37.4 | | 34.0 | | 22.8 | | 0.89 | | 0 | | 0 | |
| Stdev | | 4.44 | | 8.49 | | 5.39 | | 0.44 | | 0.00 | | 0.00 | |
| LSD =0.05 | | 22.1 | | 46.3 | | 21.5 | | 24.6 | | 30.3 | | NS | |

Table 6b. Northwest Norkotah 90 and Russet Norkotah Comparisons for plant green vine over time using the GLM Procedure for Potatoes grown at Rexburg, Idaho in 2014.

| Days After Planting Plant Green Vine (g/m²) | | | | | | | | | | | | | |
|---|----|-------------|--------|--------------|--------|--------------|--------|--------------|--------|--------------|--------|-------------|--------|
| Anova | | 75 | | 83 | | 89 | | 96 | | 103 | | 110 | |
| Source | DF | F Value | PR > F | F Value | PR > F | F Value | PR > F | F Value | PR > F | F Value | PR > F | F Value | PR > F |
| Variety | 1 | 5.15 | 0.108 | 14.13 | 0.033 | 31.48 | 0.011 | 19.73 | 0.021 | 36.73 | 0.009 | 66.28 | 0.004 |
| Rep | 3 | 0.39 | 0.770 | 0.72 | 0.601 | 1.23 | 0.434 | 2.05 | 0.285 | 0.46 | 0.729 | 1.00 | 0.500 |
| Variety | | | | | | | | | | | | | |
| NWN 90 | | | | | | | | | | | | | |
| Mean | | 98.5 | | 221.6 | | 133.6 | | 117.6 | | 100.6 | | 58.2 | |
| Minimum | | 68.9 | | 108.32 | | 92.9 | | 41.9 | | 86.7 | | 47.2 | |
| Maximum | | 128.0 | | 305.3 | | 182.2 | | 163.7 | | 105.1 | | 79.2 | |
| Stdev | | 25.43 | | 88.26 | | 37.03 | | 53.26 | | 15.96 | | 14.30 | |
| Russet Norkotah | | | | | | | | | | | | | |
| Mean | | 61.6 | | 41.9 | | 34.9 | | 16.1 | | 15.5 | | 0.0 | |
| Minimum | | 49.2 | | 29.5 | | 31.9 | | 0 | | 0 | | 0 | |
| Maximum | | 68.9 | | 49.2 | | 37.6 | | 32.4 | | 32.4 | | 0 | |
| Stdev | | 9.43 | | 9.43 | | 3.01 | | 18.61 | | 17.95 | | 0.00 | |
| LSD =0.05 | | NS | | 152.1 | | 56.0 | | 72.7 | | 44.7 | | 22.8 | |

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) | 2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER | 3. VARIETY NAME |
| 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) |
| 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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U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MD 20705

EXHIBIT F
DECLARATION REGARDING DEPOSIT

| | | |
|---|---|--|
| NAME OF OWNER (S) University of Idaho | ADDRESS (Street and No. or RD No., City, State, and Zip Code and Country) Morrill Hall 414 PO Box 443003 Moscow, Idaho 83844-303 | TEMPORARY OR EXPERIMENTAL DESIGNATION IDRN 90, NWN 90 |
| | | VARIETY NAME Northwest Norkotah 90 |
| NAME OF OWNER REPRESENTATIVE (S) Karen Stevenson Jeffrey C. Stark | ADDRESS (Street and No. or RD No., City, State, and Zip Code and Country) Morrill Hall 414 PO Box 443003 Moscow, Idaho 83844-303 | FOR OFFICIAL USE ONLY |
| | | 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.

Signature Jeffrey C. Stark

Date 7 May 2015

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.

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.

201500325

Exhibit

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

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).

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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).

