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Cultural Management of Western Russet Potatoes

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Western Russet is a medium to high yielding potato variety that is useful for both processing and fresh markets. It produces oblong tubers with medium-russet skin and has moderate specific gravity. Western Russet also has demonstrated good resistance to tuber malformations and most internal and external defects, including sugar ends.

Field Selection and Preparation

Fields suitable for planting Russet Burbank should also be appropriate for Western Russet. However, this variety will perform best in well-drained silt loam soils. Heavy, poorly drained soils should be avoided if possible. Prepare the field in the same manner as you would for Russet Burbank. Fields infested with root-knot nematodes or corky ringspot disease, or that have a history of severe early die problems, should be fumigated.

Seed and Planting Management

Optimal seed piece spacing for commercial production is 10 to 12 inches with a planting depth of 5 to 6 inches as measured from the top of the hill to the top of the seed piece. A seed piece spacing of 6 to 8 inches should be used for seed production. Western Russet has an intermediate number of eyes that are widely spaced. Thus, seed piece size should range from 2.25 to 2.75 oz to prevent a high proportion of seed pieces with no eyes. Depending on seed piece size and in-row seed piece spacing, seeding rate per acre will range from 20 to 30 cwt/a when planted in rows spaced 36 inches (Table 1).

Table 1. Amount of seed (cwt/acre) required to plant 1 acre

	In-row seed piece spacing (inch)		
Seed piece size	10	11	12
(oz)	---------- (cwt/acre) ----------		
2.25	24	22	20
2.50	27	25	23
2.75	30	27	25

Note: Amounts do not account for waste for cutting tubers into seed pieces.

Seed should be planted when soil temperatures are at or above 50°F to minimize the potential for soft rot decay. Dry rot potential of seed lots should be determined, and seed should be treated with an effective fungicide seed piece treatment when needed. The optimal hill shape is a wide, flat hill due to the relatively long stolon length of Western Russet. The final hilling operation should cover the seed with 6-8 inches of soil to help minimize tuber greening. However, emerged plants should not be covered during hilling.

Nutrient Management

Total seasonal amount of nitrogen required for Western Russet is about 90 to 100 percent of that required for Russet Burbank, but a higher proportion should be applied early in the growing season to meet the N requirements of this variety. For southern Idaho, the combined total of soil plus fertilizer N for Western Russet ranges from 220 lb N/a in areas with a 400 cwt/a yield

potential to 300 lb N/a in areas with a 600 cwt/a yield potential (Table 2).

All nitrogen can be applied prior to row closure in areas with a short growing season. Split N applications should be used in areas with longer growing seasons. Up to 50% of the N can be applied pre-plant, with the remainder applied before August 5. In-season N applications should be based on petiole nitrate concentrations (Table 3). Nitrogen response studies conducted for two years at Aberdeen, Idaho indicate that petiole nitrate-N sufficiency levels for Western Russet (Table 3) are similar to those for Russet Burbank.

Phosphorus and potassium requirements have not been established for Western Russet. Therefore, phosphorus and potassium fertilizer guidelines for Russet Burbank should be used for Western Russet until new guidelines become available (Tables 4 and 5).

Irrigation Management

Seasonal irrigation requirements for Western Russet are similar to those for Russet Burbank, although Western Russet is significantly more resistant to water-stress-related tuber defects and sugar ends. Available soil moisture (ASM) should be maintained within the range of 65 to 80% for optimal yield and quality. Plant water uptake decreases appreciably in late August, so irrigation application rates need to be adjusted according to soil moisture measurements to avoid developing excessively wet soil conditions that promote disease and swollen lenticels. However, Western Russet should not be dried down excessively prior to harvest. Available soil moisture should be maintained above 60% to avoid tuber dehydration that can increase tuber susceptibility to blackspot bruise. This may require one or more light irrigations between vine-kill and harvest.

Weed Management

Western Russet has exhibited moderate sensitivity to metribuzin, which should be taken into consideration when developing a weed control program. Metribuzin can be applied as part of the weed control program, but lower rates should be used and applications during cool, cloudy conditions should be avoided.

