

BULKING RATE OF SIX POTATO VARIETIES IN EASTERN IDAHO

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In 2003, the Russet Burbank variety was planted on approximately 69 percent of the total potato acres in Idaho followed by Ranger Russet on about 13 percent of the acres, and Russet Norkotah making up about 10 percent. Additionally, Alturas and Shepody were each planted on just over 1 percent of the total acres. Although these newer varieties are increasing in acreage, little is known about the tuber bulking rates of these varieties in eastern Idaho. It is important to understand bulking rates in order to correctly fertilize the crop and to determine when to harvest for maximum yield.

PROCEDURE

A study was planted in 2003 at the Aberdeen R & E Center to determine when Russet Burbank, Ranger Russet, Russet Norkotah, Russet Norkotah-3, Alturas, and Shepody began tuber bulking and to determine the rate of bulking. The varieties were planted May 1 in a strip-plot design with four replications. Each plot consisted of four rows 20 feet long. The center two rows of each plot were harvested every two weeks beginning July 3 (63 days after planting) with the last harvest on September 25 (147 dap) for a total of seven harvests. Vines were mechanically chopped immediately before the tubers were mechanically lifted. All tubers approximately one inch and larger in diameter were picked up manually. Tubers were taken to the laboratory to separate into size and grade categories to determine yield.

RESULTS AND DISCUSSION

Total yield bulking rate curves (profiles) for the six varieties are shown in Figure 1. For comparison, because most producers have experience raising Russet Burbank, the bulking curve of Russet Burbank is shown as a dotted line along with the bulking curve for each of the other varieties tested. By the last harvest date on September 25, 2003, all varieties had been killed by freezing temperatures, so it is unlikely that any growth would have occurred after that time. Although the graphs show harvest dates of June 5 and 19, no harvests occurred on those dates.

Knowing the bulking profiles of varieties can be used to help determine when to harvest a crop for maximum yield. After the July 31 (91 dap) harvest date, Russet Norkotah had a tuber-bulking rate of less than 1 cwt./a/day for the remainder of the season. After the August 28 (119 dap) harvest date, Russet Burbank, Russet Norkotah-3, and Shepody had a tuber-bulking rate of less than 1 cwt./a/day for the remainder of the season. Ranger

Russet and Alturas had a tuber- bulking rate of more than 1 cwt./a/day until the September 11 (133 dap) harvest date. However, the crop in 2003 appeared to develop earlier than normal resulting in early senescence, and some of the varieties may have maintained higher bulking rates later in the season had it not been for very warm summer growing conditions.

The number of days of linear bulking was estimated by using the growth curves in Figure 1 and establishing the number of days between two points: (a) production of 20 cwt. yield on the low end of the curve, and (b) the maximum yield minus 20 cwt. on the high end. Linear bulking rates were calculated as the maximum yield minus 40 cwt., divided by the length in days of the linear bulking period. Table 1 shows the maximum bulking rates, length of linear bulking, and the rate during the linear bulking period (not statistically analyzed). Russet Norkotah had the highest maximum bulking rate, but also the shortest length of linear bulking as might be expected of this short-season variety. Ranger Russet had the second lowest maximum bulking rate at 9.8 cwt./a/day, but had the longest linear bulking rate period at 60 days.

Table 1. Maximum and linear bulking rates of six potato varieties grown in 2003 at the Aberdeen R & E Center.

Variety	Maximum Bulking <i>Rate (cwt./a/day)</i>	Length of Linear Bulking <i>Period (days)</i>	Rate of Linear Bulking <i>Rate (cwt./a/day)</i>
Russet Burbank	11.6	46	6.3
Ranger Russet	9.8	60	7.1
Russet Norkotah	12.6	34	7.8
Russet Norkotah-3	8.8	51	6.3
Alturas	10.1	51	7.4
Shepody	10.4	51	6.0

Knowing the bulking rate curves can also be useful in determining nutrient management practices, particularly nitrogen. However, even if two varieties have similar bulking profiles, they may not necessarily respond to the same amount of nitrogen. Bulking profiles can be useful in determining when to apply nitrogen.

Although nitrogen uptake was not determined in the study reported here, Kleinkopf et al. (1981) reported on the uptake of nitrogen by several potato varieties. Two of the varieties in their study were Russet Burbank (long-season, indeterminate growth-pattern) and Norgold Russet (short-season, determinant growth-pattern), which has a growth pattern similar to Russet Norkotah. Kleinkopf reported that regardless of growth pattern, plants took up 60 percent of the total seasonal nitrogen by the end of growth stage II (tuberization period), but only had produced 20 percent of the total seasonal dry matter (tops, roots, and tubers).

From data presented by Kleinkopf and from research conducted at the University of Idaho, it is known that bulking rate profiles alone cannot be used to determine nitrogen amounts. For example, Russet Burbank and Shepody have very similar bulking curves,

yet Shepody requires only approximately 80 percent of the nitrogen needed for Russet Burbank due to greater nitrogen use efficiency (Love et al. 2003).

