

No.

201800302



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Cornell University

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

An application requesting a certificate of protection for an alleged novel variety of sexually reproduced, asexually 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 germplasm material 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, for 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


'Lady Liberty'

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 twenty-fourth day of June, in the year two thousand and twenty.*

Attest:


Acting Commissioner
Plant Variety Protection Office
Agricultural Marketing Service


Secretary of Agriculture

<p align="center">U.S. DEPARTMENT OF AGRICULTURE AGRICULTURAL MARKETING SERVICE SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE</p> <p align="center">APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE (Instructions and information collection burden statement on reverse)</p>		<p><i>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.</i></p> <p><i>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).</i></p>	
1. NAME OF OWNER Cornell University		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME 'NY152' and 'H15-5'	3. VARIETY NAME 'Niagara' Lady Liberty
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country) Center for Technology Licensing at Cornell University (CTL) 395 Pine Tree Road, Suite 300 Ithaca, NY 14850		5. TELEPHONE (include area code) 607-254-4698	FOR OFFICIAL USE ONLY PVPO NUMBER
		6. FAX (include area code) 607-254-5454	FILING DATE
7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) Corporation	8. IF INCORPORATED, GIVE STATE OF INCORPORATION NY	9. DATE OF INCORPORATION April 27, 1865	
10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. (First person listed will receive all papers) Tate Tischner LeClairRyan PLLC <u>Pepper Hamilton LLP</u> 70 Linden Oaks, Suite 210 Rochester, NY 14625		11. TELEPHONE (include area code) 585-270-2100	FILING AND EXAMINATION FEES: \$ DATE
		12. FAX (include area code) 585-270-2179	CERTIFICATION FEE: \$ DATE
13. E-MAIL tate.tischner@leclairryan.com; uspatentsroc@leclairryan.com tischnet@pepperlaw.com; patentsroc@pepperlaw.com			
14. CROP KIND (Common Name) Potato	15. GENUS AND SPECIES NAME OF CROP Solanum tuberosum	16. FAMILY NAME (Botanical) Solanaceae	
17. IS THE VARIETY A FIRST GENERATION HYBRID? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	18. DOES THE VARIETY CONTAIN ANY BIOTECHNOLOGY EVENTS? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <small>A biotechnology event is defined as a single insertion of a nucleic acid construct into a specific site in a plant's chromosome that is regulated under the U.S. Coordinated Framework for the Regulation of Biotechnology.</small>	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) <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) a. <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety b. <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness c. <input checked="" type="checkbox"/> Exhibit C. Objective Description of Variety d. <input type="checkbox"/> Exhibit D. Additional Description of the Variety (Optional) e. <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Owner's Ownership f. <input checked="" type="checkbox"/> Filing and Examination Fee (\$4,382). <input checked="" type="checkbox"/> Make checks and money orders payable to "Treasurer of the United States" (Mail to the Plant Variety Protection Office) <input checked="" type="checkbox"/> Credit Card Payments (See instructions on Page 2 of 11)		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	
		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. ___ FOUNDATION ___ REGISTERED ___ CERTIFIED <i>(If additional explanation is necessary, please use the space indicated on next page.)</i>	
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 next page.)	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 next page.)		
25. The owners declare that a viable sample of basic seed will be furnished directly to an acceptable depository in support of the variety within three months of filing. Seed will be replenished upon request in accordance with such regulations as may be applicable. For a tuber propagated variety or vegetative propagated parent of the variety, a tissue culture or vegetative sample will be deposited in a public repository within three months of the date of the certificate fee request letter. These will be maintained for the duration of the certificate.			
The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act. Owner(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.			
SIGNATURE OF OWNER 		SIGNATURE OF OWNER	
NAME (Please print or type) Xiang Li, Ph.D.		NAME (Please print or type)	
CAPACITY OR TITLE Executive Director, CTL	DATE 6/08/2018	CAPACITY OR TITLE	DATE

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

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

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

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

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EXHIBIT A – ORIGIN AND BREEDING HISTORY

** Use additional pages as needed.

1. Name of Owner Cornell University	2. Temporary Designation or Experimental Name 'NY152' and 'H15-5'	3. Variety Name 'Niagara'
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4. Describe the genealogy (back to and including public and commercial varieties, lines, or clones used) and the breeding method(s). **
See attached.

5. Give the details of subsequent stages of selection and multiplication. **

Year	Detail of Stage	Selection Criteria
See attached.		

6. Is the variety uniform? Yes No

How did you test for uniformity?

'Niagara' has been observed in seed multiplication plots for ten generations in one location (Mount Pleasant, near Ithaca, NY) and for seven years in yield trials at Ellis Hollow, NY. 'Niagara' was determined to be uniform from generation to generation with no evidence of variants.

7. Is the variety stable? Yes No

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

'Niagara' has been observed in seed multiplication plots for ten generations in one location (Mount Pleasant, near Ithaca, NY) and for seven years in yield trials at Ellis Hollow, NY. 'Niagara' was determined to be stable from generation to generation with no evidence of variants.

