

Premier Russet Management Guide - Idaho

General Description

Premier Russet is a product of the cooperative USDA/ARS, University of Idaho breeding program in Aberdeen, and was released jointly by the USDA/ARS and the experiment stations of Idaho, Washington, and Oregon in 2006. It is a mid-to late season, dual-purpose variety notable for its high yield of oblong-long, medium-russeted tubers, high specific gravity, excellent fry color from cold storage and resistances to sugar ends, tuber malformations and most internal and external defects. It is highly resistant to the accumulation of reducing sugars following long-term storage at 40-45 F. Its cold-sweetening resistance allows storage at colder temperatures thereby prolonging tuber dormancy and quality for processing or fresh pack use. Relative strengths include high yield with a very high proportion of U.S. No. 1 tubers, attractive tuber appearance, excellent processing quality and a high level of PVY⁰ resistance. Weaknesses include susceptibility to blackspot bruise, hollow heart, pink rot and dry rot.

Tuber Yield

Premier Russet produced higher average total yields than Russet Burbank in late harvest trials in eastern, western and central Idaho, Oregon and Washington (Table 1). Premier Russet produced substantially higher (108-247 cwt/acre) U.S. No. 1 yields than Russet Burbank at all locations. Total and U.S. No. 1 yields for Premier Russet were slightly higher than Ranger Russet in Western Idaho and Oregon but were slightly lower than Ranger Russet in Eastern Idaho and Washington. Yields of tubers >12 oz were substantially higher than Russet Burbank at all locations but were similar to or slightly lower than Ranger Russet.

Internal and External Defects

Premier Russet had a lower incidence of growth cracks and second growth than Russet Burbank with values more similar to those of Ranger Russet. It is more susceptible to hollow heart than Ranger Russet or Russet Burbank, and similar in susceptibility to shatter bruise. Recommendations are given in the management section regarding cultural practices that can minimize the incidence of hollow heart. Premier Russet is susceptible to blackspot bruise, with ratings comparable to that of, Ranger Russet.

Tuber Quality Characteristics

In 20 trials grown in Idaho, Oregon, and Washington, average specific gravity and solids content for Premier Russet were substantially higher than Russet Burbank and slightly higher than Ranger Russet. Premier Russet also produced significantly lighter fry color than both Russet Burbank and Ranger Russet out of 40⁰ and 45⁰F storage (Table 2).

Table 1 Premier Russet total yield, U.S. No. 1 yield, and greater than 12 ounce yield as compared to those of Russet Burbank and Ranger Russet in Late Harvest Trials.

| Location | Variety | Total Yield | U.S. No. 1 Yield | Yield > 12 oz. |
|----------------------------|----------------|--------------------|-------------------------|--------------------------|
| | | (cwt/A) | (cwt/A) | (cwt/A) |
| Eastern Idaho ¹ | Premier Russet | 471 | 392 | 142 |
| | Russet Burbank | 426 | 271 | 56 |
| | Ranger Russet | 496 | 409 | 158 |
| Western Idaho ² | Premier Russet | 489 | 416 | 118 |
| | Russet Burbank | 486 | 308 | 86 |
| | Ranger Russet | 474 | 341 | 138 |
| Oregon ³ | Premier Russet | 816 | 686 | 319 |
| | Russet Burbank | 771 | 439 | 134 |
| | Ranger Russet | 752 | 567 | 305 |
| Washington ⁴ | Premier Russet | 726 | 632 | 236 |
| | Russet Burbank | 690 | 455 | 125 |
| | Ranger Russet | 763 | 642 | 321 |

¹ Data from 10 trials conducted from 2001-2005 in Aberdeen, Shelley and Rexburg.

² Data from 4 trials conducted from 1999-2005 in Kimberly and Parma.

³ Data from 11 trials conducted from 2001-2005 in Hermiston, Klamath Falls, and Malheur, OR.

⁴ Data from 5 trials conducted from 2001-2005 in Othello, WA.

Table 2 Tuber specific gravity, percent solids and fry color of Premier Russet as compared with Russet Burbank and Ranger Russet.

| Characteristic | Premier Russet | Russet Burbank | Ranger Russet |
|---------------------------------------|-----------------------|-----------------------|----------------------|
| Specific gravity ¹ | 1.086 | 1.078 | 1.084 |
| Fry color (45°F storage) ² | 0.5 | 1.5 | 1.2 |
| Fry color (40°F storage) | 1.5 | 3.5 | 3.2 |
| Solids (%) | 22.45 | 20.25 | 21.78 |

¹ Specific gravity data from 35 trials grown in Idaho, Oregon and Washington.