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) | TEMPORARY OR EXPERIMENTAL DESIGNATION | VARIETY NAME |
| ADDRESS (Street and No. or RD No., City, State, Zip Code, and Country) | | FOR OFFICIAL 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) |
|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | | | | |

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 |
|---|----|----|----|----|

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 |
|---|----|----|----|----|

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

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

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

***LIGHT SPROUT BASE: ANTHOCYANIN COLORATION**

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

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

***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 |
|---|----|----|----|----|

*** LIGHT SPROUT TIP: HABIT**

1 = Closed 2 = Intermediate 3 = Open

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

2. LIGHT SPROUT CHARACTERISTICS: (continued)

LIGHT SPROUT TIP: PUBESCENCE

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

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

LIGHT SPROUT TIP ANTHOCYANIN COLORATION

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

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

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

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

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

LIGHT SPROUT ROOT INITIALS: FREQUENCY

1 = Absent 2 = Some 3 = Abundant

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

TYPE:

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

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

MATURITY: Days after planting (DAP) at vine senescence

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

PLANTING DATE:

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

STEM WINGS: (See Figure 3)

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

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

LEAF PUBESCENCE DENSITY:

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

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

LEAF PUBESCENCE LENGTH:

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

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

PETIOLES ANTHOCYANIN COLORATION:

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

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

LEAF STIPULES SIZE: (See Figure 5)

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

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

TERMINAL LEAFLET MARGIN WAVINESS:

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

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

NUMBER OF PRIMARY LEAFLET PAIRS: (See Figure 6)**AVERAGE:**

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

RANGE:

| | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|----|
| V | to | R1 | to | 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 | | R1 | | R2 | | R3 | | R4 | |
|---|--|----|--|----|--|----|--|----|--|

PRIMARY LEAFLET SIZE:

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

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

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

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

RANGE:

| | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|----|
| V | to | R1 | to | R2 | to | R3 | to | R4 | to |
|---|----|----|----|----|----|----|----|----|----|

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5. LEAF CHARACTERISTICS: (continued)

NUMBER OF INFLORESCENCE/PLANT:

AVERAGE:

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

RANGE:

| | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|----|
| V | to | R1 | to | R2 | to | R3 | to | R4 | to |
|---|----|----|----|----|----|----|----|----|----|

NUMBER OF FLORETS/INFLORESCENCE:

AVERAGE:

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

RANGE:

| | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|----|
| V | to | R1 | to | 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 | | R1 | | 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 | | R1 | | 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 | | R1 | | R2 | | R3 | | R4 | |
|---|--|----|--|----|--|----|--|----|--|

COROLLA SHAPE: (See Figure 10)

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

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

6. INFLORESCENCE CHARACTERISTICS:

CALYX ANTHOCYANIN COLORATION:

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

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

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

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

ANTHER SHAPE: (See Figure 11)

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

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

6. INFLORESCENCE CHARACTERISTICS: (continued)

POLLEN PRODUCTION:

1 = None 3 = Some 5 = Abundant

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

STIGMA SHAPE: (See Figure 12)

1 = Capitate 2 = Clavate 3 = Bi-lobed

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

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

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

BERRY PRODUCTION: (Under field conditions)

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

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

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

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

SECONDARY SKIN COLOR:

1 = Absent 2 = Present (please describe)

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

7. TUBER CHARACTERISTICS: (continued)

* TUBER SHAPE: (See Figure 14)

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

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

TUBER THICKNESS:

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

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

TUBER LENGTH (mm):

AVERAGE:

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

RANGE:

| | | | | | | | | | | | | | | |
|---|--|----|----|--|----|----|--|----|----|--|----|----|--|----|
| V | | to | R1 | | to | R2 | | to | R3 | | to | R4 | | to |
|---|--|----|----|--|----|----|--|----|----|--|----|----|--|----|

STANDARD DEVIATION:

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

AVERAGE WEIGHT OF SAMPLE TAKEN:

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

TUBER WIDTH (mm)

AVERAGE:

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

RANGE:

| | | | | | | | | | | | | | | |
|---|--|----|----|--|----|----|--|----|----|--|----|----|--|----|
| V | | to | R1 | | to | R2 | | to | R3 | | to | R4 | | to |
|---|--|----|----|--|----|----|--|----|----|--|----|----|--|----|

STANDARD DEVIATION:

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

AVERAGE WEIGHT OF SAMPLE TAKEN (g):

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

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7. TUBER CHARACTERISTICS: (continued)

TUBER THICKNESS (mm):

AVERAGE:

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

RANGE:

| | | | | | | | | | | | | | | |
|---|--|----|----|--|----|----|--|----|----|--|----|----|--|----|
| V | | to | R1 | | to | R2 | | to | R3 | | to | R4 | | to |
|---|--|----|----|--|----|----|--|----|----|--|----|----|--|----|

