

Cultural Management of Gem Russet Potatoes

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Gem Russet was released in 2000 by the USDA/ARS and the agricultural experiment stations of Idaho, Oregon, and Washington. It is a medium- to late-maturing variety that produces oblong to long tubers with medium russet skin. Tubers have exceptional appearance and excellent fresh pack and processing qualities.

This publication provides management guidelines for producing high-quality Gem Russet potatoes in southern Idaho. Growers should adapt this information to their own situations as experience dictates.

Field Selection and Preparation

Gem Russet has moderate levels of resistance to early dying but may benefit from some control measures for this disease. Fields prepared for planting with Gem Russet should not have a history of serious problems with this disease and should be in a 3-year or longer rotation. It will usually respond positively to soil fumigation if short rotations are followed. Soils with a history of root-knot nematodes or corky ringspot should also be fumigated.

Seed Production

Gem Russet is very susceptible to PVY, being similar to or worse than Russet Norkotah and Shepody. PVY in Gem Russet spreads very rapidly within a field and is very difficult to detect and rogue. Consequently, some special seed management techniques must be used that are based on the concept of preventing initial infection.

The most important principle for keeping Gem Russet seed within tolerances for PVY is intergenerational isolation. As much as possible, produce each generation of seed in isolation from higher or lower generations. Nuclear seed fields should be located at least one-half mile, if possible, from all other Gem Russet potatoes and from fields of other varieties that may harbor PVY.

When feasible, the same practices should be used for G1 seed. Later generations of Gem Russet seed, G2 through G4, can be grown next to PVY-free fields of other varieties that are not PVY carriers but should be isolated from later generations of Gem Russet, Russet Norkotah, or Shepody seed.

Other virus prevention practices should also be used to prevent the buildup of aphid vectors. Use of a systemic insecticide is suggested, along with measures to control movement of aphids from adjoining crops and landscape plants.

Seed Management and Planting

Follow sound seed storage and handling practices (see PNW 248, Potatoes: Influencing Seed Tuber Behavior; CIS 1031, Potato Seed Management: Seed Size and Age; and CIS 974, Potato Seed Management: Seed Certification and Selection). Store seed at 38° to 40°F through the winter. Gem Russet tubers have long dormancy, and plants may emerge slowly after planting. To encourage quicker emergence, warm seed tubers to 50°F for 1 to 3 weeks before cutting.

Optimum seed piece size is 1.5 to 2.5 ounces. Gem Russet, like Russet Burbank, can have problems associated with *Fusarium* dry rot and late blight tuber rot. Use a seed piece treatment that will help control these seed piece decay problems as well as the spread of late blight during cutting.

Gem Russet has a tendency to produce more undersized tubers than is desirable. It also seldom produces malformed tubers when planted at wide spacing. It will benefit from a seed piece spacing that is similar to or slightly wider than that which is optimum for Russet Burbank (Table 1). Planting depth should be approximately 5 inches as measured from the top of the seed piece to the top of the hill.

Table 1. Within-row seed piece spacing and cut seed per acre for Gem Russet potatoes.

Market class	Seed piece spacing ¹	Seed quantity per acre ²
	(inches)	(cwt)
Seed	7 to 9	31 to 24
Fresh	12 to 14	18 to 16
Frozen processed	12 to 14	18 to 16

¹Recommendation based on a 36-inch row width.

²Based on a 2.0-ounce average seed piece size. When computing whole-tuber seed purchase requirements, allow 10 percent loss for cutting and sorting waste.

Table 2. Preplant, broadcast phosphorus (P) fertilizer recommendations for Gem Russet potatoes, based on recommendations developed for Russet Burbank.

Soil test P (0 to 12 inches)	Percent free lime (%)			
	0	4	8	12
(ppm)	(lb P ₂ O ₅ /acre)			
0	320	360	400	440
5	240	280	320	360
10	160	200	240	280
15	80	120	160	200
20	0	40	80	120
25	0	0	0	40
30	0	0	0	0

Apply an additional 60 to 80 pounds of banded P₂O₅/acre as a starter at planting if soil test P levels are below 30 ppm. Total P₂O₅ application should include the appropriate chart value plus 60 to 80 pounds.

