



Cultural Management Of Frontier Russet Potatoes

Stephen L. Love, Joseph J. Pavek, Dennis L. Corsini, James C. Whitmore and Timothy P. Baker

Frontier Russet, a new potato variety released by the Northwest Potato Breeding Program, is an early- to medium-maturing, long russet with good processing and fresh-market characteristics. Due to its early maturity and low tuber set, Frontier Russet has some unique management requirements. This publication is designed to provide management tips for the successful production of high-quality Frontier Russet potatoes in southern Idaho. Growers should adapt this information to their own situations as experience dictates.

Seed Management

All sound seed storage and handling practices should be followed (see Pacific Northwest publication 248, *Potatoes: Influencing Seed Tuber Behavior*, and University of Idaho CIS 208, *Better Potato Stands*). Optimum seed size is 2 to 2.5 ounces. Avoid seed lots with an abundance of large tubers. Large tubers of Frontier Russet have widely spaced eyes and may produce some blind seed pieces. A seed treatment is advised.

Seed Spacing and Planting Depth

Frontier Russet develops a small plant and produces a relatively low number of tubers. Tubers are typically set high in the hill. Frontier Russet benefits from a closer seed spacing than is normal for Russet Burbank (Table 1). Suggested spacings are intended to optimize

yield and tuber size response and will need to be adjusted according to seed cost and availability.

To prevent excess greening, planting depth should be about 1 inch deeper than is usual for Russet Burbank. Suggested planting depth is 6 to 7 inches with a depth of 8 to 9 inches after final hilling.

Fertility

No research information is available concerning the phosphorus, potassium or micronutrient requirements of Frontier Russet. Follow recommendations developed for Russet Burbank potatoes (see University of Idaho CIS 261, *Idaho Fertilizer Guide: Potatoes*).

Because Frontier Russet has a small plant and matures early, its nitrogen management differs from that of large-vined, late varieties such as Russet Burbank. Crop need is based on potential yield. Use Table 2 to predict potential yield until experience provides better estimates. Obtain a soil test to determine residual nitrogen, and use Table 3 to determine the amount of nitrogen to apply. As a rule, Frontier Russet will use approximately 10 to 20 percent less nitrogen than Russet Burbank.

Due to the determinate¹ growth habit of Frontier Russet, it is recommended that all nitrogen fertilizer be applied before tuber initiation. This is especially important for seed producers. Application can be made entirely preplant or in early split applications. Early nitrogen availability will bring the benefits of greater tuber set and earlier completion of bulking.

Petiole testing of Frontier Russet is optional because of the plant's need for early nitrogen applications. How-

Table 1. Suggested within-row seed piece spacing and seed per acre for Frontier Russet according to intended market class.

Market class	Seed spacing ¹ (inches)	Seed per acre ² (cwt)
Seed	6 to 7	31 to 36
Fresh pack	8 to 9	24 to 27
Frozen processed	9 to 10	22 to 24

¹Recommendation based on a 36-inch row width.

²Based on a 2-ounce average seed piece.

¹Early potato varieties are typically determinate, that is, they have a short, fixed growth period. They do not respond well to efforts such as fertilization to extend the growth period.

ever, if you do petiole testing, apply at least half of the seasonal nitrogen requirement before planting then use the suggested petiole nitrate-nitrogen levels from Table 4 to help you decide the crop's need for nitrogen. If you apply additional nitrogen, total amounts should not exceed rates found in Table 3 and application should cease 6 weeks before the desired harvest date. This is especially important when projecting an early harvest, which requires tuber maturation following the killing of green vines.

Irrigation

Frontier Russet requires less water to produce a crop than does Russet Burbank for two reasons: (1) It uses less water during the season, and (2) it has a shorter growing period. As with other potato varieties, available soil moisture should be maintained above 65 percent. However, Frontier Russet requires less water to maintain this level during the growing season than does Russet Burbank.

Frontier Russet has a more extensive root system than Russet Burbank and is better able to maintain adequate photosynthetic rates during periods of drought. Consequently, short, dry periods will do less damage to the yield and quality of Frontier Russet.