STANDARD DEVIATION:

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

AVERAGE WEIGHT OF SAMPLE TAKEN (g):

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

TUBER EYE DEPTH:

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

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

TUBER LATERAL EYES:

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

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

NUMBER EYE/TUBER:

AVERAGE:

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

RANGE:

| | | | | | | | | | | | | | | |
|---|--|----|----|--|----|----|--|----|----|--|----|----|--|----|
| V | | to | R1 | | to | R2 | | to | R3 | | to | R4 | | to |
|---|--|----|----|--|----|----|--|----|----|--|----|----|--|----|

DISTRIBUTION OF TUBER EYES:

1 = Predominantly apical 2 = Evenly distributed

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

PROMINENCE OF TUBER EYEBROWS:

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

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

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

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

SECONDARY TUBER FLESH COLOR:

1 = Absent 2 = Present, please describe: _____

| | | | | | | | | | |
|---|--|----|--|----|--|----|--|----|--|
| V | | R1 | | 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 | | R1 | | 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 Lesions in Number and Size
 4 = Moderately Resistance 5 = Intermedia Susceptible 6 = Moderate Susceptible
 7 = Susceptible 9 = Highly Susceptible

LATE BLIGHT: (Phytophthora)

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

EARLY BLIGHT: (Alternaria)

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

SOFT ROT (Erwinia)

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

COMMON SCAB (Streptomyces)

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

POWDERY SCAB (Spongospora)

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

DRY ROT (Fusarium)

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

POTATO LEAF ROLL VIRUS (PLRV)

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

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8. DISEASES CHARACTERISTICS: (continued)

POTATO VIRUS X (PVX)

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

POTATO VIRUS Y (PVY)

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

POTATO VIRUS M (PVM)

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

POTATO VIRUS A (PVA)

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

GOLDEN NEMATODE (Globodera)

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

ROOT - KNOT NEMATODE (Meloïdogyne)

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

OTHER DISEASE _____

| | | | | | | | | | |
|---|--|----|--|----|--|----|--|----|--|
| V | | R1 | | 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 | | R1 | | R2 | | 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 = Intermedia Susceptible 6 = Moderate Susceptible
 7 = Susceptible 9 = Highly Susceptible

COLORADO POTATO BEETLE (CPB) (*Leptinotarsa*)

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

GREEN PEACH APHID (*Myzus*)

| | | | | | | | | | |
|---|--|----|--|----|--|----|--|----|--|
| V | | R1 | | R2 | | 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 | |
|---|--|

| | |
|----|--|
| R1 | |
|----|--|

| | |
|----|--|
| R2 | |
|----|--|

| | |
|----|--|
| R3 | |
|----|--|

| | |
|----|--|
| R4 | |
|----|--|

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

| | |
|---|--|
| V | |
|---|--|

| | |
|----|--|
| R1 | |
|----|--|

| | |
|----|--|
| 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.

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.