Add 25 pounds P₂O₅/acre for each additional 100 cwt/acre of potential yield above 400 cwt/acre.

Petiole phosphorus concentrations should be kept above 0.22 percent through tuber bulking.

Table 3. Potassium (K) fertilizer recommendations for Gem Russet potatoes, based on recommendations developed for Russet Burbank.

Soil test K (0 to 12 inches)	Yield goal (cwt/acre)			
	300	400	500	600
(ppm)	(lb K ₂ O/acre)			
25	550	600	650	700
50	450	500	550	600
75	350	400	450	500
100	250	300	350	400
125	150	200	250	300
150	50	100	150	200
175	0	0	50	100

Petiole potassium concentrations should be kept above 7 percent through tuber bulking.

Fertility

No research information is available concerning Gem Russet's phosphorus, potassium, or micronutrient requirements. Follow recommendations for Russet Burbank potatoes. See Tables 2 and 3 for recommended application rates of phosphorus and potassium. These application rates are based on soil tests from the top 12 inches of the soil profile.

Table 4. Gem Russet potential yield in southern Idaho.

Growing area	Potential yield ¹
	(cwt/acre)
East ²	300 to 400
Central	400 to 450
West	450 to 500

¹Due to the variability of conditions within each growing area, a range of potential yields is given. If yields in your locale are traditionally lower or higher than yields in most other locales within the area, determine your potential yield from the corresponding end of the range.

²East includes all of the upper Snake River Plain south and west to American Falls and all high-altitude seed areas.

Table 5. Total nitrogen (N) fertilizer recommendations for Gem Russet potatoes. Application rates include preplant and seasonal applications.

Soil test N ¹ (0 to 12 inches)	Yield goal (cwt/acre)			
	300	400	500	600
(ppm)	(lb N/acre)			
0	240	290	340	380
5	220	260	310	360
10	190	240	290	340
15	170	220	260	310
20	140	190	240	290
25	120	170	220	260
30	100	140	190	240
35	70	120	170	220
40	50	100	140	190

¹Soil test N = Nitrate-Nitrogen + Ammonium-Nitrogen.

Add 15 pounds N/acre for each ton of grain straw residue up to 60 pounds N/acre.

Add an additional 30 to 50 pounds N/acre on sandy soils.

Gem Russet will produce maximum yield and quality with similar or slightly higher rates of nitrogen than required for Russet Burbank. Gem Russet also benefits from having more nitrogen available early in the season. In some of the short season seed areas of southeastern Idaho, the nitrogen can be applied all preplant. In other production areas, nitrogen should be split-applied preplant and during the growing season.

N Applied All Preplant—Obtain a representative soil test from the top of 12 inches. Use Table 4 to predict potential yield until experience provides better estimates. Alternatively, the historical average yield for Russet Burbank can be used as an estimate of Gem Russet's potential yield. Use Table 5 to determine the amount of nitrogen to apply, making the entire application before or at planting.

Seasonal N Applications—Obtain a soil test and use Table 5 to determine the amount of preplant N to apply. At or before planting, apply half of the total seasonal N requirement indicated in Table 5. Apply additional nitrogen in the early to middle part of the bulking season. About three-fourths of total nitrogen needs should be applied before the end of the first

Table 6. Petiole NO₃-N sufficiency range for Gem Russet during different growth stages.

Growth stage	Description	Sufficiency range ¹ (ppm)
I	Emergence thru tuberization	21,000 to 23,000
II	Tuberization	21,000 to 23,000
III	Early tuber bulking	16,000 to 19,000
IV	Late tuber bulking	10,000 to 13,000
V	Maturation (after Aug. 15)	6,000 to 11,000

¹See CIS 743, Tissue Analysis—A Guide to Nitrogen Fertilization for Russet Burbank Potatoes, for petiole sampling techniques.

bloom. Decisions for additional applications should be based on petiole testing and applied as needed.