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

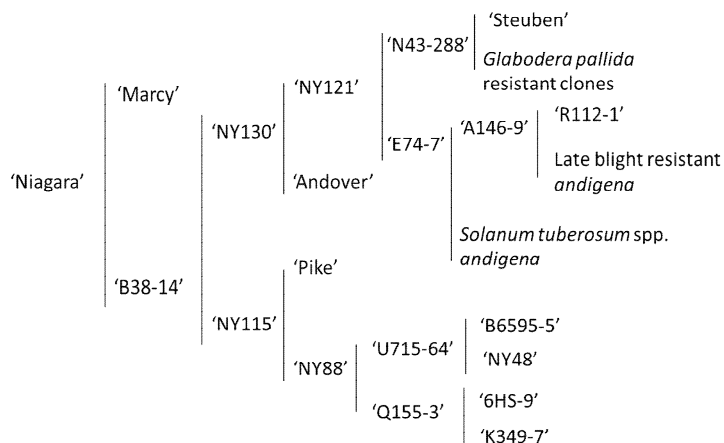
If yes, state how these variants may be identified, their type and frequency.

Exhibit A (continued). Origin and Breeding History for Potato Variety ‘Niagara’.

The potato clone ‘Niagara’, previously evaluated as ‘NY152’ and ‘H15-5’, resulted from a cross made in early 2006 between the chipping clones ‘B38-14’ (female parent) and the cultivar ‘Marcy’ (pollen parent). ‘B38-14’ was selected from a cross made in 2000 between ‘NY130’ and ‘NY115’. Parents of ‘NY130’ were ‘NY121’ and the cultivar ‘Andover’ (cross made in 1994). Parents of ‘NY121’ were ‘N43-288’ and ‘E74-7’ (cross made in 1991). Parents of ‘N43-288’ were ‘Steuben’ and bulked pollen from *Globodera pallida*-resistant breeding clones (cross made in 1989). Parents of ‘E74-7’ were ‘A146-9’ and bulked pollen from *Solanum tuberosum* ssp. *andigena* (cross made in 1981). Parents of ‘A146-9’ were ‘R112-1’ and bulked pollen from late blight resistant *andigena* (cross made in 1977). Parents of ‘NY115’ were ‘Pike’ and ‘NY88’ (cross made in 1990). Parents of ‘NY88’ were ‘U715-64’ and ‘Q155-3’ (cross made in 1983). Parents of ‘U715-64’ were ‘B6595-5’ and ‘NY48’ (cross made in 1973). Parents of ‘Q155-3’ were ‘K349-7’ and ‘6HS-9’ (cross made in 1972).

Seed from the ‘B38-14’ x ‘Marcy’ cross was first sown in 2007. Seedlings were transplanted to styrofoam quadra-packs, then to 6 inch pots and raised in the field on Mount Pleasant, near Ithaca, NY. Four tubers were harvested from each pot and planted as four hill plots in the field in 2008. Selections were made in the field in the fall of 2008 based on visual impressions of appearance and yield. During the winter clones were assayed for fry color out of cold storage and only those yielding light-colored chips were retained. Clones that passed the first round of selection were planted and evaluated as 20 hill plots in 2009. In each successive year evaluation plots increased in size and selection became more intensive, so that progressively fewer and fewer clones were retained. Traits which were evaluated most rigorously were the ability to chip directly from 44°F cold storage, external tuber appearance, freedom from internal and external physical defects, resistance to common scab, specific gravity, maturity, and yield.

‘Niagara’ has been observed in seed multiplication plots for ten generations in one location (Mount Pleasant, near Ithaca, NY), as well as for seven years in yield trials at Ellis Hollow, NY, and was determined to be uniform and stable from generation to generation with no evidence of variants.



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EXHIBIT B – STATEMENT OF DISTINCTNESS

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

1. Name of Owner Cornell University	2. Temporary Designation or Experimental Name 'NY152' and 'H15-5'	3. Variety Name 'Niagara'
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Based on overall morphology, 'Niagara' is most similar to 'Snowden'.
Applicant's new variety *Most similar comparison variety(ies)*
'Niagara' most clearly differs from 'Snowden' in the following traits:
Applicant's new variety *Most similar comparison variety(ies)*

Name the specific trait. Then list the value of that trait for each variety in the comparison. Submit appropriate supporting evidence (see the [Guidelines for Presenting Evidence in Support of Variety Distinctness in the instructions below](#)).

<i>Eg. Leaf Pubescence</i> <i>Eg. Leaf Color</i> <i>Eg. Plant Height</i>	<i>heavy pubescence</i> <i>Dark Green (5GY 3/4)</i> <i>200 cm +/- 10 cm (N=25)</i>	<i>glabrous</i> <i>Light Green (2.5GY 8/10)</i> <i>250 cm +/- 15 cm (N=25)</i>	<i>photograph attached</i> <i>Munsell Color Chart</i> <i>statistics attached</i>
1. Qualitative traits:	Applicant's New Variety _____ 'Niagara'	1 st Comparison Variety _____ 'Snowden'	Location of Evidence Within the Application
2. Color traits:			
Leaf color Anther color	147A RHS 17A	137A RHS 14A	photo attached; Exhibit C photo attached; Exhibit C
3. Quantitative traits:			
Tuber eye depth	3	5	photo attached; Exhibit C
4. Other:			
Resistance to common scab (Streptomyces)	3	7	see attached; Exhibit C

Exhibit B (continued). Statement of Distinctness for Potato Variety ‘Niagara’.