CONCLUSIONS

- Potato varieties grown at the Aberdeen R & E Center in 2003 had different bulking rate profiles, and different maximum and linear bulking rates.
- Russet Burbank, Shepody, and Russet Norkotah-3 had similar bulking patterns in 2003.
- Bulking rate profiles can be used to help determine optimum harvest dates.
- Bulking rate profiles alone cannot be used to determine quantity of nitrogen to apply.
- Bulking rate profiles provide information for determining timing of nitrogen applications.
- Research must be conducted to optimize the amount of nitrogen to apply, and when best to apply the nitrogen.

REFERENCES

- Kleinkopf, G.E., D.T. Westeman, and R.B. Dwelle. 1981. Dry matter production and nitrogen utilization by six potato cultivars. *Agron. J.* 73: 799-802.
- Love, Stephen L., Richard Novy, Dennis Corsini, and Peggy Bain. 2003. Variety Selection and Management. *In* Stark, J.C. and S.L. Love. (eds.) *Potato Production Systems*. p. 34. University of Idaho.

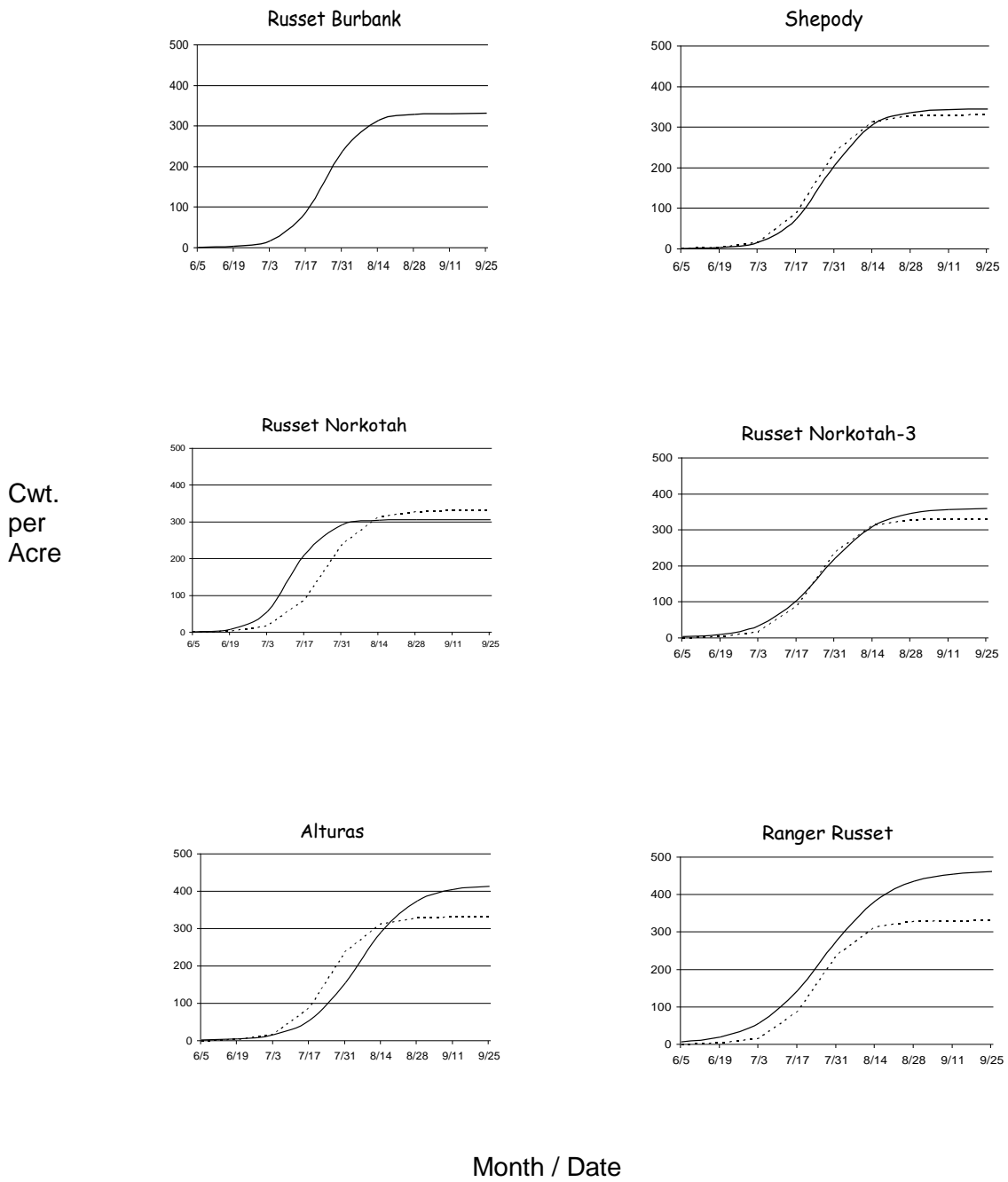


Figure 1. Total yield bulking rate curves for six potato varieties grown in 2003 at the Aberdeen R & E Center. Dotted line is Russet Burbank.