



## **Nutrient Recommendations for Russet Burbank Potatoes in Southern Alberta**

*This research shows that optimal nutrient requirements for Russet Burbank potatoes, as measured in the plant petioles, may be different than traditionally recommended. The new recommended nitrate nitrogen range for southern Alberta is slightly lower than the northwest USA standard, both early and late in the growing season. Optimal phosphorus ranges are substantially less than the standard recommendation. The optimal potassium ranges are similar early in the season, but may be higher late in the growing season.*

### **Why is this research important to potato growers?**

The collection and analysis of potato petiole (leaf stem) samples can be a useful and timely technique for identifying crop deficiencies that may occur mid-season, however, the currently recommended petiole nutrient concentrations for Russet Burbank potatoes are based on data collected in the northwest United States. Previous studies in southern Alberta indicate these recommendations may be high for potassium (K) and slightly high for phosphorus (P), especially in the early part of the growing season. While sufficient nutrients are necessary to maximize tuber yield, quality, and uniformity, excess fertilizer is undesirable from both an economic and an environmental perspective.

A three-year project was conducted by Alberta Agriculture and Food, with financial support from the Potato Growers of Alberta, to determine the optimal petiole nutrient concentrations for Russet Burbanks grown in southern Alberta and the relationship, if any, between potato petiole nutrient concentrations and tuber specific gravity.

### **How was the research conducted?**

Ten different rates of N, P, and K fertilizers were surface applied on replicated plots at three different sites in southern Alberta during three growing seasons. The plots were located on a coarse-textured Orthic Brown Chernozemic soil (2004), a medium-textured Orthic Brown Chernozemic soil (2005) and a medium-textured Orthic Dark Brown Chernozemic soil (2007). The fertilizer rates for the treatments were chosen to create four increasing amounts of one nutrient, while holding the other two constant.

Petiole samples were collected and analyzed for each plot on seven occasions, starting in late June and ending in mid-August, using the fourth petiole from the top of the main stem. Approximately 80 petioles were collected from each plot, at each sampling date. Samples were ground and sent to a laboratory for analysis of nitrate nitrogen (NO<sub>3</sub>-N), phosphorus (P), and potassium (K). Tuber samples were collected in mid September, using the PGA two-row harvester. The samples were graded and weighed to calculate total yield (short tons per acre), marketable yield, mean tuber weight, and the percentage of smalls (potatoes less than 1<sup>7</sup>/<sub>8</sub> in. diameter). Marketable yield was defined as total yield

minus the yield of undersize tubers. Specific gravity was calculated as the weight in air divided by the weight in water.

Specific gravity is the most widely accepted measurement of potato quality. There is a high correlation between the specific gravity and the starch content and percentage of dry matter or total solids in the potato. Specific gravity is important to the processor because it affects the quality and yield of the processed product. Where potatoes are fried, it affects processing costs, as oil absorption rates are inversely related to dry matter levels.

### What were the research findings?

The suggested petiole nitrate-nitrogen range is slightly lower than the northwest USA standards both at the beginning of the growing season and late in the growing season. The revised optimal petiole ranges for phosphorus are substantially lower than the northwest USA standards. The recommended potassium ranges are wider than the northwest USA standards overall. They are similar early in the growing season, but the upper limits of the new potassium recommendations are greater than for the northwest USA standards later in the growing season.

### Recommended Russet Burbank Petiole Nutrient (NO<sub>3</sub>-N, P, and K) Concentrations for Southern Alberta

Days After Planting	Optimal Petiole Nutrient Concentrations					
	NO <sub>3</sub> -N (ppm)		P (%)		K (%)	
	90%RY	100%RY	90%RY	100%RY	90%RY	100%RY
60	13000	21400	0.15	0.30	7.3	12.4
65	11550	19950	0.15	0.28	6.6	11.6
70	10100	18500	0.14	0.27	5.9	10.7
75	8650	17050	0.14	0.25	5.2	9.9
80	7200	15600	0.13	0.24	4.5	9.0
85	12978	20378	0.13	0.22	8.8	14.1
90	11756	19156	0.13	0.21	7.9	13.2
95	10533	17933	0.12	0.19	7.1	12.4
100	9311	16711	0.12	0.18	6.2	11.5
105	8089	15489	0.12	0.16	5.4	10.6
110	6867	14267	0.11	0.15	4.5	9.7
115	5644	13044	0.11	0.13	3.7	8.9
120	4422	11822	0.10	0.12	2.8	8.0
125	3200	10600	0.10	0.10	2.0	7.1

NO<sub>3</sub>-N = nitrate nitrogen, P = phosphorus, K = potassium, RY = relative yield

Potato growers should determine petiole nutrient concentrations on a field-by-field basis, considering precipitation, soil texture, sampling technique, irrigation management, and other factors, and using the new recommendations as guidelines only.

Though many growers believe increased potassium applications have an effect on specific gravity, the researchers observed no consistent or significant relationship to exist.

#### For more information contact:

Shelley Woods ([Shelley.A.Woods@gov.ab.ca](mailto:Shelley.A.Woods@gov.ab.ca)) or  
Michele Konschuh, ([Michele.Konschuh@gov.ab.ca](mailto:Michele.Konschuh@gov.ab.ca))  
Alberta Agriculture and Food

DRAFT