

## HIGHLAND RUSSET CHARACTERISTICS

Proposed name: (Highland Russet)  
Experimental designation: A9045-7  
Botanical name: Solanum tuberosum L.  
Intended Market: French fry processing/Fresh Market

### General Description:

Highland Russet (A9045-7) is a product of the cooperative USDA/ARS, University of Idaho breeding program in Aberdeen, Idaho. It resulted from the hybridization of Ranger Russet and Russet Legend (Figure 1) in 1990. Highland Russet subsequently was evaluated for 14 years in public and industry trials throughout the western U.S. The release will be made jointly by the partners of the Northwest (Tri-State) Potato Variety Development Program including the USDA/ARS and the Idaho, Washington, and Oregon state experiment stations.

Highland Russet is a mid to late season variety notable for its high yield of uniform, oblong-long, lightly-russetted tubers. This variety has moderately high specific gravity and resistances to second growth and most internal defects. It does have some susceptibility to growth cracks, which were noted in the Western Regional Trials from 2000-2002, however levels observed were less than for Russet Burbank in the same trials. Highland Russet also is moderately resistant to common scab, powdery scab (galling in the roots), tuber blight (early and late), and PVY<sup>o</sup>. It is resistant to infection by PVX. Highland Russet has been successfully grown and processed in commercial trials. Fry recovery from the field and storage has been high and it shows good potential for the processing market. Fresh market use for Highland Russet may be limited due to its light skin, but tuber conformation and uniformity are excellent.

### Plant Characteristics:

Highland Russet has an erect, vine with a medium-late maturity. It produces medium red-purple flowers with limited pollen production. It can be used as a male parent, but produces a lower number of seed per berry relative to other male fertile clones. See Table 1 for a full description of plant characteristics and Figure 2 for photographs.

Table 1. Foliage characteristics of Highland Russet compared with those of Russet Burbank. Comparisons were made on plants grown in Aberdeen, Idaho in 2000 and 2001.

| Characteristic    | Highland Russet   | Russet Burbank |
|-------------------|-------------------|----------------|
| Maturity          | Medium-Late       | Late           |
| Flower color      | Medium red-purple | White          |
| Pollen production | Limited           | None           |

### Tuber Characteristics:

Highland Russet produces oblong tubers with buff, netted skin. The eyes are intermediate in depth and number and are evenly distributed. Tuber set is low, and tuber size is medium to large (Table 2). See Figure 2 for photographs.

Table 2. Physical tuber characteristics of Highland Russet compared with those of Russet Burbank. Comparisons were made using tubers grown at Aberdeen, Idaho in 2000 and 2001.

| Characteristic     | Highland Russet                  | Russet Burbank       |
|--------------------|----------------------------------|----------------------|
| Skin Color         | Buff                             | Tan                  |
| Skin texture       | Netted                           | Russet               |
| Size <sup>1</sup>  | Med-Large (Ave. 9.30 oz)         | Medium (Ave. 6.7 oz) |
| Shape              | Oblong –Long (3.9 <sup>2</sup> ) | Long (4.2)           |
| Thickness          | Slightly flattened               | Slightly flattened   |
| Eye depth          | Shallow                          | Intermediate         |
| Eye number         | Intermediate                     | High                 |
| Eye distribution   | Evenly distributed               | Evenly distributed   |
| Eyebrow prominence | Slight prominence                | Slight prominence    |
| Flesh color        | Cream-white                      | Cream-white          |
| Tuber set          | Low                              | Low                  |
| Dormancy           | Medium                           | Long                 |

<sup>1</sup> Tuber size data were collected from 8 trials grown in Idaho, Oregon and Washington in 1999 and 2001.

<sup>2</sup> Shape is a 1-5 rating scale with 1 = round and 5 = long and narrow; data taken from 6 trials between 1999 and 2001.

### Tuber Yield:

Highland Russet produced higher average total yields than Russet Burbank in late harvest trials in eastern, western and central Idaho, Oregon, and Washington (Table 3). Average yield was 114 cwt/acre (30%) higher than Russet Burbank in eastern Idaho, and 23 to 44 cwt/acre (5 to 7%) higher in western and central Idaho, Oregon and Washington. Highland Russet produced substantially higher U.S. No. 1 yields than Russet Burbank in all 4 regions (Table 3), with average U.S. No. 1 yields 137 to 190 cwt/acre greater than those observed for Russet Burbank, representing an increase of 37 to 81%.

Table 3. Highland Russet total and U.S. No. 1 yields as compared to those of Russet Burbank in late harvest trials.

| Location                               | Variety         | Total Yield<br>(cwt/A) | U.S. No. 1 Yield<br>(cwt/A) |
|--|-----------------|------------------------|-----------------------------|
| Eastern Idaho <sup>1</sup>             | Highland Russet | 492                    | 426                         |
|  | Russet Burbank  | 378                    | 236                         |
| Western and Central Idaho <sup>2</sup> | Highland Russet | 499                    | 413                         |
|  | Russet Burbank  | 476                    | 271                         |
| Oregon <sup>3</sup>                    | Highland Russet | 645                    | 527                         |
|  | Russet Burbank  | 611                    | 361                         |
| Washington <sup>4</sup>                | Highland Russet | 658                    | 505                         |
|  | Russet Burbank  | 614                    | 368                         |

<sup>1</sup> Data from 10 trials conducted from 1999-2002 in Aberdeen, Shelley and Rexburg.