Monitor petiole nitrate nitrogen concentrations throughout the season. Use Table 6 as a guide to determine optimal petiole nitrate nitrogen concentrations for each growth stage. Gem Russet's seasonal petiole nitrate nitrogen profile differs from that of Russet Burbank. Consequently, critical concentrations of petiole nitrate nitrogen, at any point in the season, will also differ. Petiole nitrate nitrogen concentration should be higher early in the season, above 17,000 ppm from emergence through early bulking, but can fall to 7,000 to 12,000 ppm at senescence. The necessity for higher petiole nitrate nitrogen early in the season reflects Gem Russet's need for higher levels of early-season nitrogen.

Irrigation

Total seasonal water use for Gem Russet is similar to that of Russet Burbank. Maintain available soil moisture above 65 percent throughout the growing season. Gem Russet can withstand short periods of water stress with no detrimental impact on tuber quality. However, water stress during early tuber bulking may reduce yield.

Gem Russet is more susceptible to blackspot bruise than shatter bruise. Pre-harvest irrigation practices should lean toward maintaining high levels of tuber hydration. Do not allow soil moisture levels to fall below 55 percent during maturation, then apply one pre-harvest irrigation at least 7 days before harvest to encourage tuber rehydration.

Weed Control

Gem Russet is tolerant of metribuzin (Sencor) applied at labeled rates (see CIS 291, Metribuzin for Weed Control in Potatoes). No injury has been observed as a result of any other herbicides that are currently registered for use on potatoes. The most critical period for weed control for Gem Russet is before row closure. Gem Russet produces a sufficiently large vine to successfully compete with most mid- to late-season weeds.

Diseases

Use certified seed to reduce problems with virus diseases, bacterial ring rot, and blackleg. Gem Russet and Russet Burbank have similar susceptibilities to storage diseases. Gem Russet is susceptible to root-knot nematodes and corky ringspot. Avoid planting in or treat fields with a history of root-knot or stubby root nematodes. Gem Russet is moderately susceptible to early dying. Fumigation is required to help control nematodes and/or early dying.

The foliage of Gem Russet is susceptible to late blight, and standard recommendations for fungicide applications should be followed. Tubers of Gem Russet have a moderate level of resistance to late blight tuber rot, thus providing some protection when tubers from infected fields are stored. However, some tuber rot should be expected in potatoes harvested from late blight infected fields, so the best available harvest practices for limiting tuber infection should be followed (see CIS 1051, Late Blight of Potato and Tomato). If late blight has been found in a field, continue fungicide applications until the vines, including stems, are completely dead. This will help reduce the amount of inoculum present at harvest.

Vine Kill and Harvest

Kill vines at least 14 to 21 days before the intended harvest date to allow time for tuber maturation and skin set. Gem Russet stems are relative easy to kill, and skin-set occurs fairly rapidly.

Gem Russet is moderately susceptible to blackspot bruise. To help reduce bruise, follow the recommendations discussed in the previous section on irrigation. Also, employ all proven bruise prevention practices during harvesting and handling, including digging with proper soil moisture, keeping all belts and chains fully loaded with potatoes, making sure the harvester chains are properly timed, and adjusting other equipment as needed. Do not harvest when tuber pulp temperature is below 45°F.

Storage

Store only healthy potatoes that are relatively free of handling injury. Gem Russet tubers have a period of dormancy similar to those of Russet Burbank, which is approximately 120 days at 45°F.

For potatoes held for processing, Gem Russet can be stored at slightly lower temperatures than tubers of Russet Burbank. After a healing period of 2 to 3 weeks at 55° to 60°F, tubers can be slowly cooled to a holding temperature of 43° to 44°F. Potatoes held that are intended for storage for longer than 4 to 5 months will need an application of a chemical sprout inhibitor.

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