Table 2. Nitrogen fertilizer recommendations for Western Russet potatoes

Soil test NO_3-N (0-12 inches)	Potential yield (cwt/acre)			
	300	400	500	600
(ppm)	---------- (lb N/acre) ----------			
0	180	220	260	300
5	160	200	240	280
10	140	180	220	260
15	120	160	200	240
20	100	140	180	220
25	80	120	160	200

Table 3. Recommended petiole and soil (0-18 inches) NO_3-N concentrations for Western Russet potatoes

	Vegetative	Tuber initiation	Tuber bulking	Maturation
	---------- (ppm NO_3-N) ----------			
Petiole	---	20,000-25,000	15,000-20,000	10,000-15,000
Soil	>20	20	15-20	<15

Table 4. Phosphorus broadcast fertilizer recommendations for Western Russet potatoes for yields up to 400 cwt/acre[a]

Soil test P (0-12 inches)	Percent free lime			
	0	4	8	12
(ppm)	---------- (lb P_2O_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

Note: Apply an additional 40 to 80 lbs P_2O_5/acre in a band application at mark-out or in a band as a starter fertilizer for soil test P levels below 30 ppm.

[a] Add 25 lb P_2O_5/acre for each additional 100 cwt/acre above 400 cwt/acre.

Table 5. Potassium fertilizer recommendations for Western Russet potatoes

Soil test K (0-12 inches)	Potential yield (cwt/acre)			
	300	400	500	600
(ppm)	---------- (lb K_2O/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

Table 6. Disease reactions of Western Russet compared with those of Russet Burbank

Disease[a]	Western Russet	Russet Burbank
Common scab (*Streptomyces*)	1	1
Verticillium wilt (*Verticillium*)	5	8
Early blight (*Alternaria*)		
Foliar	5	6
Tuber	7	3
Late blight (*Phytophthora*)		
Foliar	8	8
Tuber	4	4
Dry rot (*Fusarium*)	8	7
Soft rot (*Pectobacterium*)	6	7
PVS	8	8
PVX	8	8
PVY^{o}	3	7
PLRV		
Foliar infection	7	8
Net necrosis	5	8
Corky ringspot	8	8

[a] Relative disease reactions are based on data from field trials conducted in Aberdeen, ID and Corvallis and Hermiston, OR from 1987-2001. Ratings were based on a 1-9 scale where 1 = very resistant and 9 = very susceptible.

Disease Resistance and Management

Western Russet is very resistant to common scab and it seldom shows symptoms under normal field conditions in Idaho. Foliar and tuber susceptibility to late blight, and susceptibility to PVS, PVX and corky ringspot are similar to Russet Burbank. However, Western Russet is more resistant to Verticillium wilt, PLRV net necrosis and PVY than Russet Burbank and is slightly more resistant to foliar early blight, soft rot and PLRV. It is more susceptible to dry rot and is significantly more susceptible to early blight infections of the tubers. Western Russet is also more susceptible to pink rot than Russet Burbank (data not shown). See Table 6 for detailed information.

General disease management guidelines for Western Russet

1. Fumigate fields with a history of nematode problems. Fumigation for early die (Verticillium dahliae) may not be economically viable in fields with no history of severe problems.
2. Use a seed piece treatment labeled for control of Fusarium dry rot if necessary.
3. Scout for early blight and make fungicide applications as necessary.
4. Use prescribed late blight control methods.
5. Control green peach aphids to minimize net necrosis. This is not quite as critical as for Russet Burbank, but still needs attention for this variety since it is susceptible.
6. Use an effective management program for pink rot.

Recommendations for managing early blight

The foliage of Western Russet expresses a "normal" response to early blight. It rarely becomes severe enough to impact yield, but lesions will generally be present every season and will become more evident as the crop senesces. However, serious problems can result from susceptibility to the tuber phase of this disease. Infection of the tubers does not cause a destructive rot, but leads to unsightly sunken lesions that affect quality. Infection of eyes in seed tubers may also influence emergence and stem numbers and may make seed tubers more susceptible to dry rot decay.

Tubers become infected with early blight at harvest. Although the fungus can penetrate tubers directly, infection is much more likely in tubers that have been injured. Factors that lead to more infection include a high level of early blight in the foliage, immature tubers that lose skin during handling, and bruising during harvest. Adequate nitrogen fertilization is also important, particularly early in the season to help minimize the development of foliar infections. Infected tubers stored at warm temperatures are susceptible to more rapid development of this disease.

To minimize tuber infection it is important to be very aggressive in foliar early blight management. Use early blight control products in rotation with EBDC fungicides (ethylene bisdithiocarbamates) or chlorothalonil. Early blight control should continue until shortly before vine kill. Plan on using one to two more fungicide applications than for Russet Burbank.

Management strategies during crop growth

Control early blight development in the vines to reduce opportunities for tuber infection. Products containing strobilurins are very effective in managing this disease. Experience with Western Russet and other susceptible varieties suggests the following general fungicide regime should be effective for controlling early blight, although additional fungicide applications may be necessary:

1. At row closure—treat with boscalid or a strobilurin fungicide.
2. Ten to fourteen days after row closure—treat with a protectant fungicide spray such as chlorothalonil or EBDC.
3. Mid-August (within 3 weeks of vine kill)—treat with boscalid or a strobilurin fungicide.