<sup>2</sup> Data from 8 trials conducted from 1995-2002 in Kimberly and Parma.

<sup>3</sup> Data from 10 trials conducted from 1999-2001 in Hermiston, Klamath Falls, and Malheur, OR.

<sup>4</sup> Data from 8 trials conducted from 1999-2001 in Othello, WA.

### Tuber Quality Characteristics

In 24 trials grown in Idaho, Oregon, and Washington, average specific gravity and percent solids for Highland Russet were significantly higher than that of Russet Burbank. Highland Russet produced similar fry color to Russet Burbank out of 45°F storage (Table 4).

Table 4. Tuber specific gravity, french fry color and percent solids of Highland Russet as compared with Russet Burbank.

| Characteristic                        | Highland Russet | Russet Burbank |
|---------------------------------------|-----------------|----------------|
| Specific gravity <sup>1</sup>         | 1.086           | 1.080          |
| Fry color (45°F storage) <sup>2</sup> | 1.5             | 1.3            |
| Solids (%)                            | 22.8            | 20.1           |

<sup>1</sup> Specific gravity data from 24 trials grown in Idaho, Oregon and Washington.

<sup>2</sup> French fry color data from 18 trials grown in Idaho, Oregon and Washington. Tubers were stored at 45°F prior to frying for approximately two months.

USDA color chart [00 – 4.0(darkest)]

### Internal and External Defects

Highland Russet has demonstrated greater resistance to tuber growth cracks, second growth, shatter bruise, and hollow heart than Russet Burbank, particularly under high stress conditions (Table 5). Blackspot bruise susceptibility of Highland Russet is similar to Russet Burbank.

Table 5. Internal and external defects of Highland Russet tubers compared with those of Russet Burbank. Data taken are from trials grown in Idaho, Oregon and Washington from 1999 – 2002.

| Defect                                 | Highland Russet | Russet Burbank |
|--|-----------------|----------------|
| Growth cracks <sup>1</sup>             | 4.4             | 3.8            |
| Second growth <sup>1</sup>             | 4.4             | 3.5            |
| Shatter bruise <sup>1</sup>            | 3.7             | 3.0            |
| Blackspot bruise <sup>1</sup>          | 2.6             | 2.8            |
| Hollow heart/Brown Center <sup>2</sup> | 1%              | 8%             |

<sup>1</sup> Growth cracks, second growth, shatter bruise, and blackspot bruise rated on a scale 1-5 where 1 = severe occurrence of the defect and 5 = no occurrence of the defect.

<sup>2</sup> Hollow heart/Brown Center measured as percent of >12 oz tubers with the defect.

### Biochemical Composition:

Highland Russet tubers have lower glycoalkaloid concentrations than Russet Burbank and slightly higher reducing sugar, sucrose and protein concentrations. Vitamin C concentrations for Highland Russet were also higher than Russet Burbank (Table 6).

Table 6. Biochemical composition of Highland Russet tubers compared with those from Russet Burbank. Data was taken from three trials grown from 1999-2001 at Aberdeen, Idaho.

| Component                | Highland Russet | Russet Burbank |
|--------------------------|-----------------|----------------|
| Glycoalkaloids (mg/100g) | 2.2             | 3.6            |
| Reducing sugars (% FWB)  | 0.12            | 0.11           |
| Sucrose (% FWB)          | 0.17            | 0.14           |
| Protein (%DWB)           | 5.0             | 4.7            |
| Vitamin C (mg/100g)      | 24.5            | 17.2           |

Disease Reactions:

Highland Russet is substantially more resistant to tuber late blight, PVX, and PVY<sup>0</sup> than Russet Burbank (Table 7). However, it is more susceptible to powdery scab of the tuber than is Russet Burbank. The resistances of Highland Russet to other diseases is similar to that of Russet Burbank.

Table 7. Disease response of Highland Russet and Russet Burbank<sup>1</sup>

| Disease/Pest Reaction <sup>2</sup> | Highland Russet | Russet Burbank           |
|------------------------------------|-----------------|--------------------------|
| Vert. wilt                         | MS              | S                        |
| Pink rot                           | MS              | MS                       |
| Scab                               |                 |                          |
| Common                             | MR              | MR                       |
| Powdery                            | MR(r), MS(t)    | MS(r) <sup>3</sup> ,R(t) |
| Early Blight                       |                 |                          |
| Foliar                             | MS              | MS                       |
| Tuber                              | MR              | MS                       |
| Late Blight                        |                 |                          |
| Foliar                             | S               | S                        |
| Tuber                              | MR              | S                        |
| Viruses <sup>4</sup>               |                 |                          |
| PLRV                               | S               | S                        |
| PVY <sup>0</sup>                   | MR              | S                        |
| PVX                                | R               | S                        |
| PLRV Net Necrosis                  | MS              | S                        |
| Corky ringspot <sup>6</sup>        | S               | S                        |
| Erwinia soft rot                   | MS              | S                        |
| Fusarium dry rot                   | MS              | S                        |

<sup>1</sup> Responses for Pink rot and Powdery scab are based on one year's evaluation, all other responses are based on a minimum of 2 years of controlled field evaluations. Responses defined as very resistant (VR), resistant (R), moderately resistant (MR), moderately susceptible (MS), susceptible (S), very susceptible (VS).