13. FINGER PRINTING MARKERS:

ISOZYMES 1 = YES 2 = NO

IF YES, attach information

14. DNA PROFILE: 1 = YES 2 = NO

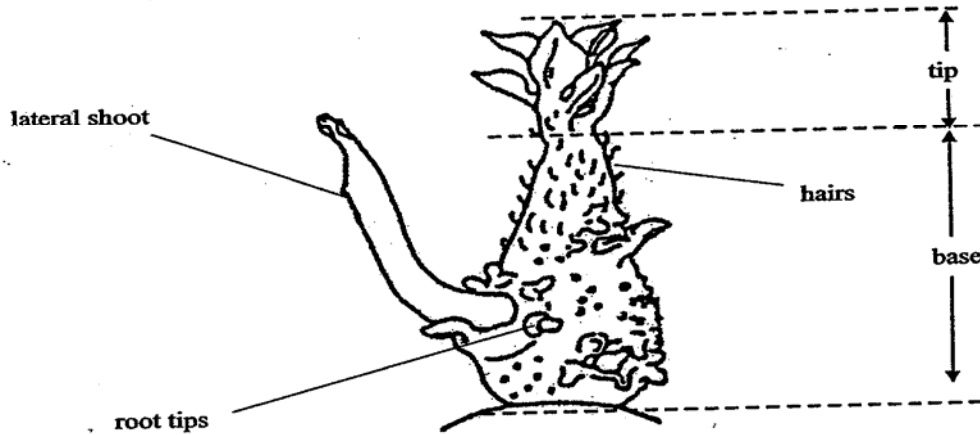
IF YES, attach information

15. ADDITIONAL COMMENTS AND CHARACTERISTICS:

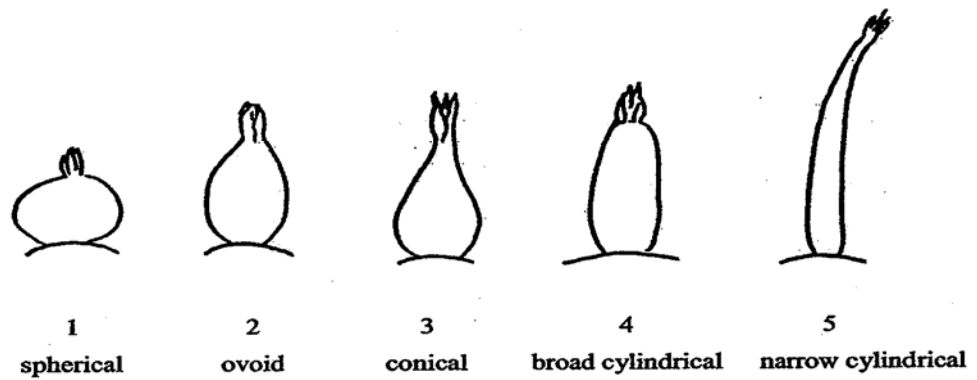
Include any additional descriptors that would be useful in distinguishing the candidate variety.

Figure 1: Light sprout

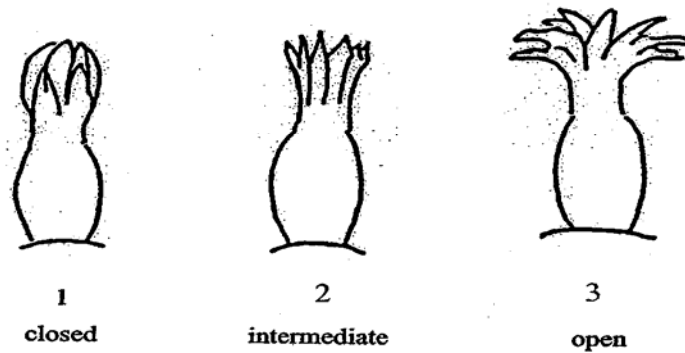
Light sprout dissection



Light sprout shape

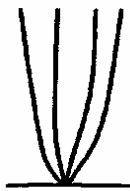


Light sprout tip habit

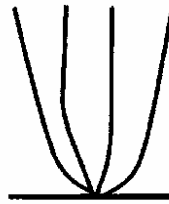


The characteristic should be observed after about 10 weeks to obtain a good differentiation in the collection.