‘Niagara’ is a chipping variety. Because of its excellent chip color from cold storage, we anticipate it will compete most directly with the variety ‘Snowden’. Both ‘Niagara’ and ‘Snowden’ produce round tubers with netted skin, but the eyes of ‘Niagara’ are shallower than the eyes of ‘Snowden’ (photo below). The leaves of ‘Niagara’ are yellow-green in color (RHS color chart value 147A) while the leaves of ‘Snowden’ are green (RHS 137A) (photo below). The anthers of ‘Niagara’ flowers are darker yellow-orange in color (RHS 17A) than the anthers of ‘Snowden’ flowers (RHS 14A) (photo below). ‘Niagara’ has moderate-to-good resistance to common scab, as evaluated over five years in a scab-infested plot in Ellis Hollow, NY, while ‘Snowden’ is susceptible.



The eyes of ‘Niagara’ tubers, on left, are shallower than the eyes of ‘Snowden’ tubers, on right.



Anthers of ‘Niagara’ (left) are deeper yellow-orange in color than anthers of ‘Snowden’ (right)



Leaves of 'Niagara' are yellow-green (left), while leaves of 'Snowden' are green (right)

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 4.25 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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

Exhibit C

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

INSTRUCTIONS

The Objective Description Form:

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

Test Guidelines:

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

Reference Varieties:

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

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

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

Characteristics:

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

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

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

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

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

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

Quality characteristics should be described according to the market use.

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

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

NAME OF APPLICANT (S) Cornell University	TEMPORARY OR EXPERIMENTAL DESIGNATION 'NY152' and 'H15-5'	VARIETY NAME 'Niagara'
ADDRESS (Street and No. or RD No., City, State, Zip Code, and Country) Center for Technology Licensing at Cornell University (CTL) 395 Pine Tree Road, Suite 300 Ithaca, NY 14850		FOR OFFICIAL USE ONLY PVPO NUMBER

1. MARKET CHARACTERISTICS:3 **MARKET CLASS:**

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

2. LIGHT SPROUT CHARACTERISTICS: (See Figure 1)4 **LIGHT SPROUT: GENERAL SHAPE**

1 = Spherical 2 = Ovoid 3 = Conica 4 = Broad cylindrica 5 = Narrow cylindrical 6 = Other _____

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

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

1 **LIGHT SPROUT BASE: ANTHOCYANIN COLORATION**

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

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

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

1 **LIGHT SPROUT TIP: HABIT**

1 = Closed 2 = Intermediate 3 = Open

2 **LIGHT SPROUT TIP: PUBESCENCE**

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

1 **LIGHT SPROUT TIP ANTHOCYANIN COLORATION**

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

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

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

2 **LIGHT SPROUT ROOT INITIALS: FREQUENCY**

1 = Absent 2 = Some 3 = Abundant

3. PLANT CHARACTERISTICS:5 **GROWTH HABIT:** (See Figure 2)

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

2 **TYPE:**

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

____ **MATURITY: Days after planting (DAP) at vine senescence**

PLANTING DATE: _____

3 **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 _____

4 **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).

4. STEM CHARACTERISTICS: Measure at early first bloom

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

1 **STEM ANTHOCYANIN COLORATION:**3 **STEM WINGS:** (See Figure 3)

5. LEAF CHARACTERISTICS:

2 **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 _____

147A **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)

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

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

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

3 **LEAF SILHOUETTE:** (See Figure 4)
 1 = Closed 3 = Medium 5 = Open

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

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

2 **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 _____

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

4 **TERMINAL LEAFLET BASE SHAPE:** (See Figure 9)
 1 = Cuneate 2 = Acute 3 = Obtuse 4 = Cordate 5 = Truncate 6 = Lobed 7 = Other _____

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

NUMBER OF PRIMARY LEAFLET PAIRS: (See Figure 6)

AVERAGE: 3.7

RANGE: 3 to 4

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

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

1 **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 _____

4 **PRIMARY LEAFLET BASE SHAPE:** (See Figures 6 and 9)
 1 = Cuneate 2 = Acute 3 = Obtuse 4 = Cordate 5 = Truncate 6 = Lobed 7 = Other _____

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

AVERAGE: 5.5

RANGE: 2 to 10

NUMBER OF INFLORESCENCE/PLANT:

AVERAGE: _____

RANGE: _____ to _____

NUMBER OF FLORETS/INFLORESCENCE:

AVERAGE: 10.4

RANGE: 7 to 14

5. LEAF CHARACTERISTICS: (continued)

155C **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)

155C **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)

1 **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 _____

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

6. INFLORESCENCE CHARACTERISTICS:

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

17A **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)

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

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

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

152B **STIGMA COLOR CHART VALUE:** Royal Horticulture Society Color Chart or Munsel Color Chart (Circle the appropriate color chart)

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

7. TUBER CHARACTERISTICS:

4 **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 _____

161A **PREDOMINANT SKIN COLOR CHART VALUE:** Royal Horticulture Society Color Chart or Munsell Color Chart (Circle the appropriate color chart)

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

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

SECONDARY SKIN COLOR DISTRIBUTION: (See Figure 13)
 1 = Eyes 2 = Eyebrows 3 = Splashed 4 = Scattered 5 = Spectacled 6 = Stippled 7 = Other _____

