

**AIM Research Trial Report:**      **Reduced Nitrogen on Seed Potatoes**  
Working Group:                      Seed and Tuber Quality Improvement  
Crop Year:                              2022  
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### **Project Rationale:**

Since the start of the AIM program, the Seed Working Group has been investigating ways to optimize the size profile of seed potatoes to necessitate less cutting of seed. Reduced seed cutting with larger average seed piece size has generally been associated with improved emergence, less seed wastage, and improved yields. This group has conducted research on a number of best management practices associated with reducing average tuber size and increasing the number of tubers per plant, including use of gibberellic acid, tighter seed spacing, manipulation of physiological age, and use of ethylene gas in storage. There has also been some work done around reducing the amount of nitrogen applied at planting for seed potatoes. In these past studies, there has been no reduction in yield with the reduction of nitrogen; in fact, we have seen some small increases in yield and tuber number at lower rates of nitrogen. Therefore, it was requested to continue this work in 2022 but with some of the newer varieties being contracted by Cavendish Farms instead of just with legacy varieties such as Russet Burbank and Shepody.

### **Project Overview:**

A total of four (4) fields were set up with reduced nitrogen trials in 2022 across two farms. At a farm in West Prince (WP), we set up two trials on seed fields. Varieties evaluated were Dakota Russet and Alverstone Russet. For both varieties, the standard nitrogen rate was 100 lbs N per acre, applied in-furrow at planting. The treatment rate was 80 lbs N per acre applied in-furrow. This fertilizer was specially blended for the trial, ensuring that the P, K, and other nutrients were the same between treatment and control, with nitrogen as the only nutrient reduced. Both fields (adjacent to each other) were in an alfalfa/timothy forage mix in 2021, so there would have been some nitrogen credit coming from the alfalfa for the 2022 potato crop. Planting date was May 16<sup>th</sup> for Alverstone Russet and May 24<sup>th</sup> for Dakota Russet and top-kill date was September 3<sup>rd</sup> (1<sup>st</sup> spray) and September 9<sup>th</sup> (2<sup>nd</sup> spray). Samples were harvested on September 29<sup>th</sup>, 2022.

On the WP Dakota Russet field, there was significant foliar injury evident in July and August. Samples sent for analysis were inconclusive; however, the level of foliar injury was relatively consistent across the field. Therefore, we do not feel that this foliar injury would bias the results of the trial in either direction.

For both WP trials, the low N treatment consisted of 18 rows (3 planter passes) in the middle of the field, with the conventional N control filling the remainder of the field. At harvest, four 10 foot samples were dug from each of the low N treatment and control in the same part of the field to reduce the effect of natural in-field variability.

At a field in East Prince (EP) we set up two trials on an irrigated seed field. Varieties evaluated were Dakota Russet and Mountain Gem Russet. For both varieties, the standard nitrogen rate was 177 lbs/ac

N, applied in-furrow at planting. The treatment rate was 145 lbs/ac N applied in-furrow. In this trial, the total fertilizer blend was reduced by 18%, so P, K and other nutrients were also reduced by 20%; however, given the relatively strength of this field, it was not felt that this reduction would have a negative impact on yield or quality. Sorghum sudangrass (mulched) was grown in this field in 2021, so it was anticipated that there would be a limited nitrogen credit coming from the previous crop. Planting date was May 20<sup>th</sup>, 2022 and top-killing date was September 13<sup>th</sup>. Harvest samples were dug on September 30<sup>th</sup>, 2022.

For both EP trials, the low N treatment consisted of 12 rows (2 planter passes) in the middle of the field, with the conventional N control filling the remainder of the field. At harvest, four 10 foot samples were dug from each of the low N treatment and control in the same part of the field to reduce the effect of natural in-field variability.

For all four trials, the hand-dug potato yield samples were graded by Steve Watts of Genesis Crop Systems. Seed was divided into four size categories (1-4 oz, 4-7 oz, 7-10 oz, and > 10 oz.). One specific gravity reading was determined from a pooled sample from the four samples per treatment. The total number of tubers per plot was also recorded.

### Potato Yield and Quality:

West Prince – Dakota Russet

Treatment	Tubers/ Plot	Specific Gravity	1-4 oz lbs/10 ft	4-7 oz lbs/10 ft	> 7 oz lbs/10 ft	1-7 oz seed (cwt/ac)	Total Yield (cwt/ac)
100 lbs/ac N	64.5	1.080	2.9	11.6	6.6	188.5	273.7
80 lbs/ac N	69.0	1.080	3.4	12.0	7.1	200.9	292.2
Difference	+4.5	0	+0.5	+0.4	+0.5	+12.4	+18.5

West Prince – Alverstone Russet

Treatment	Tubers/ Plot	Specific Gravity	1-4 oz lbs/10 ft	4-7 oz lbs/10 ft	> 7 oz lbs/10 ft	1-7 oz seed (cwt/ac)	Total Yield (cwt/ac)
100 lbs/ac N	90.3	1.083	4.8	11.9	14.0	217.1	398.5
80 lbs/ac N*	89.2	1.086	5.0	11.8	13.5	218.6	394.1
Difference	-0.9	+0.003	+0.2	-0.1	-0.5	+1.5	-4.4

\* A slight adjustment was made to the averages for the 80 lbs/ac treatment due to a slightly smaller number of plants per 10 feet (9.5 instead of 10).

East Prince – Dakota Russet

Treatment	Tubers/ Plot	Specific Gravity	1-4 oz lbs/10 ft	4-7 oz lbs/10 ft	> 7 oz lbs/10 ft	1-7 oz seed (cwt/ac)	Total Yield (cwt/ac)
177 lbs/ac N	92.3	1.084	6.7	13.2	6.2	259.4	340.0
145 lbs/ac N	91.3	1.083	5.7	14.2	7.0	257.4	347.4
Difference	-1.0	-0.001	-1.0	+1.0	+0.8	-2.0	+7.4

East Prince – Mountain Gem Russet

Treatment	Tubers/ Plot	Specific Gravity	1-4 oz lbs/10 ft	4-7 oz lbs/10 ft	> 7 oz lbs/10 ft	1-7 oz seed (cwt/ac)	Total Yield (cwt/ac)
177 lbs/ac N	91.3	1.089	5.0	12.6	10.2	228.8	360.4
145 lbs/ac N	86.3	1.091	3.5	14.6	10.5	235.0	370.8
Difference	-5.0	+0.002	-1.5	+2.0	+0.3	+6.2	+10.4

Key findings from this trial were:

- At none of the four trial sites was there any statistical difference between treatment or control for any yield or quality variables. This gives us confidence that a 20% decrease in nitrogen on these farms did not result in a reduction of yield.
- We did not see the anticipated increase in tuber numbers with the reduced nitrogen treatment on these trials. It may be that the total nitrogen available to the crop may be sufficiently high even at the lower rate to mask any effect.
- The 2022 growing season was quite favourable in both of the regions where these potatoes were grown, and these fields were not under moisture stress. No difference was observed in the foliage between treatment and control during the growing season.
- In all four trials, there was still a significant amount of tubers greater than 7 ounces in size, tubers that will need to be cut more than once during seed cutting. Further reductions in nitrogen may help to decrease the size of these tubers and increase tuber numbers along with other management practices, such as tighter spacing and use of gibberellic acid.

Thank you to the two farms participating in this trial this year. Thanks also to Steve Watts of Genesis Crop Systems for assisting with grading of samples for this trial.