² French fry color data from 14 (40 and 45°F) trials grown in Idaho. USDA color chart [00 (lightest) – 4.0 (darkest)]

Processing Characteristics

Premier Russet is notable for the production of tubers with low concentrations of reducing sugars even following long-term storage at 42 F. Russet Burbank glucose concentrations spike above the acceptable level of 0.10% at 42 F prior to 50 days of storage, whereas Premier Russet glucose concentrations remain below 0.05%, and are acceptable for processing even following 250 days of storage.

The reduced accumulation of reducing sugars in tubers of Premier Russet is reflected in consistently acceptable fry color scores (≤ 2.0) following storage of tubers at 42 to 45 F. In trials conducted in Idaho, Oregon, and Washington, Premier Russet consistently had greater fry uniformity between the stem and bud end of tubers than either Ranger Russet or Russet Burbank. Reducing sugar concentrations in tubers of Premier Russet were 37%-71% lower than Ranger Russet and Russet Burbank across all three states. The dormancy of Premier Russet is shorter than that of Russet Burbank and slightly longer than Ranger Russet based on the percentage of sprouted tubers and average sprout length.

Disease Reactions

Premier Russet is more resistant to *Verticillium* wilt than either Russet Burbank or Ranger Russet and more resistant to common scab than Ranger Russet (Table 3). However, it is susceptible to pink rot. Its susceptibility to powdery scab is similar to Russet Burbank, but it is more susceptible to powdery scab than Ranger Russet. Its resistance to foliar and tuber early blight and late blight is similar to Russet Burbank, but is slightly better than Ranger Russet for foliar early blight and tuber late blight resistance. Premier Russet is very susceptible to PVX and PLRV, although it is only moderately susceptible to PLRV net necrosis. However, it is highly resistant to PVY^o, which should be a major advantage in seed production, although it is susceptible to PVYⁿ. Resistance to corky ringspot and *Fusarium* dry rot is similar to Russet Burbank but it is more resistant to *Erwinia* soft rot. It also is more susceptible to *Fusarium* dry rot than Ranger Russet but has similar reactions to corky ringspot and *Erwinia* soft rot.

Table 3 Disease reactions of Premier Russet (2003-2005), Russet Burbank and Ranger Russet (1996-2005).

| Disease/Pest Reaction | Premier Russet | Russet Burbank | Ranger Russet |
|-------------------------------|-----------------------|-----------------------|----------------------|
| Vert. wilt ² | MR | S | MS |
| Pink rot | S | MS | MS |
| Scab | | | |
| Common | R | R | S |
| Powdery | MS(r),R(t) | MS(r),R(t) | MR(r),MR(t) |
| Early Blight | | | |
| Foliar | MR | MR | MS |
| Tuber | MR | MR | MR |
| Late Blight ³ | | | |
| Foliar | S | S | S |
| Tuber | MS | MR | S |
| Viruses ⁴ | | | |
| PLRV | VS | VS | S |
| PVY ⁰ | VR | S | MR |
| PVX | VS | S | R |
| PLRV Net Necrosis | MS | S | S |
| Corky ringspot ⁵ | MS | MS | MS |
| Erwinia soft rot | MR | MS | MR |
| Fusarium ⁶ dry rot | S | S | MS |

¹ Responses are defined as very resistant (VR), resistant (R), moderately resistant (MR), moderately susceptible (MS), susceptible (S), very susceptible (VS).

² Verticillium - combined from Aberdeen, Idaho and Hermiston, Oregon.

³ Late blight - Corvallis, Oregon.

⁴ 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.

⁵ Corky Ringspot - Prosser, Washington. Ranger Russet, 2002-2004.

⁶ Fusarium - combination of *F. sambucinum* and *F. solani* var. *coeruleum* reactions

⁷ (r) = root galling, (t) = tuber

CULTURAL AND STORAGE MANAGEMENT

Studies on cultural and storage management practices for Premier Russet were conducted for several years in southeastern Idaho. Results of these studies also may provide growers in other production regions with a foundation for the development of management guidelines specific for their locale.