<sup>2</sup> Verticillium - Aberdeen, Idaho and Hermiston, Oregon; Scab, Early blight, PLRV net necrosis, soft and dry rot – Aberdeen, Idaho; viruses – Kimberly, Idaho; Late blight – Corvallis, Oregon; Corky ringspot – Prosser, Washington.

<sup>3</sup> (r) = root galling, (t) = tuber

<sup>4</sup> Virus responses are based on seed borne infections as determined by ELISA, following field infection with PLRV from aphid vectored source of inter-planted virus infected potato, mechanical inoculation and aphid vectored PVY, and mechanical inoculation with PVX.

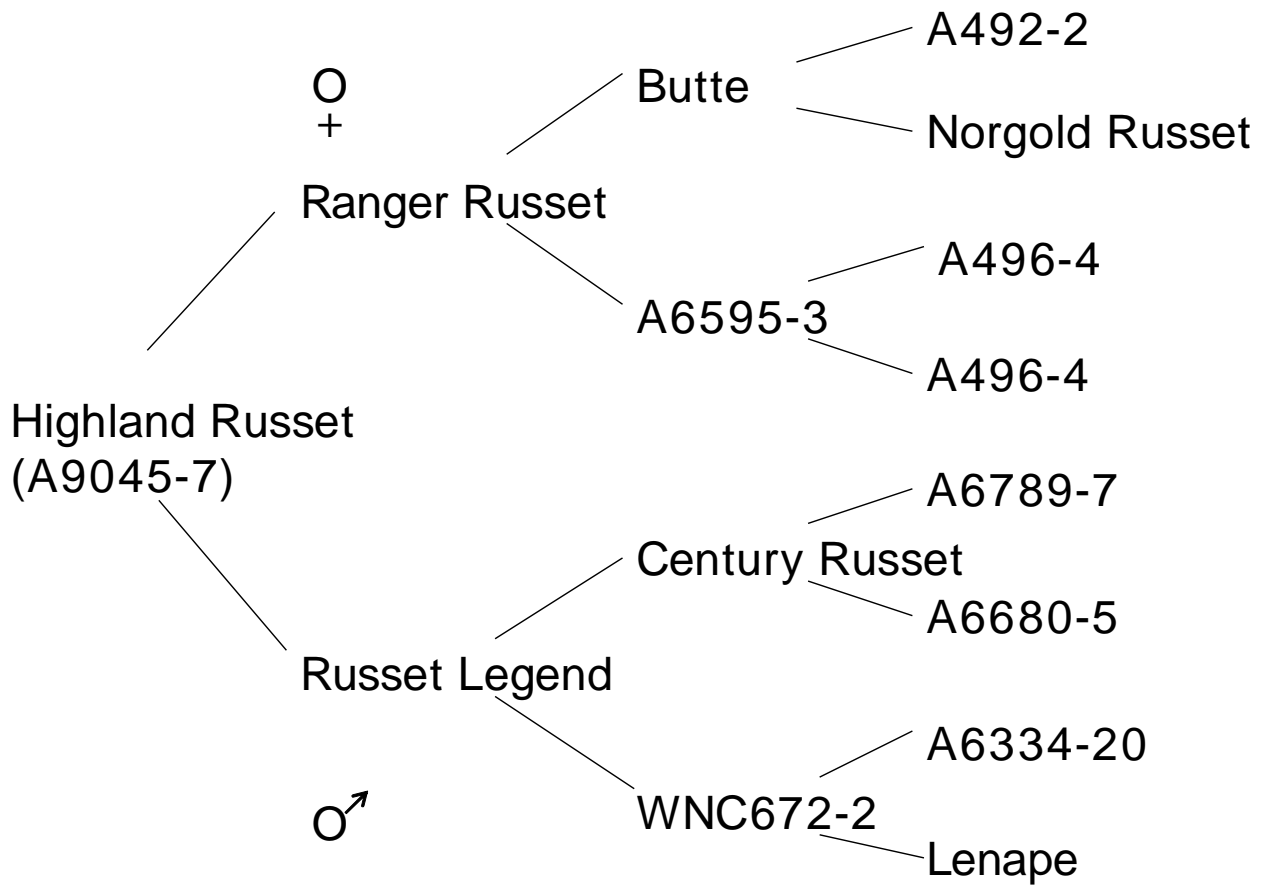


Figure 1. Four-generation pedigree of Highland Russet (A9045-7)