Strobilurin products include: Amistar, Gem, Headline, Quadris Flowable, Quadris Opti, Reason 500 SC, and Tanos. Boscalid is formulated as Endura.

Management strategies during vine kill

Reduce the exposure of tubers to early blight inoculum by mechanically removing the vines or using a vine kill product that comes as close as possible to completely killing all green vine and leaf tissue. Try to eliminate the presence of living vines for at least two weeks prior to harvest. Make sure tubers are sufficiently mature in order to minimize skinning injury. Also use vine kill measures that minimize sloughing of the shoulders of the hills to reduce tuber exposure to sunlight and reduce greening.

Management strategies at harvest

Use proper handling practices to prevent bruising of tubers during harvest, including proper timing of harvester chains, operating harvest and handling equipment at full capacity, and padding contact points that may bruise tubers. Avoid harvesting during wet weather.

Management strategies in storage

Provide high humidity (>95%) conditions to promote wound healing and cool as soon as possible to 55°F for 2 to 3 weeks. If holding for processing, drop the temperature 1.0 -1.2°F each week or 0.1 to 0.2°F per day. Final holding temperature should be 45-48°F, depending on customer requirements.

Managing Blackspot Bruise

Although not as prone to blackspot bruise as Ranger Russet, Western Russet can exhibit bruise symptoms as a result of improper handling. The bruise symptoms can be expressed at any point prior to marketing, including at harvest, during removal from storage, or during packing. Blackspot bruise potential is greater in tubers that have been 1) stressed during the growing season, 2) are over-mature (allowed to remain in the soil for long periods after vine death), 3) are dehydrated at the time of harvest or handling, and 4) are handled when cold.

Management strategies during crop growth

Maintain good fertility and irrigation practices throughout the crop growth period. Ensure adequate availability of soil potassium. Control pests that injure foliage and increase plant stress. Maintain healthy foliage up to the point of vine kill.

Management strategies during vine kill

Plan the harvest to coincide with optimum maturity to avoid development of over-mature tubers. Kill the vines while they are senescing but still alive, and then harvest as soon as feasible without causing excessive skinning. Maintain soil moisture above 55 to 60% ASM to prevent tubers from becoming dehydrated during the maturation period. This may require a light irrigation during the skin-set period prior to the pre-harvest irrigation.

Management strategies at harvest

Use best management practices to prevent bruising of tubers during handling, including proper timing of harvesters, operating harvest and handling equipment at full capacity, and padding contact points that may bruise tubers.

Management strategies in storage

Maintain humidity greater than 95% throughout the storage period to prevent dehydration.

Management strategies during removal from storage and packing

Significant amounts of bruising can occur during packaging if tubers are handled improperly. Warm tubers to at least 45°F (50 to 55°F is better) before handling. During retrieval from storage and packing operations, use the same handling practices previously described for harvest.

Storage Management

Tuber dormancy for Western Russet is about 45-55 days shorter than Russet Burbank at 42°F, 45°F and 48°F storage temperatures. At 42°F, Western Russet breaks dormancy at approximately 130 days after harvest (DAH), 100 DAH at 45°F, and 80 DAH at 48°F. Consequently, a sprout inhibitor should be applied after wound healing and curing but before dormancy break. Thus, sprout inhibitor application should take place within the first few weeks after harvest. In the absence of disease problems, Western Russet can be stored up to nine months for processing or fresh market uses. Western Russet shows low to moderate weight loss in long-term storage.

In storage research conducted at Kimberly, Idaho, Western Russet exhibited sucrose concentrations that were similar to Russet Burbank from harvest during nine months of storage at 45 to 48°F. Glucose and fry color from non-stressed tubers were also similar to Russet Burbank, remaining acceptable during nine months of storage. Glucose concentration peaked at about 70 to 110 days in storage and then progressively decreased. Research with Western Russet indicates that in growing seasons with normal temperatures, a storage temperature of 46-48°F is appropriate for tubers intended for processing. One clear benefit to this variety is the limited incidence of sugar end development. Tubers intended for the fresh market should be stored at 42-45°F. A sprout inhibitor should be applied early for long-term storage. Seed crops should be stored at 37-39°F as late into the spring as possible. In cases where the final destination is uncertain, store Western Russet at the above processing temperatures.

For more information, see "Storage Management of Western Russet Potatoes" at http://info.ag.uidaho.edu/pdf/CIS/CIS1151.pdf.

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