Seed Management

Seed spacing trials indicate that the optimal commercial seed piece spacing for Premier Russet on 36 inch rows is 9 to 11 inches. Optimal seed sizes ranges from 2 to 3 oz. with a 5 to 6 inch cm planting depth. *Seed should be checked for dry rot potential and treated with an effective fungicide if needed, due to the susceptibility of Premier Russet to dry rot.* Premier Russet has not been observed as being sensitive to metribuzin when applied at labeled rates.

Recommendations for minimizing hollow heart in southeast Idaho include using 8 to 9 inch seed piece spacings, reducing nitrogen applications early in the season to avoid excessive vine development, avoidance of excessive, early season soil moisture, and later planting if possible—cooler soil temperatures during early tuber development appear to increase hollow heart in Premier Russet.

Premier Russet is susceptible to pink rot. Avoid over-irrigation and treat with an effective fungicide program. Foliar applications of mefenoxam or metalaxyl should be made when the largest tubers are dime-size and then again two weeks later. Mefenoxam/metalaxyl can be applied in-furrow at planting but this has not performed consistently in some areas. Phosphorous acid fungicides are recommended in areas where mefenoxam/metalaxyl resistance is present. Phosphorous acid products should be applied at a rate of 8-10 pt/acre when the largest tubers are dime-sized, and then be repeated on a 14-day schedule for a total of three applications. Post-harvest application of phosphorous acid (12.8 fl oz/ton tubers) can also be effective in reducing pink rot development in storage.

Fertilizer Management

Fertilizer management recommendations were developed based on replicated field trials conducted over 3 years at Aberdeen, ID. Total nitrogen application recommendations for Premier Russet are approximately 75% of recommendations for Russet Burbank (Stark et al., 2004), with most N applied during tuber bulking. For southern Idaho, total soil plus fertilizer N recommendations range from about 180 lb N/acre in areas with a 400 cwt/acre yield potential to 210 lb N/acre with a 500 cwt/acre yield potential and 240 lb N/acre in areas with a 600 cwt/acre yield potential. Nitrogen uptake decreases substantially after August 10 so N applications should not be made after that time. Petiole nitrate sufficiency levels run about 3,000 to 5,000 ppm higher than Russet Burbank early in the season, about the same as Russet Burbank during mid-season and about 2,000-4,000 ppm lower late in the season. Phosphorus requirements for Premier Russet are about 20-30 % lower than those for Russet Burbank.

Irrigation Management

Premier Russet has good tolerance to water stress, but soil moisture should still be maintained between 65 and 80% available soil moisture (ASM) during tuber development and bulking for optimal yield and quality.

Harvest Management

Premier Russet is similar to Ranger Russet with respect to blackspot bruise susceptibility. Consequently, available soil moisture should be maintained above 60% during tuber maturation prior to harvest to minimize tuber dehydration. Bruising can be minimized by optimization of harvest, transport, and cellar piling operations to reduce impacts that contribute to bruising. *Since Premier Russet is also susceptible to Fusarium dry rot, particular care must be taken to minimize bruising during harvest and handling in order to manage this disease. Phosphorous acid applications should be considered going into storage in areas where there is a significant potential for pink rot.*

Storage Recommendations

The following recommendations are based on data collected over a three-year period at the University of Idaho Kimberly R&E Center on Premier Russet potatoes grown in Southern Idaho.

Curing Conditions: Cure at 55°F and 95% relative humidity for 14 days

Storage Conditions: Maintain 95% relative humidity throughout storage. Weight loss is higher in Premier Russet than Russet Burbank.

To minimize weight loss, store at 45°F.

- **Frozen Processing:** 42°F holding temperature
- **Fresh Market:** 45°F
- **Dehydration Processing:** 42°F

Sprout Inhibition: Apply CIPC before dormancy break but after curing

- 42°F - apply CIPC between 14 and 120 days after harvest
- 45°F - apply CIPC between 14 and 100 days after harvest
- 48°F - apply CIPC between 14 and 85 days after harvest

Due to the fact that this is a shorter dormancy potato, CIPC residues should be checked to ensure long season sprout inhibition

Duration of Storage: High processing quality persists throughout 250 days after harvest at 42, 45 and 48 °F, although some mottling has been observed after 10 months of storage. Higher tuber shrinkage is typically higher than Russet Burbank in long term storage.

Fusarium Dry Rot: Susceptibility is higher than Russet Burbank, therefore minimize bruising and manage with appropriate fungicides.