3 **SKIN TEXTURE:**
 1 = Smooth 2 = Rough (flaky) 3 = Netled 4 = Russetted 5 = Heavily russetted 6 = Other _____

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

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

TUBER LENGTH (mm):

AVERAGE: 67

RANGE: 55 to 88

11.3 **STANDARD DEVIATION:**

138 **AVERAGE WEIGHT OF SAMPLE TAKEN:**

7. TUBER CHARACTERISTICS: (continued)**TUBER WIDTH (mm)**AVERAGE: 64RANGE: 49 to 75**6.6 STANDARD DEVIATION:****138 AVERAGE WEIGHT OF SAMPLE TAKEN (g):****TUBER THICKNESS (mm):**AVERAGE: 52RANGE: 41 to 64**5.0 STANDARD DEVIATION:****138 AVERAGE WEIGHT OF SAMPLE TAKEN (g):****3 TUBER EYE DEPTH:**

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

3 TUBER LATERAL EYES:

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

NUMBER EYE/TUBER:AVERAGE: 9.8RANGE: 8 to 12**1 DISTRIBUTION OF TUBER EYES:**

1 = Predominantly apical 2 = Evenly distributed

2 PROMINENCE OF TUBER EYEBROWS:

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

1 PREDOMINANT TUBER FLESH COLOR1 = 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 _____**158A PRIMARY TUBER FLESH COLOR CHART VALUE:** Royal Horticulture Society Color Chart or Munsell Color Chart (Circle the appropriate color chart)**1 SECONDARY TUBER FLESH COLOR:**

1 = Absent 2 = Present, please describe: _____

____ **SECONDARY TUBER FLESH COLOR CHART VALUE:** Royal Horticulture Society Color Chart or Munsell Color Chart (Circle the appropriate color chart)**NUMBER OF TUBERS/PLANT:**

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

8. DISEASES CHARACTERISTICS:____ **DISEASES REACTION:** 0 = Not Tested 1 = Highly Resistant 2 = Resistant Few Symptoms 3 = Resistance Few Lesions in Number and S
4 = Moderately Resistance 5 = Intermedia Susceptible 6 = Moderate Susceptible 7 = Susceptible 9 = Highly Susceptible0 **LATE BLIGHT: (Phytophthora)**0 **EARLY BLIGHT: (Alternaria)**0 **SOFT ROT (Erwinia)**3 **COMMON SCAB (Streptomyces)**0 **POWDERY SCAB (Spongospora)**0 **DRY ROT (Fusarium)**0 **POTATO LEAF ROLL VIRUS (PLRV)**0 **POTATO VIRUS X (PVX)**0 **POTATO VIRUS Y (PVY)**

8. DISEASES CHARACTERISTICS: (continued)

0 POTATO VIRUS M (PVM)

0 POTATO VIRUS A (PVA)

7 GOLDEN NEMATODE (*Globodera*)

0 ROOT – KNOT NEMATODE (*Meloidogyne*)

OTHER DISEASE _____

4 PHYSIOLOGICAL DISORDER

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

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

0 COLORADO POTATO BEETLE (CPB) (*Leptinotarsa*)

0 GREEN PEACH APHID (*Myzus*)

OTHER: _____

OTHER: _____

10. GENE TRAITS:

2 INSERTION OF GENES: 1 = YES 2 = NO

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

11. QUALITY CHARACTERISTICS:

4 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

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

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:

