University of Idaho Extension

CIS 1181

Cultural Management of Classic Russet Potatoes

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CULTURAL MANAGEMENT

Classic Russet is a medium-maturing potato variety with medium russet skin. It is notable for its early bulking potential and excellent culinary characteristics that are comparable to Russet Burbank's. Classic Russet has moderate specific gravity and resistance to sugar ends, tuber malformations, and most internal and external defects.

Classic Russet resulted from a 1995 cross between Blazer Russet and Summit Russet. It was released in 2008 by the USDA Agricultural Research Service and the agricultural experiment stations of Idaho, Oregon and Washington. It is a product of the Northwest Potato Variety (Tri-State) Development Program.

A number of studies on the management of Classic Russet have been conducted in southern Idaho. Growers in this and other production regions may use the results of these studies as the basis for developing appropriate management guidelines for their locales.

Seed size and spacing

Optimal seed size for Classic Russet is 2 to 3 ounces. The dry rot potential of seed lots should be determined, and seed should be treated with an effective fungicide when needed.

Planting depth should be 6 to 8 inches from the top of the seed piece to the top of the hill. For early harvest, seed piece spacing should be 8 to 9 inches for fresh market use and 9 to 11 inches for processing. For late-season harvest for either fresh market or processing, seed piece spacing should be about 8 to 9 inches.

Disease responses

Classic Russet is moderately resistant to common scab caused by *Streptomyces scabies* and to Fusarium dry rot. It is moderately susceptible to foliar and tuber infections of early blight (*Alternaria solani*) and to symptoms of corky ringspot (table 1). It is susceptible to Verticillium wilt (*Verticillium dahliae*), root knot nematode, foliar and tuber late blight (*Phytopthora infestans*), potato leafroll virus (PLRV) and PLRV net necrosis, PVY^{O}, and *Pectobacterium* (syn. *Erwinia*) soft rot.

Its responses to diseases are generally similar to those of Russet Burbank, except for having slightly greater resistance to foliar early blight, PLRV, corky ringspot, and tuber dry rot. Compared with Ranger Russet, Classic Russet is more resistant to common scab and slightly more resistant to foliar early blight, tuber late blight, corky ringspot, and tuber dry rot. However, it is more susceptible than Ranger Russet to Verticillium wilt, PVY^{O}, and PVX, and slightly more susceptible to net necrosis and tuber soft rot.

Foliar symptoms of PVY^{O} in Classic Russet are similar to those in Ranger Russet and Russet Burbank. The typical symptoms are mosaic, veinal necrosis, and necrotic lesions on the leaves. The foliar index, which measures symptom expression over time, indicates that Classic Russet has a narrower window of expression compared with Ranger Russet or Russet Burbank. Classic Russet was not susceptible to tuber necrotic ringspot symptoms. Expression of $PVY^{N\text{-}Wi}$ and PVY^{NTN} strains was less visible in Classic Russet than in Ranger Russet or Russet Burbank and consisted only of mild mosaic symptoms.

Weed, disease, and insect management

Weeds. Classic Russet has exhibited good resistance to the herbicide metribuzin when applied at labeled rates. It has an erect, medium-maturing, medium-sized vine but competes reasonably well with weeds after row closure during early to mid- tuber bulking.

Diseases. Soils infested with root knot nematodes or with a history of severe early die problems should be fumigated. Fungicide treatments for management of early and late blights may need to be considered if prevailing weather conditions are favorable for disease development. Application of an effective postharvest treatment may be needed if late blight or pink rot tuber

infection is known to have occurred in the field. The incidence of storage diseases can be minimized by reducing tuber skinning and bruising during handling operations and avoiding harvesting in wet weather.

Insects. Application of a systemic insecticide effective against colonizing aphids should be considered if the production area has any history of PLRV or tuber net necrosis.

Nutrient management

Nitrogen. Proper nitrogen management is critical for fresh pack production of Classic Russet. Delayed spring planting and environmental conditions that slow crop development can delay crop maturity, particularly in fields with relatively high N application rates. These conditions can make it very difficult to develop good skin set on Classic Russet, resulting in more skinning and bruising, which provides more wound entry points for pathogens. Poor skin set, therefore, will make it more difficult to pack directly out of the field or to store for long periods of time.

