

Yield Improvement for Idaho Potatoes

A study was made to compare yield and quality response of Russet Burbank potatoes using a conventional starter fertilizer program versus a *ByoGrow NPK* program. The location of the study was Shelley, Idaho, on a calcareous, sandy, loam soil with a pH of 8.0. Initially, a broadcast application of 80-120-250 63 S was made over the entire field prior to spring tillage. This trial was set up as a side-by-side strip comparison. Each strip was approximately 12 acres. The field was irrigated with hand lines.

Basis of Treatment

ByoGrow products include a unique blend of components designed to correct soil problems and provide basic nutrient requirements of plants and crops. The primary ingredients in *ByoGrow* include a proprietary humic acid extract, essential soil microbes, and a proprietary microbial biostimulant. *ByoGrow NPK* also contains a blend of N-P-K nutrients.

ByoGrow is scientifically designed to restore and maintain naturally beneficial microbial colonies in multiple soil environments. *ByoGrow* is engineered with an organic derived extract and nine enhanced plant beneficial soil microbes that are assimilated by plants on a cellular level. This advanced formula increases natural biological activity, detoxifies soil from contaminants, accelerates root development for critical nutrient storage, protects against pathogenic diseases, and transports valuable nutrients from the soil into the cell membrane of the plant. *ByoGrow* also contains an advanced biostimulant alkaloid compound derived from plant extracts, primarily aloe vera and kelp. This patented component provides for microbial stimulation that functions at a subenzymatic level – naturally increasing biological activity and facilitating beneficial microbial outcomes.



Treatment and Results

The grower's potato planter equipped to apply fertilizer on both sides of the seed, at seed depth. He commonly applies starter fertilizer to hasten germination and enhance early root and tuber development. The two comparison mixes were:

ByoGrow NPK

- ½ gal/acre *ByoGrow NPK*
- Applied in 31 gal of water/acre

Conventional

- 20 gal/acre 10-34-0 (ammonium polyphosphate)
- 11 gal/acre of a biological, humic acid product

Total of 31 gallons of product per acre was used.

Potato petioles were analyzed for nutrient content for five consecutive weeks during the growing season. Soil samples were taken approximately every two weeks and analyzed for nitrate nitrogen and salts. Based on soil and petiole testing, the entire field received an additional 80 units of nitrogen and 20 units of phosphate through the irrigation system. Harvest data was obtained by hand digging four, ten-foot strips randomly selected in each treatment area. Grade was determined by using USDA fresh market potato grading standards (Table 1).

Table 1. Yield comparison (cwt/acre) of *ByoGrow NPK* to conventional fertilizer treatment

	<i>ByoGrow NPK</i>	Conventional
US #1 (4-6 oz)	103.5	108.9
US #1 (6-10 oz)	177.9	154.3
US#1 (>10 oz)	203.3	128.9
US #2	0.0	0.0
Culls	92.6	130.7
Total (cwt/acre)	577.2	522.7
Market Value (\$/cwt)	\$8.90	\$7.42

Table 2. Financial comparison of *ByoGrow NPK* to a typical fertilizer treatment

Treatment	Total Yield (Cwt/acre)	Market Value (\$/cwt)	Cost (\$/acre)	Profit (\$/acre)
<i>ByoGrow NPK</i>	577.2	\$8.90	\$28.50	\$5,109
Conventional	522.7	\$7.42	\$57.35	\$3,821

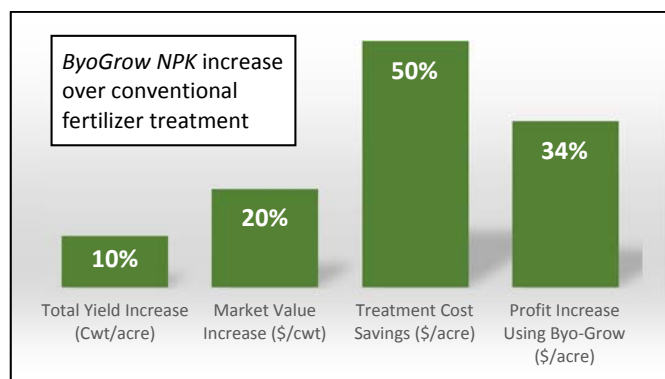


Figure 1. Quantified benefits of *ByoGrow NPK* treatment over conventional fertilizer treatment

Table 2 shows that the *ByoGrow NPK* treatment improved many production properties including the grower's bottom line (i.e. profit). Figure 1 also illustrates the percentage increases that the grower observed using *ByoGrow NPK*. The main reason for the financial increase is a much higher production of US #1 potatoes over 10 ounces. Market value for fresh potatoes is determined on price of various potato sizes. Usually, potatoes greater than 10 ounces bring a significantly higher price than smaller potatoes.

Another observation needing comment is the petiole and soil test data (see Table 3). Petiole nitrate levels showed little differences. Petiole phosphorous levels were significantly higher in the conventional treatment. This should be expected, since this area received 80 more units P_2O_5 than the *ByoGrow NPK* plot. Petiole potassium levels in the *ByoGrow NPK* plot were surprisingly much higher than the conventional plot. This difference is highly significant. However, it is interesting to note that the soil test potassium at the end of the season showed a much lower potassium level in the *ByoGrow NPK* side than the conventional side (145 vs 250 ppm).

Another interesting observation comes from the in-season soil samples. High salt levels (above 1.5 mmhos/cm) are detrimental to early root growth and potato development. The season average soil salt level on the *ByoGrow NPK* side was much lower than the conventional program (0.85 vs 1.5 mmhos/cm). The conventional treated area in the early season was very high in salts (2.1 vs. 1.4 mmhos/cm). This difference continued for two more weeks (1.9 vs. 0.8 mmhos/cm). As stated earlier, high salts can be very detrimental to early potato root and tubular development. The *ByoGrow NPK* plot had much lower salts.

Table 3. Soil & Petiole seasonal averages

Treatment	N (ppm)	P %	K %	Nitrate (ppm)	Salts (mmhos/cm)
<i>ByoGrow NPK</i>	19,740	0.22	10.57	13.2	0.85
Conventional	20,060	0.29	8.29	28.75	1.5

N=Nitrogen; P=Phosphorous; K=Potassium; Nitrate= Soil Nitrate

Summary

In a side-by-side comparison, Russet Burbank potato yield and quality was increased using *ByoGrow NPK* compared to a conventional fertilizer program. Total yield was increased 10%; market price per hundred weight (cwt) was increased 20% due to an increase of tubers greater than 10 ounces. The total grower return on their investment was increased 34%.