2 **ISOZYMES** 1 = YES 2 = NO

IF YES, attach information

14. 2 DNA PROFILE: 1 = YES 2 = NO

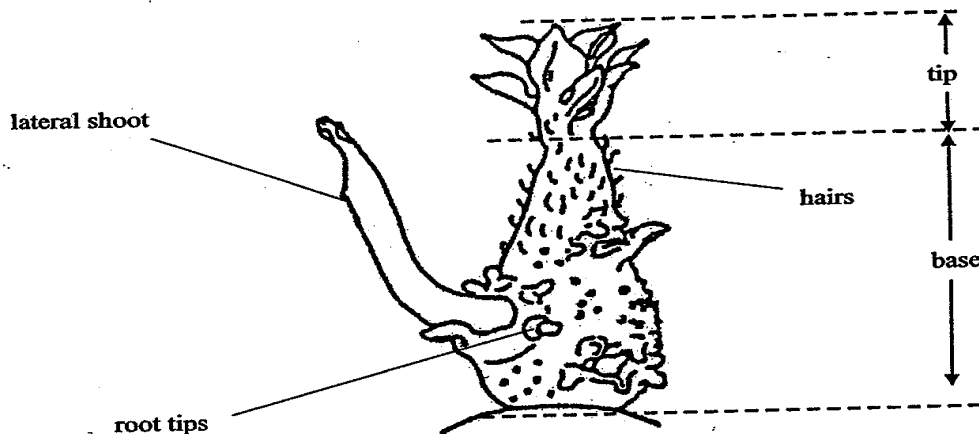
IF YES, attach information

15. ADDITIONAL COMMENTS AND CHARACTERISTICS:

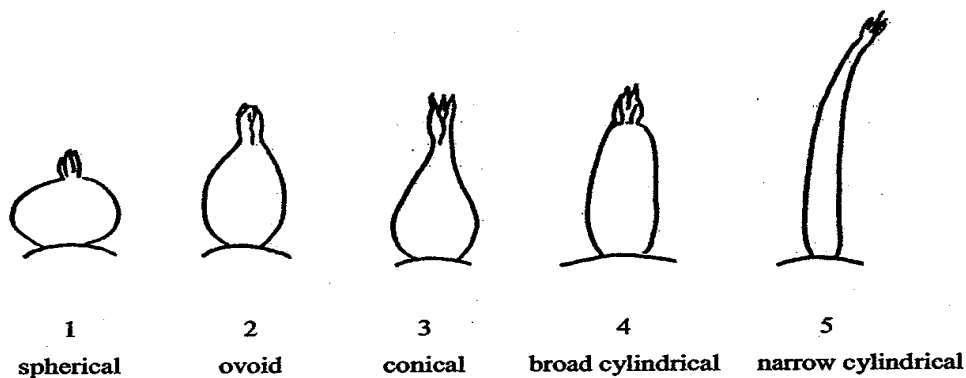
Include any additional descriptors that would be useful in distinguishing the candidate variety.