The total seasonal nitrogen requirements for Classic Russet are about 30 to 40% less than for Russet Burbank at the same yield potential. For production in southern Idaho, total soil plus fertilizer N recommendations should range as follows:

- 150 to 170 lb N/acre in areas with a 400 cwt/acre yield potential
- 180 to 200 lb N/acre in areas with a 500 cwt/acre yield potential
- 210 to 220 lb N/acre in areas with a 600 cwt/acre yield potential.

It is important to note that these amounts include quantities of residual N in the soil prior to planting.

Table 1. Disease reactions of Classic Russet tubers compared with those of Ranger Russet and Russet Burbank.

Disease	Classic Russet	Ranger Russet	Russet Burbank
Verticillium wilt (*Verticillium*)	S	MR	S
Foliar early blight (*Alternaria*)	MS	S	S
Tuber early blight (*Alternaria*)	MS	MS	MS
Late blight (*Phytophthora*)	S	S	S
Late blight (tuber)	S	VS	S
Common scab (*Streptomyces*)	MR	S	MR
Corky ringspot	MS	S	S
Root knot nematode	S	S	S
Dry rot (*Fusarium*)	MR	MS	MR
Dry rot (*F. sol*. var. *coer*.)	MR	MS	S
Soft rot (*Pectobacterium*)	S	MS	S
PVX[1]	VS	R	VS
PVY[0]	S	MR	S
PLRV foliar infection	S	S	VS
PLRV net necrosis/serious defect[2]	S	MS	S

Note: Responses of Classic Russet to diseases were based on a minimum of 2 years of controlled field evaluations. Responses were defined as follows: very resistant (VR), resistant (R), moderately resistant (MR), moderately susceptible (MS), susceptible (S), and very susceptible (VS).

Disease evaluations were conducted at the following locations: Verticillium wilt—Aberdeen, ID, and Hermiston, OR; Pink rot—Parker, ID; common scab—Aberdeen, ID and Antigo, WI; early blight, *Pectobacterium* (Erwinia) soft rot, and Fusarium dry rot—Aberdeen, ID; powdery scab of tuber—Potter County, PA, Parker, ID, and Suring, WI; powdery scab of roots—Parker, ID; viruses and PLRV net necrosis—Kimberly, ID; late blight—Corvallis, OR; corky ringspot—Prosser, WA.

[1] Virus responses are based on seedborne infections as determined by ELISA following field infection with PLRV from aphid-vectored sources of inter-planted virus-infected potato, mechanical inoculation and aphid-vectored infection with PVY, and mechanical inoculation with PVX.

[2] PLRV necrosis/serious defect readings are from a percentage of tubers with net necrosis that extends more than ¼ inch into the tuber resulting in a "serious defect."

About 65% of the fertilizer N should be applied by tuber initiation, with the remaining N applied via sprinkler irrigation prior to the last week of July. To promote skin set, N applications should be completed at least 30 days prior to harvest.

Nitrogen response studies conducted for two years at Aberdeen, Idaho, indicate that petiole nitrate levels for Classic Russet should be about 20,000 ppm at the end of tuber initiation and decrease to 12,000 to 15,000 ppm during mid-bulking and to 6,000 to 8,000 ppm during late bulking.

Phosphorus, potassium, and micronutrients. Phosphorus, potassium, and micronutrient requirements have not been established for Classic Russet. It is recommended that growers follow local nutrient management recommendations for Russet Burbank until new guidelines for Classic Russet become available. However, since phosphorus is important for enhancing crop maturity, growers should make sure adequate phosphorus is available for their crop.

Irrigation management

Seasonal irrigation requirements of Classic Russet are similar to those of Russet Burbank, although Classic Russet is significantly more resistant to tuber defects caused by water stress. Available soil moisture (ASM) should be maintained within the range of 70 to 85% for optimal yield and quality. Plant water uptake decreases appreciably in late August, so irrigation application rates need to be adjusted to avoid developing excessively wet soil conditions that promote disease and enlarged lenticels.

Low soil moisture (<60%ASM) conditions should be avoided during tuber maturation and harvest to minimize tuber dehydration and blackspot bruise. However, since significant amounts of shatter bruise have sometimes been observed in commercial operations when Classic Russet is well hydrated, it should be harvested with a moderate tuber hydration level. To accomplish this, irrigation rates should be gradually reduced during the last couple of weeks prior to vine kill to about 65% ASM to allow tuber hydration to decrease to an intermediate level during skin set. This will also minimize the potential for producing swollen, open lenticels that can provide entry points for disease organisms.

