

New Potato Varieties Have Potential to Produce Higher Yields with Less N Fertilizer

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Sustainability – we’ve heard a lot about that concept in the recent past as it relates to potato production. In fact, the 2010 University of Idaho Potato Conference theme was “Putting Sustainability into

Practice.” Developing a sustainable potato industry includes optimizing the use of production inputs such as fertilizer, water and pesticides. The aspect of sustainable potato production that we’ll address in this

article is nitrogen-use efficiencies of newer potato varieties. A five-year study was initiated in 2005 at the UI Aberdeen Research & Extension Center to evaluate the potential of improving nitrogen-use efficiency in potato production systems by growing recently released potato varieties. From 2005 through 2009, the nitrogen responses of seven varieties—Alpine Russet, Alturas, Classic Russet, Clearwater Russet, Highland Russet, Premier Russet and Western Russet—released by the Northwest Variety Development gram were compared with set Burbank, the industry dard. In each trial, all varieties were fertilized at rates of 0, 90, 180, 270 and 360 lb N/ac. Sixty percent of the nitrogen was applied prior to planting and 40 percent was applied during tuber bulking. All en varieties were included in the trial for at least two years.

Data from two of the varieties in the study are shown in figures 1 and 2, which compares the N responses of Premier Russet (Fig. 1) and Alturas (Fig. 2) to Russet Burbank. Similar response curves were developed for the other five varieties, with data being combined for the years that they were in the trial. Note that the maximum yield for Russet Burbank was 400 cwt/ac and it took 240 lb N/ac to produce that yield. Consequently, for every 1 lb N/ac, Russet Burbank produced 1.67

cwt/ac (400 cwt ÷ 240). Maximum yield for Premier Russet was 465 cwt/ac (Fig. 1), but it took only 200 lb N/ac. Therefore, for every 1 lb N/ac, Premier Russet produced 2.33 cwt/ac (465 cwt ÷ 200). Alturas produced 2.84 cwt/ac for each 1 lb N/ac (Fig. 2).

Total yield produced per lb of N at the point of maximum yield (expressed as cwt/lb N/ac) was determined for each of the seven varieties and is summarized in Table 1. With the exception of Highland Russet, all the new varieties produced appreciably higher yields per lb of N fertilizer than Russet Burbank. These values are expressed in Table 1 as nitrogen use efficiency (NUE) compared with Russet Burbank, and ranged from 9 percent higher for Western Russet to 70 percent higher for Alturas. That is, for each 1 lb N/ac Western Russet produced 9 percent more yield and Alturas produce 70 percent more yield.

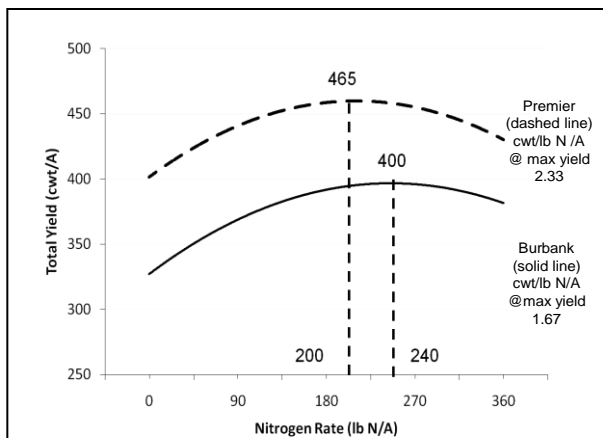


Figure 1. Total Yield Response to N Fertilizer for Premier Russet and Russet Burbank.

Figure 2: Total Yield Response to N Fertilizer for Alturas and Russet Burbank. The graph shows Total Yield (cwt/A) on the y-axis (250 to 500) and Nitrogen Rate (lb N/A) on the x-axis (0 to 360). Alturas (dashed line) peaks at 440 cwt/A at 155 lb N/A. Russet Burbank (solid line) peaks at 400 cwt/A at 240 lb N/A. The NUE for Alturas is 2.84 cwt/lb N/A and for Russet Burbank is 1.67 cwt/lb N/A.

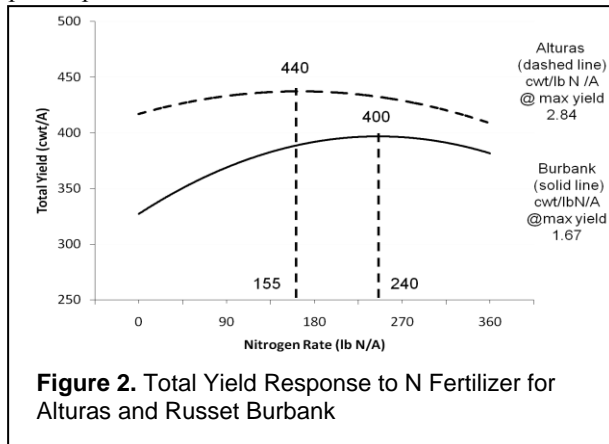


Figure 2. Total Yield Response to N Fertilizer for Alturas and Russet Burbank

Variety	cwt/lb N/ac @ Maximum Yield	NUE (% of Russet Burbank)
Alpine	1.77	118%
Alturas	2.84	170%
Classic	1.90	127%
Clearwater	2.00	133%
Highland	1.70	102%
Premier	2.33	139%
Western	1.82	109%

Theses yield responses to N were subsequently used to develop N fertilizer requirements for these new varieties based on yield goal (Table 2). Within the range of yields produced in the trials at Aberdeen, Alturas required about 40 percent less N than Russet Burbank for a given yield goal, while Classic Russet, Clearwater Russet and Premier Russet required about 20 to 25

percent less N. Alpine Russet and Western Russet were slightly less efficient than Alturas, Clearwater Russet, Premier Russet and Classic Russet, but still

quired less N than Russet Burbank.

These results show that the potential for improving the efficiency of N fertilizer

Table 2. Nitrogen requirement of seven varieties based on yield goal

Variety	Yield Goal 400 cwt/a (lb N/ac)	Yield Goal 500 cwt/a (lb N/ac)	Percent Reduction in N Requirement vs. Russet Burbank
R. Burbank	240	280	0%
Alpine	200	235	17%
Alturas	140	165	42%
Classic	190	220	21%
Clearwater	180	210	25%
Highland	240	280	0%
Premier	175	200	27%
Western	220	255	9%

bility of potato production systems.

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use by incorporating these newer potato varieties into potato production systems is substantial. Reducing fertilizer applications by 20 to 40 percent per unit of yield produced would not only provide a substantial economic benefit to growers, but would also provide environmental benefits and contribute significantly to the sustaina-

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Did You Know?

There were nearly 400 varieties of potatoes accepted for seed certification in the U.S. in 2009.

the Spudvine newsletter is published 9 times a year by UI Extension, Bingham County Office, 583 W. Sexton St., Blackfoot, ID 83221, (208)785-8060. Also available on the Internet at <http://www.extension.uidaho.edu/bingham/spudvine/htm>

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