Figure 1: Light sprout

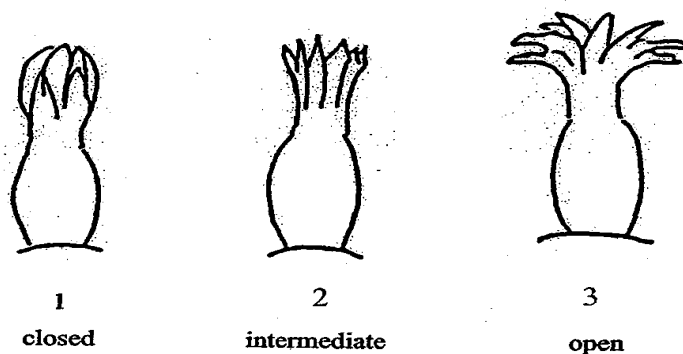
Light sprout dissection



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

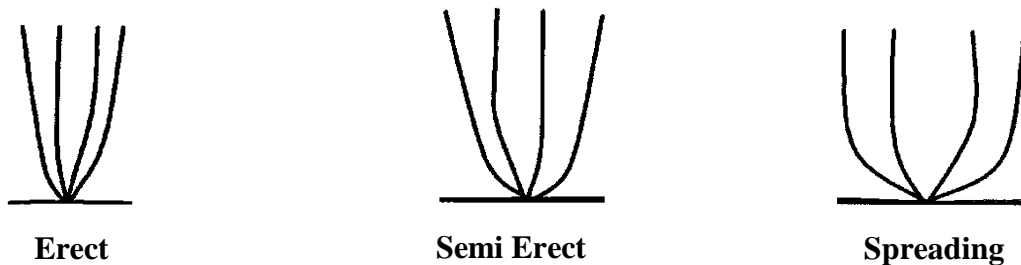


Figure 3: Stem Wings

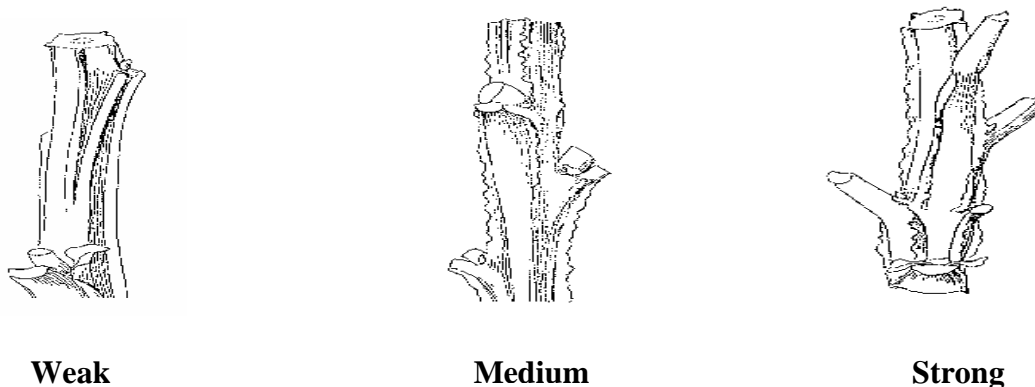


Figure 4: Leaf Silhouette

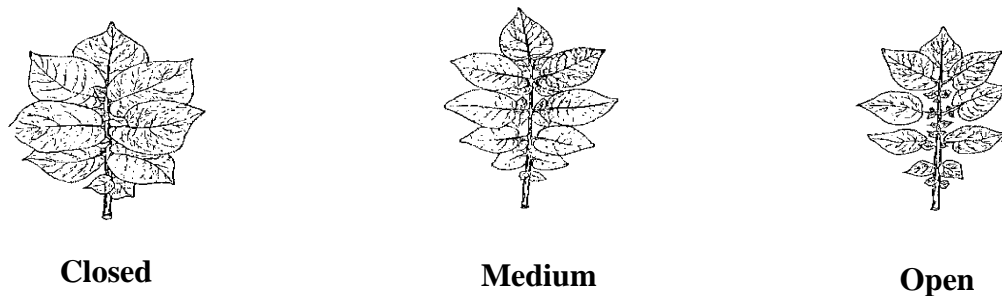


Figure 5: Leaf Stipules

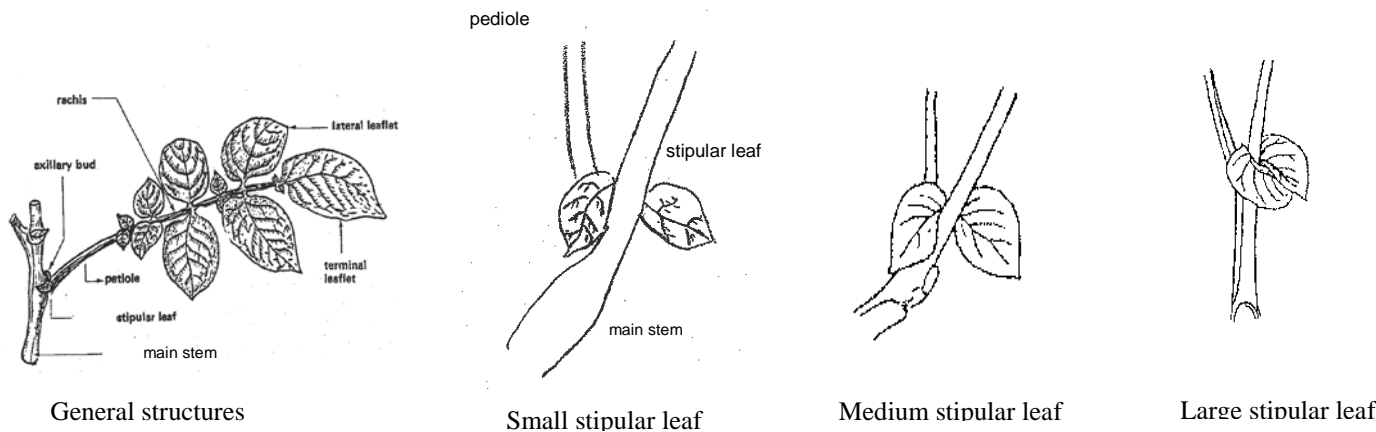


Figure 6: Leaf Dissection

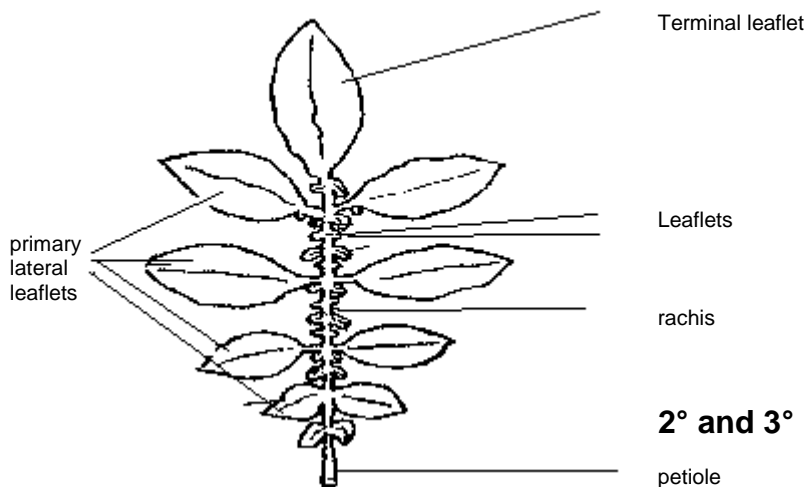


Figure 7: Terminal Leaflet Shape/Primary Leaflet Shape

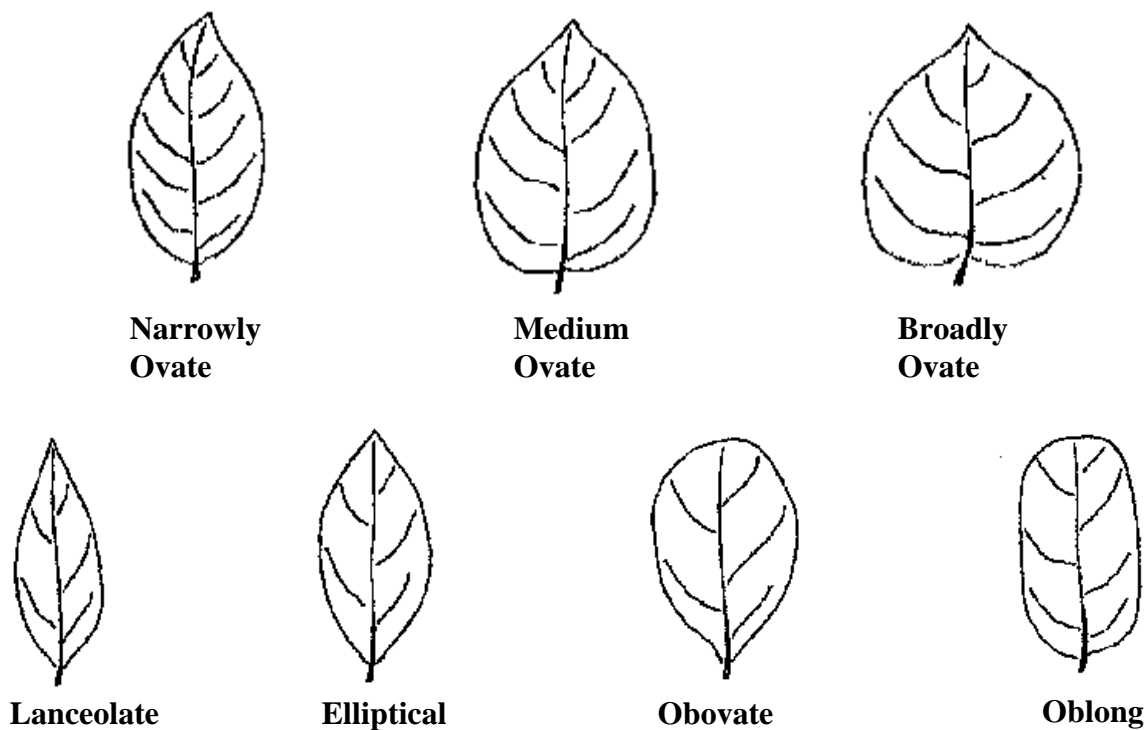


Figure 8: Terminal Leaflet Shape of Tip/Primary Leaflet Shape of Tip

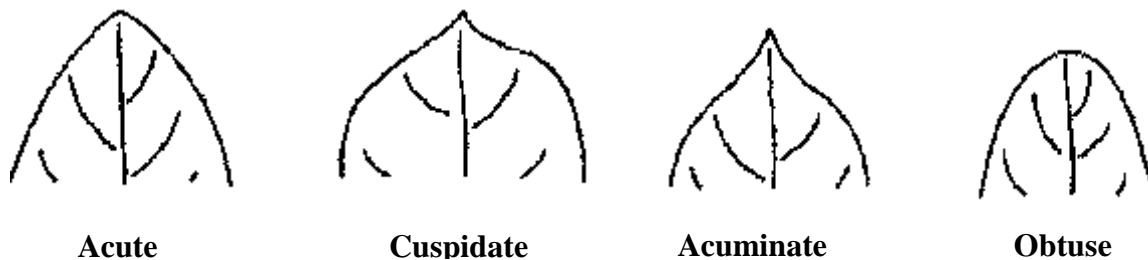


Figure 9: Terminal Leaflet Shape of Base/Primary Leaflet Shape of Base

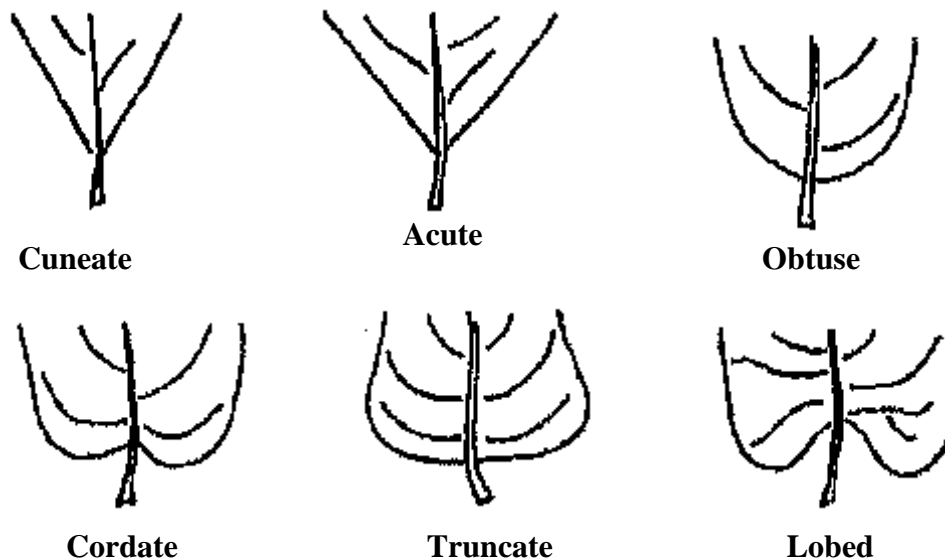


Figure 10: Corolla Shape

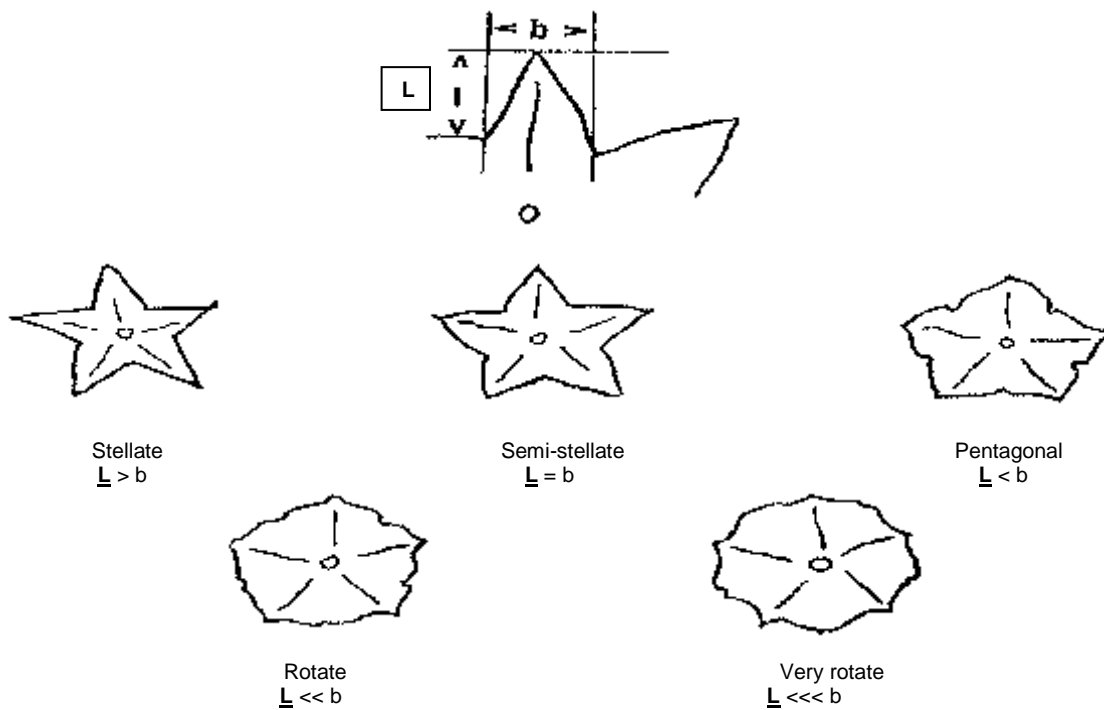


Figure 11: Anther Shape

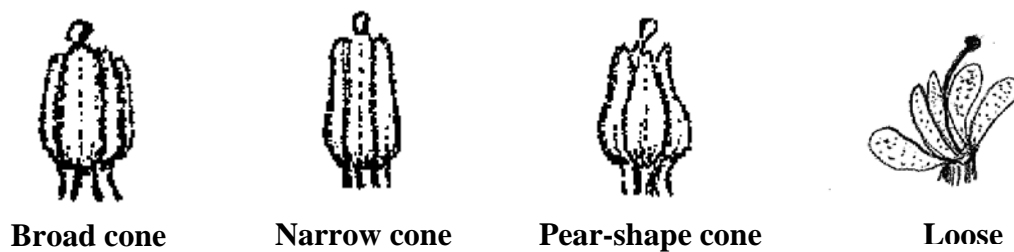
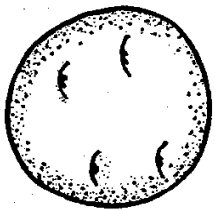
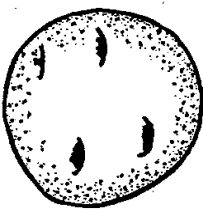
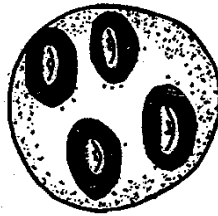
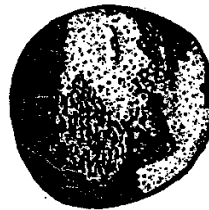
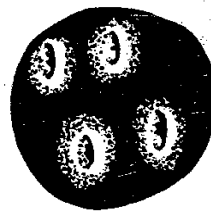