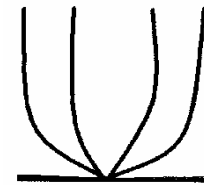
Figure 2: Growth Habit



Erect



Semi Erect



Spreading

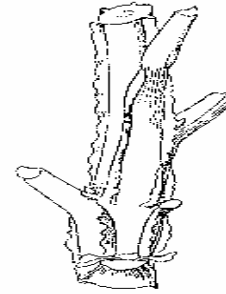
Figure 3: Stem Wings



Weak



Medium

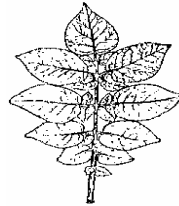


Strong

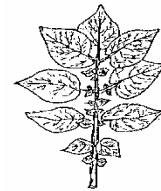
Figure 4: Leaf Silhouette



Closed

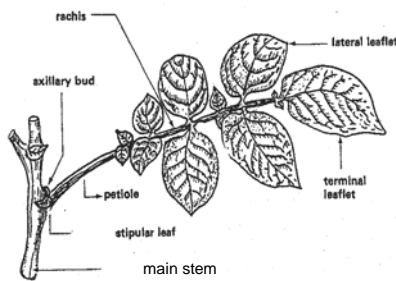


Medium

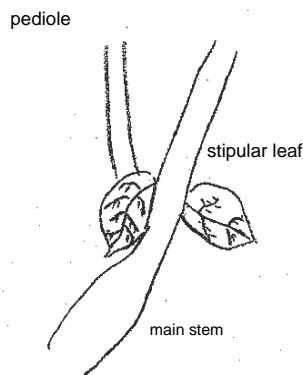


Open

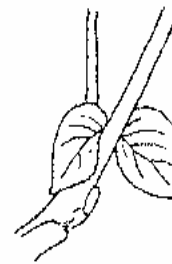
Figure 5: Leaf Stipules



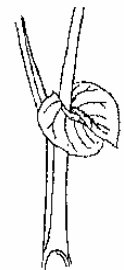
General structures



Small stipular leaf



Medium stipular leaf