Harvest management

Growers should not consider growing Classic Russet for early harvest unless appropriate adjustments in management are made to allow for adequate maturation and skin set. Adjustments include using the moderate N rates described above, completing N applications at least 30 days prior to harvest, and allowing at least 21 days after vine kill before harvesting.

Harvest operations should also be optimized to minimize bruising and skinning as follows:

- Complete N fertilizer applications at least 30 days prior to harvest.
- Allow soils to dry to a moderate moisture level of about 65% ASM during vine kill and maturation so that tubers are at medium turgidity (tubers are not firm or well hydrated but not flaccid, where the surface is easily depressed).
- Allow at least 21 days after vine kill prior to harvest.
- If possible, irrigate a few days prior to harvest to reduce bruising from clods, etc.
- Harvest tubers when pulp temperature is warm but, to minimize disease development, not greater than 60°F.
- Operate all chains and conveyors at speeds that fill the chains to capacity with soil and tubers and minimize the distance tubers drop.

STORAGE MANAGEMENT

Fresh pack management

Grower experience has shown that it is best not to pack Classic Russet directly out of the field at harvest, particularly when growing conditions and management practices have not allowed for adequate skin set to develop. Tubers with good skin set at harvest generally have had fewer disease problems during packing and shipping operations than those that did not. In addition, tubers that were allowed to go through the wound healing process in storage prior to packing appeared to maintain better condition than those fresh packed out of the field. Growers should monitor Classic Russet often during the first couple of months of storage to determine the potential for rot development, which should be based on the amount of shatter bruise, Pythium leak, or soft rot going into storage.

A key factor in the management of soft rot in fresh pack operations is tuber pulp temperature. Soft rot progress is greatly retarded, or stopped completely, when pulp temperatures are 50°F or below. Often, tubers are warmer than this critical temperature when handled, washed, and packaged. Realistically, 50°F may be difficult to achieve, especially in the early part of the harvest season. However, tubers should be cooled

as rapidly as possible to 55°F to greatly reduce the potential for soft rot problems.

Infection and growth of soft rot bacteria are also favored by moisture on the tuber surface, something that is impossible to avoid when washing potatoes. Wounds and other entry points in the tuber skin, such as the lenticels, are particularly vulnerable to soft rot invasion. The bacterium has the ability to thrive either with or without oxygen, and immediately placing wet tubers into poly bags creates an environment very conducive to soft rot. Add to this scenario excessively high pulp temperatures, and the result can be high levels of rotted potatoes. This problem can be reduced to some extent with the use of effective wash water disinfectants, but tuber pulp temperatures are a greater contributing factor. In addition, periods of prolonged tuber wetness should be avoided. Fans, sponge rollers, etc., can promote quick drying.

Storage recommendations

The following recommendations are based on data collected over a 3-year period at the University of Idaho's Kimberly Research and Extension Center on Classic Russet potatoes grown in Southern Idaho.

Tuber dormancy. Classic Russet has a shorter dormancy period than Russet Burbank (20-30 days shorter depending on temperature and year). On average, Classic Russet has a dormancy of 155 days at 42 °F, 130 days at 45°F, and 100 days at 48°F.

Curing conditions. Cure at 50 to 55°F and 95% relative humidity for 14 days.

Storage conditions. Maintain 95% relative humidity throughout storage. Weight loss is about 1.5 times higher in Classic Russet than in Russet Burbank.

- Frozen processing—Hold at 48°F to minimize fry color and mottling.
- Fresh market—Hold at 42 to 45°F to reduce weight loss and dry rot.
- Dehydration processing—Hold at 42 to 45°F depending on intended product.

Sprout inhibition. Apply CIPC before dormancy break but after curing. Because this is a shorter-dormancy potato, CIPC residues should be checked to ensure long season sprout inhibition.

- 42°F—Apply CIPC between 14 and 155 days after harvest.
- 45°F—Apply CIPC between 14 and 130 days after harvest.
- 48°F—Apply CIPC between 14 and 100 days after harvest.

Duration of storage. Good processing quality persists throughout 250 days after harvest when storage is at 48°F.

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Published October 2011