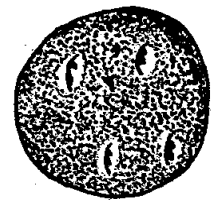


Figure 12: Stigma Shape**Capitate****Clavate****Bi-lobed****Figure 13: Distribution of Secondary Skin Tuber Color****Eyes****Eyebrows****Splashed****Scattered****Spectacled****Stippled****Figure 14: Tuber Shape****Compressed****Round****Oval****Oblong****Long****References:**

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.

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

FOR OFFICIAL USE ONLY

PVPO NUMBER

EXHIBIT E - STATEMENT OF THE BASIS OF OWNERSHIP

1. Name of Owner Cornell University	2. Temporary Designation or Experimental Name 'NY152' and 'H15-5'	3. Variety Name 'Niagara'
4. Does the applicant own all rights to the variety? Mark an "X" in the appropriate block. If no, please explain.		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
5. Is the applicant a U.S. national or a U.S. based entity? If no, give name of country.		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
6. Is the applicant the original owner? <input type="checkbox"/> YES <input checked="" type="checkbox"/> 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)? <input type="checkbox"/> YES <input type="checkbox"/> 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? <input type="checkbox"/> YES <input type="checkbox"/> NO If no, give name of country		
7. Additional explanation on ownership (<i>Trace ownership from original breeder to current owner</i>).		

Pursuant to assignment executed on December 14, 2012, the breeder, Walter De Jong, an employee of Cornell University and citizen of Canada (a member nation of the International Union for the Protection of new Varieties of Plants (UPOV)), assigned all right, title, and interest in and to late-season chipping potato variety 'Niagara' ('NY152' and 'H15-5') to Cornell University, a not-for-profit corporation organized under the laws of the State of New York.

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.

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- 1) mail: U.S. Department of Agriculture Office of the Assistant Secretary for Civil Rights 1400 Independence Avenue, SW Washington, D.C. 20250-9410;
- 2) fax: (202) 690-7442; or
- 3) email: program.intake@usda.gov.

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