Large stipular leaf

Figure 6: Leaf Dissection

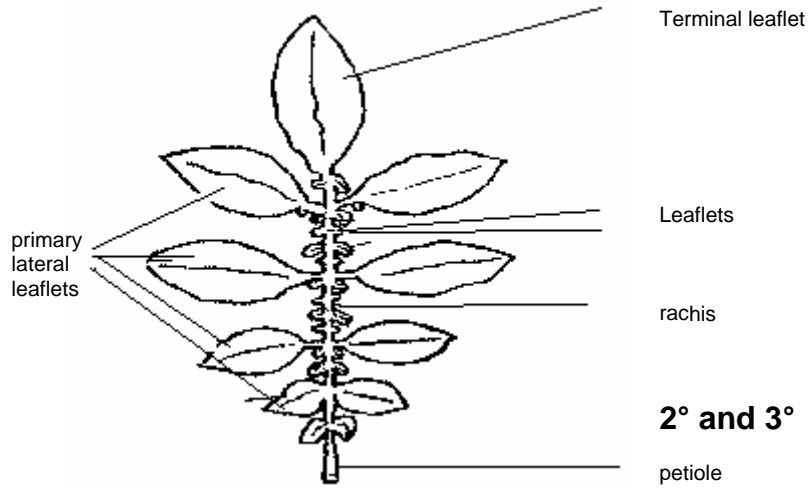


Figure 7: Terminal Leaflet Shape/Primary Leaflet Shape

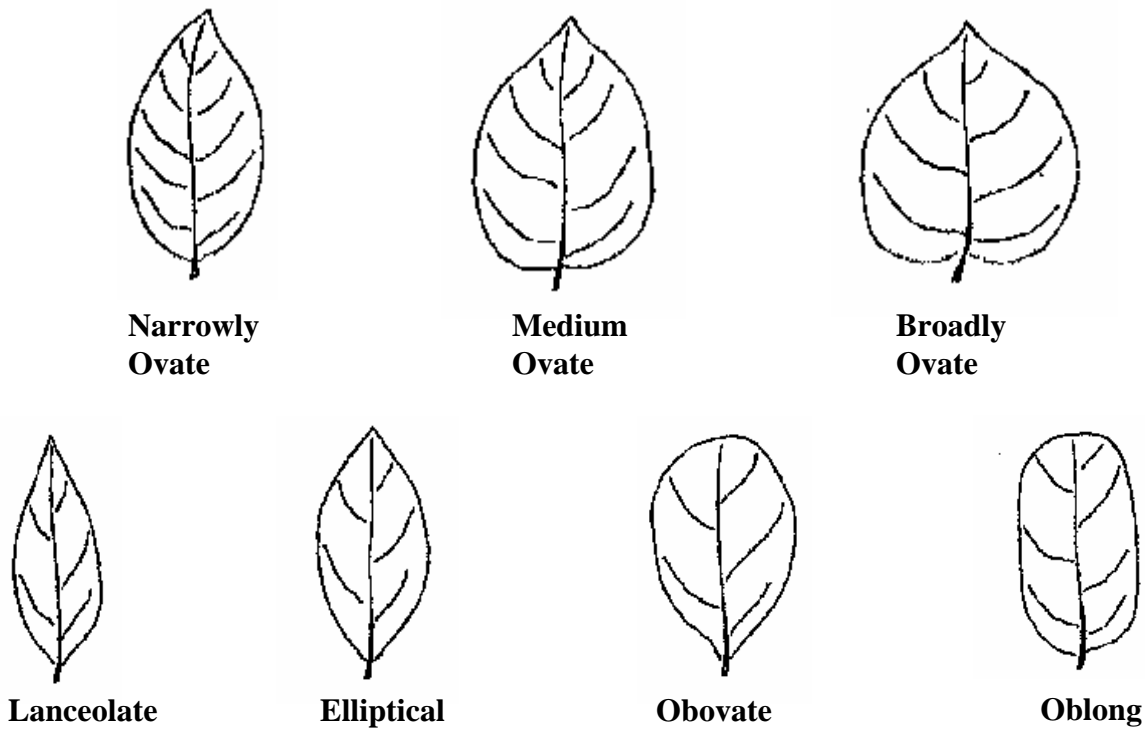


Figure 8: Terminal Leaflet Shape of Tip/Primary Leaflet Shape of Tip

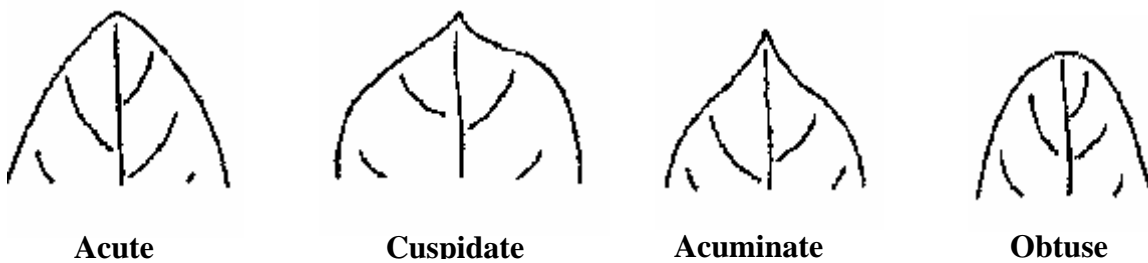


Figure 9: Terminal Leaflet Shape of Base/Primary Leaflet Shape of Base

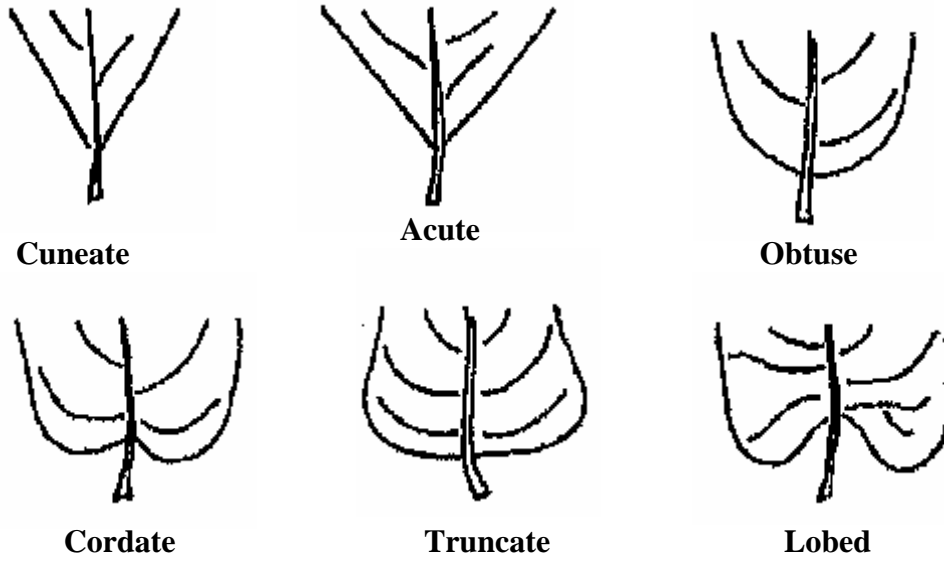


Figure 10: Corolla Shape

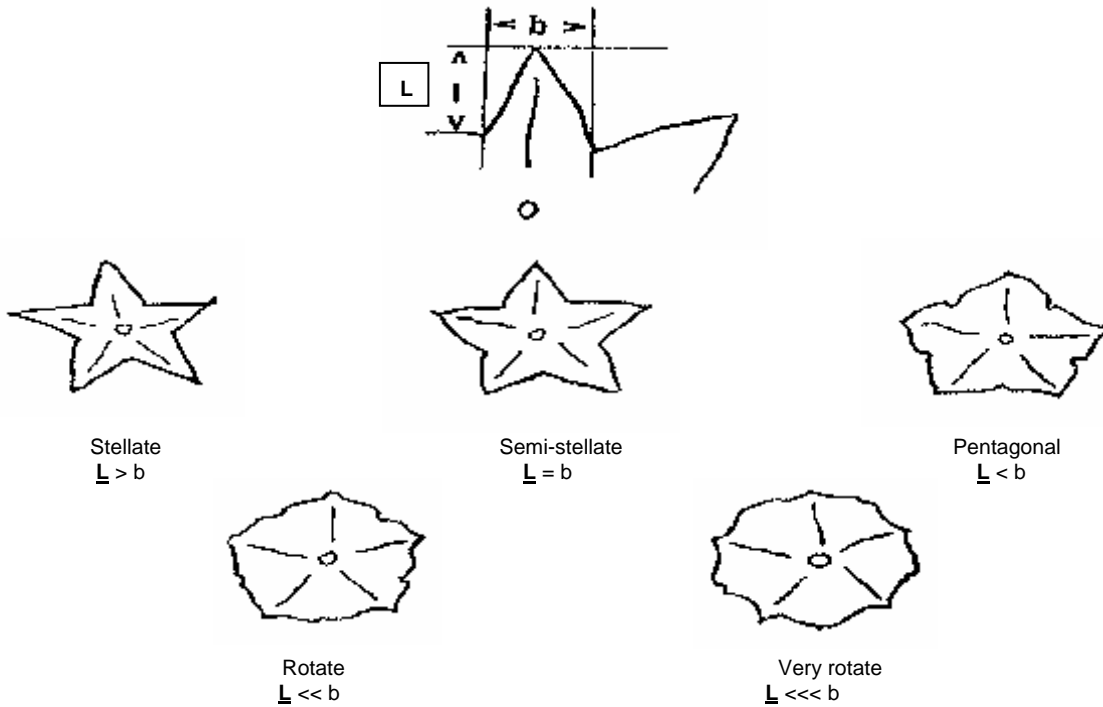


Figure 11: Anther Shape

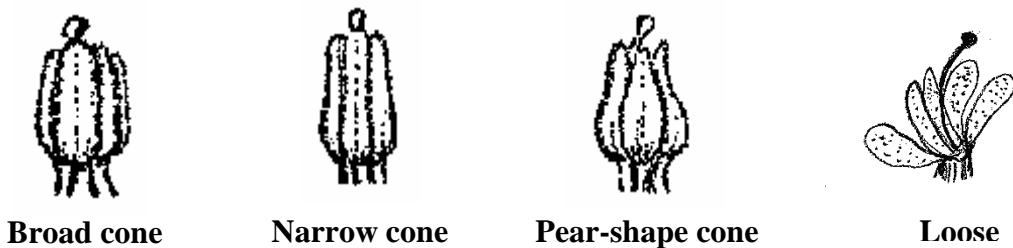


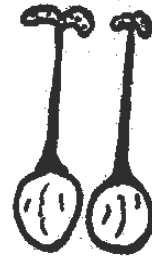
Figure 12: Stigma Shape



Capitate

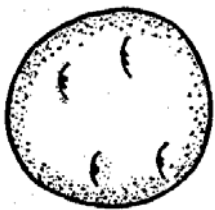


Clavate

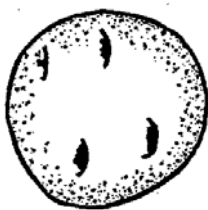


Bi-lobed

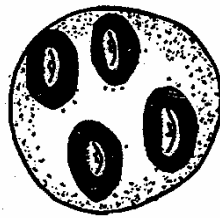
Figure 13: Distribution of Secondary Skin Tuber Color



Eyes



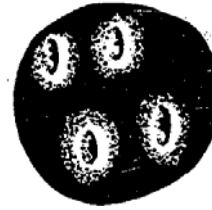
Eyebrows



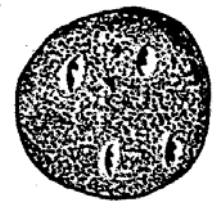
Splashed



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.

(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 14 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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