**Rainier Russet Cultural Management Recommendations**

**for the Columbia Basin of WA and OR**

June 2023 MJ Pavek and ZJ Holden - WSU

*Disclaimer: This may change slightly in near future as research and grower feedback increases.*

**Columbia Basin of WA and OR:** Rainier Russet typically produces a larger tuber size profile than Ranger Russet, Russet Burbank and Russet Norkotah. Rainier Russet tends to produce fewer tubers per plant (4.8 vs. 7.8) than the same three varieties listed above. Recommended seed-piece depth is 7-8 inches from top of hill to top of seed piece, after all post-planting tillage is finished. Similar to most varieties grown in the Columbia Basin, Rainier Russet will produce up to 6% more net revenue when planted into 32-inch rows versus 34-inch rows.

Early Harvest Production – Fresh and Process Markets:

Rainier Russet is typically a medium-maturing variety when grown in the Columbia Basin of WA and OR (<120 days after planting). It can be grown for an early-to mid-season harvest, especially if the vines are removed prior to natural maturity. For an early- to mid-season harvest between mid-July and mid-August, (100-120 days after planting (DAP)), seed pieces should be spaced approximately 8-10 inches apart in-row. Total seasonal N applications should be 250-280 lbs/A, including pre-plant and residual inorganic soil N (NO3-N plus NH4-N). See also “Nitrogen Management” section and figures below.

Late Harvest (Full Season) Production – Fresh and Process Markets:

For full season growth with a harvest between mid-August and October (>130 DAP), seed should be spaced 8 inches apart in-row. Total seasonal N applications should be 300-325 lbs/A for fresh-market and 325-350 lbs/A for process market, including pre-plant and residual inorganic soil N (NO3-N plus NH4-N). See also “Nitrogen Management” section and figures below.

Nitrogen Management

We recommend applying pre-plant or at-planting nitrogen so there is 125- to 150-lbs/A of available N (soil residual N + applied) in the root zone at emergence. Petiole and soils during the growing season should be used as a guide, however, growers should strive to hit the season total N targets (Table 1). ***Petiole values alone should not drive in-season nutrient applications.*** Petiole and soil samples should be collected prior to row closure and continue through the season until late bulking (once every 2 weeks is adequate). Soil N should be at or below 50 lbs/A by mid-July and plants kept healthy via “spoon-feeding” of nitrogen. With low soil N and the cessation of N applications prior to mid-August, plants will be able to adequately mature during August and September. Full season rates do not account for N applications to aid in crop residue breakdown.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Table 1. Full-season nitrogen rates and associated petioles values for Rainier Russet. These rates and values were those that maximized grower return for each variety following three years of research. Growers should strive to hit the full-season target rates. | | | | | |
|  | Full-Season |  |  |  |  |
|  | Nitrogen | Petiole Nitrate Target Concentrations | | | |
| Rainier Russet | Target Rate\* | June 15 | June 30 | July 15 | July 30 |
|  |  |  | | | |
|  | lbs/A | -----------------% NO3-N----------------- | | | |
|  |  |  |  |  |  |
| Process Market | 325-350 | 2.3 | 2.0 | 1.9 | 1.5 |
| Fresh Market | 300-330 | 2.3 | 2.0 | 1.9 | 1.5 |
|  |  |  |  |  |  |

(\*Soil residual N + applied fertilizer)

Nutrients other than Nitrogen:

Management guidelines for nutrients other than N have not been established for Rainier Russet, however, preliminary research results indicate Rainier Russet responds well to 250 lbs P2O5. Soil pH and phosphorus tie-up can alter results. For additional info, growers should follow local nutrient management recommendations for Russet Burbank (Lang et al. 1999) until new guidelines for Rainier Russet become available. (Lang, N.S., R.G. Stevens, R.E. Thornton, W.L. Pan, and S. Victory. 1999. Nutrient Management Guide: Central Washington Irrigated Potatoes. Washington State University Experiment Station Extension Bulletin EB1882.)

Irrigation Management:

Available soil moisture (ASM) should be maintained as close to 85% as possible without dropping below 65% from full emergence until late bulking. Throughout the season, irrigation applications equivalent to the evapotranspiration loss should be applied to maintain soil ASM near 85% (Gonzalez et al. 2023). During the last 3 weeks of growth and as vines senesce, ASM should be reduced to about 60-65%. Avoid excessive soil moisture from mid to late bulking to prevent disease, rot, and shatter bruising at harvest.

Harvesting and Handling Rainier Russet

Rainier Russet is susceptible to shatter and blackspot bruising at harvest. Shatter, mechanical cracking, thumbnail cracks, and air checks are terms that refer to hairline fractures in the tuber that typically result when turgid tubers collide with a solid surface. Susceptibility to shatter is often variety specific and heavily influenced by a variety’s genetics. Genetic potential plus the environmental conditions conducive for shatter can be devastating to a grower’s pocket book. Shatter can reduce marketability and lead to excessive rot in storage. Turgid tubers (firm, well hydrated, high fluid content) are more susceptible to shatter bruise than flaccid tubers.

To prevent shatter:

1) Your goal should be to dehydrate (reduce turgor) the tubers to a level that will minimize shatter

2) Warm temperatures and dry soils facilitate dehydrating tubers

3) Best to harvest tubers when it is warm (pulp temp as warm as possible ~ 65F might be ideal)

4) Allow 14-21 days after vine kill

5) If possible, irrigate just prior to harvest to reduce bruising from clods, etc.

6) Follow steps outlined in the "Preventing Potato Bruise Damage” by Mike Thornton & Bill Bohl located at: www.cals.uidaho.edu/edcomm/pdf/BUL/BUL0725.pdf

7) Review also: “Thumbnail Cracks of Potato Tubers” By Bill Bohl & Mike Thornton, located at: [www.cals.uidaho.edu/edcomm/pdf/CIS/CIS1129.pdf](http://www.cals.uidaho.edu/edcomm/pdf/CIS/CIS1129.pdf)

Unfortunately, some of the things, like warmer temperatures and tuber turgidity, that help to prevent shatter bruising can exacerbate blackspot bruising and vice versa. Do your best to handle all tubers gently and minimize conveyor drop heights.

**IMPORTANT PRODUCTION CONCERNS:**

* Rainier Russet is susceptible to hollow heart. When Rainier Russet is grown near Othello, WA hollow heart tends to be more serious when planted early, before the middle of April, than later planting dates.
* Rainier Russet is more susceptible to shatter and blackspot bruising than Russet Norkotah, handle gently.

Reference: Gonzalez T., Francisco, Mark J. Pavek, Zachary J. Holden, and Rudy Garza. 2023. Evaluating potato evapotranspiration and crop coefficients in the Columbia Basin of Washington state. Agricultural Water Management. Volume 286, 1 August 2023, 108371, ISSN 0378-3774. <https://doi.org/10.1016/j.agwat.2023.108371>.