Two growth stages require careful water management. The first critical growth stage is early tuber bulking. Although it is easier under drought conditions to

obtain a high percentage of U.S. No. 1 potatoes with Frontier Russet than with Russet Burbank, insufficient water during this period may significantly reduce yields. The second critical stage is when the vines begin to mature. At this stage, water use drops drastically, and it becomes easy to overwater. Careful monitoring of the soil water content becomes critical because overwatering can result in water rot.

Irrigation management during the maturation phase of growth depends on intended vine kill and harvest dates. If an early harvest is planned (August to mid-September) and the vines are still green, the soil should be allowed to dry to 50 percent available moisture before vine kill. This may take about 2 weeks and will aid the maturation process. If a later harvest is planned (September to early October), monitor the soil moisture and let the soil dry to 60 percent before applying additional water. The most prominent irrigation problem likely to occur with Frontier Russet is overwatering. Do not simply assume that this variety can be irrigated using the same water amounts and time intervals used for large-vined varieties.

Weed Control

Frontier Russet is not sensitive to any of the common herbicides registered for potatoes in Idaho. Rates recommended for Russet Burbank should be adequate (see University of Idaho CIS 291, *Metribuzin for Potato Weed Control*).

Table 2. Potential yield of Frontier Russet in southern Idaho.

Growing area	Potential yield ¹ (cwt/acre)
East ²	300 to 400
Central	400 to 500
West	500 to 600

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 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 4. Suggested minimum petiole NO₃-N levels for Frontier Russet during different growth stages.

Growth stage	Growth stage description	Minimum petiole nitrogen ¹ (ppm NO ₃ -N)
I	Planting until tuberization	20,000
II	Tuberization phase	18,000
III	Tuber bulking phase	18,000
IV	Maturation (yellowing, leaf loss)	13,000

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

Table 3. Total nitrogen fertilizer requirements for Frontier Russet based on soil test and potential yield.

Soil test nitrogen ² (ppm N)	Nitrogen requirement based on potential yield ¹				
	200	300	400	500	600
	(lb N/acre)				
0	90	135	180	225	270
10	55	100	145	190	235
20	20	65	110	155	200
30	0	30	70	120	160
40	0	0	35	80	125
50	0	0	0	45	90
60	0	0	0	0	55

Note: Add 15 pounds N for each ton of grain straw from the previous crop, up to 50 pounds per acre.

¹Nitrogen requirement is based on potential yield in cwt per acre.

²Total ppm of NO₃-N and NH₄-N in 0- to 12-inch samples and 12- to 24-inch samples.

Diseases

Use of certified seed is recommended to reduce problems with virus diseases, ring rot and blackleg. Proper field rotation practices to minimize verticillium wilt should also be followed. Frontier Russet is not affected by early dying to the same extent as other early varieties, but some reduction in yield and quality can result (see University of Idaho CIS 564, *Verticillium Wilt in Potatoes in Southeastern Idaho*).

Mid- and late-season inspections for early blight are necessary. Like other early varieties, Frontier Russet is susceptible to rapid spread of the disease, and early onset of symptoms may indicate a need for fungicide treatments (see University of Idaho CIS 239, *Control of Early Blight in Potato in Eastern and Southeastern Idaho*).

Vine Kill and Harvest

Frontier Russet has a short and extremely rapid tuber bulking phase. Also, the vines can remain green after tubers have reached optimum size. Consequently, it is important to sample the crop every few days when the desired vine kill date is approaching. This is especially critical for seed growers because late vine kill can lead to an excess of oversized tubers. Because the optimum size depends on the intended market, no specific recommendations can be given. But growers should be aware of the tendency for oversized tubers.

When projecting a harvest date for Frontier Russet, plan for proper vine kill. If you desire an early harvest and the vines are still green, a maturation period of 17 to 21 days between the beginning of vine kill and harvest is required. A shorter period will result in skinning during harvest.

Frontier Russet is less susceptible than Russet Burbank to both blackspot and shatter bruise. However, good bruise prevention practices should be followed (see University of Idaho CIS 858, *Potato Harvester Modifications for Bruise Reduction*).

Storage

Frontier Russet's length of dormancy and general ability to be stored are very similar to those of Russet Burbank, but Frontier Russet is less susceptible to storage rots. With a few exceptions, the storage practices developed for Russet Burbank will be adequate for Frontier Russet (see Pacific Northwest publication 275, *Potatoes — Storage and Quality Maintenance in the*

Pacific Northwest, and University of Idaho CIS 297, *Potato Storage — Construction and Management*). One exception is storage temperature for potatoes intended for processing. Although Frontier Russet was developed as a fresh-market and early-season processing variety, it may at times be stored before processing. Potatoes intended for processing should be stored at 47°F to 50°F in order to prevent sugar buildup. At no time should the temperature drop below 45°F. Temperature management will be more critical than for Russet Burbank.

Seed potatoes of Frontier Russet should be stored at 37°F to 39°F. They usually break dormancy several days earlier than Russet Burbank potatoes. Fluctuations in storage temperature shorten dormancy. Consequently, Frontier Russet seed potatoes should be stored at cool (37°F to 39°F), even temperatures until just before cutting.

Management Summary

Seed: Optimal cut seed size is 2 to 2.5 ounces. Seed piece spacing should be 8 to 10 inches for commercial crops and 6 to 7 inches for seed crops. Final seed piece depth should be 8 to 9 inches.

Fertility: Use recommendations developed for Russet Burbank for phosphorus and potassium. Apply all or most of the nitrogen preplant. Total nitrogen requirement is 80 to 90 percent of Russet Burbank's.

Irrigation: Avoid early- to midseason water stress and late season overwatering.

Diseases: Spray for foliar early blight when needed.

Vine Kill: Vine kill is required for early harvest and prevention of oversized seed. Kill vines 17 to 21 days before harvest.

Storage: Potatoes destined for french fry production should be maintained at 47°F to 50°F.

Authors — Stephen L. Love is potato variety development specialist and assistant professor at the University of Idaho Research and Extension Center at Aberdeen. Joseph J. Pavsek is research geneticist-potato breeder and Dennis L. Corsini is research plant pathologist, both with the USDA Agricultural Research Service at Aberdeen, Idaho. James C. Whitmore is superintendent of the UI Research and Extension Center at Teton. Timothy P. Baker is research associate at the UI Research and Extension Center at Aberdeen.



SERVING THE STATE

Teaching . . . Research . . . Service . . . this is the three-fold charge of the College of Agriculture at your state Land-Grant Institution, the University of Idaho. To fulfill this charge, the College extends its faculty and resources to all parts of the state.

Service . . . The Cooperative Extension System has offices in 42 of Idaho's 44 counties under the leadership of men and women specially trained to work with agriculture, home economics and youth. The educational programs of these College of Agriculture faculty members are supported cooperatively by county, state and federal funding.

Research . . . Agricultural Research scientists are located at the campus in Moscow, at Research and Extension Centers near Aberdeen, Caldwell, Parma, Teton and Twin Falls and at the U.S. Sheep Experiment Station, Dubois and the USDA/ARS Soil and Water Laboratory at Kimberly. Their work includes research on every major agricultural program in Idaho and on economic activities that apply to the state as a whole.

Teaching . . . Centers of College of Agriculture teaching are the University classrooms and laboratories where agriculture students can earn bachelor of science degrees in any of 20 major fields, or work for master's and Ph.D. degrees in their specialties. And beyond these are a variety of workshops and training sessions developed throughout the state for adults and youth by College of Agriculture faculty.

Issued in furtherance of cooperative extension work in agriculture and home economics, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, LeRoy D. Luft, Director of Cooperative Extension System, University of Idaho, Moscow, Idaho 83843. We offer our programs and facilities to all people without regard to race, creed, color, sex or national origin.