



# Goodbye Corn Crowns

*Helping microbes digest residue earlier reduces late N, pleases processors*

Data from two years of research on adding a soil applied microbial food source to corn fields post-harvest is pointing to a promising triple “crown” effect when setting up and improving the follow-on potato crop. Growers and agronomists are seeing:

- A more regulated, steady release of nitrogen as the corn residue and root crowns are digested earlier, avoiding late surges of nitrogen that interfere with proper skin set.
- Petiole testing during the research showed that this consistent release of nitrogen from microbial digestion translates to a significant reduction in the need for additional N applications to major varieties, saving costs to the grower.
- And what’s left of the largely digested root crowns simply disintegrates when jostled at harvest or will fall through the chains. That reduces or eliminates dockage to the grower for trash. Processors can reduce costly hand-sorting to remove crowns and can avoid broken processing knives and the waste of a contaminated batch.



*“For a couple of years now we’ve seen a huge difference in treated versus untreated potato crops that follow corn when we’ve included Bio-Mulch 7-0-0 in a soil amendment and nutrition blend used after the corn harvest,”* said Ian Crawford, Simplot Grower Solutions PHT Technical Representative for the Lower Snake River Basin.

*“In-season monitoring of petiole tests of nitrate levels showed we were getting more consistent and predictable release of organic nitrogen components in the soil,”* Crawford said. *“We want the nitrogen available early to mid-season and then we need reduced levels toward*

*the end of the season. We saw that in the fields where Bio-Mulch was added to activate the soil biosphere. We need to avoid a late season surge of nitrogen when residue digestion is delayed. That can trigger unwanted vine growth and delay bulking.”*

One of the growers participating in the trials is Chad Ralphs, manager of CSC Farms near Jerome, Idaho, where potatoes, sweet corn, silage corn, hay, barley and wheat are grown on 13,000 acres, with about 3,000 acres of potatoes. Ralphs said he watched nearby potato growers use Bio-Mulch three years ago and the results convinced him to try it.



*“The first year I put it on about 300 acres of sweet corn, which produces even more stubble,”* said Ralphs. *“During the following year we saw a little bit of corn material, but it did a good job of breaking down the sweet corn. Then we studied petiole samples and saw a real jump in nitrogen compared with the untreated acres. So I didn’t pump any nitrogen on those Bio-Mulch acres.”*

*“The remaining corn crowns are much smaller. They’ve had the mass taken out of them, and they are brittle, so they tend to break up from the fans instead of dropping through the air flow.”*

Ralphs said Bio-Mulch was used on 450 lower-fertility acres last year and that will increase significantly in years to come as they try it on their better soils and work through their six or seven year rotations with Ranger, Shepody, Russet and Norkotah varieties.

Crawford said the trials he monitored involved Bio-Mulch treated acres and a standard treatment. The “untreated check” corn ground received a post-harvest blend of 40 to 50 units of nitrogen plus sulfur and 6.6% B.A. Humus (Humic Acid). The treated ground received that plus a quart per acre of Bio-Mulch. The mixtures were applied and tilled into the soil as soon as possible after corn harvest. The varieties planted the next spring for the trials were Russet Burbank and Ranger Russet. Simplot has been using the Bio-Mulch protocol on some of their own farms as well as fields of several commercial growers.

*“That first season, in 2012, we took potato petiole tissue samples on June 19, July 6 and July 24, and saw substantial uptake of nitrogen, potassium, and sulfur,”* said Crawford. *“The result was that the grower saved putting on more nitrogen as the season progressed, saving about \$40/acre.”*

*“Potatoes yield better following corn, so it’s a desirable rotation, and the savings in nitrogen applications more than pays for the Bio-Mulch. Then if the grower avoids being docked and keeps his processor happy, that’s good for everyone,”* said Crawford.

Ralphs said dockage for corn crowns, whether measured by their number or weight, can be very costly.

*“Reducing dockage is a pretty significant benefit, and we’ve reduced our deduction about 60 percent,”* Ralphs said.

Agro-K Corporation in Minneapolis developed Bio-Mulch to accelerate crop residue breakdown and improve nutrient cycling and availability in the soil.

*“Bio-Mulch is a unique blend of nutrients and fermentation enzymes designed to increase existing local populations of cellulose digesting microbes,”* said Chapman Mayo, Agro-K president. *“Bio-Mulch does not contain any living organisms. The microbial food source in Bio-Mulch increases populations of residue-digesting microbes naturally, which accelerates cellular structure breakdown in stubble, stalks, cobs, roots and other organic matter.”* Agro-K has been an innovator and leader in crop nutrition since the 1970s, and for several years has been partnering with Simplot Grower Solutions on research and development programs such as this one.

Dusty Danos, the Simplot field agronomist working with CSC Farms and others using Bio-Mulch after corn, said that for many growers the early season nitrogen release from residue breakdown has become the major attraction.

*“They saw a big nitrogen release the next season and the potato crops were doing so well that the growers began using Bio-Mulch more as a nutrient management tool than worrying about the corn stalks,”* Danos said.

Crawford notes that soil biology and nutrient cycling are limiting factors in potato production. If the carbon-to-nitrogen ratio results in too much carbon, it limits the breakdown of anything lignin because there is not enough nitrogen to feed the bacteria.

*“By putting the nitrogen, sulfur, humus and Bio-Mulch on, those bacteria and other soil microbes and fungi now have what they need to go on and break down the lignin,”* he said. *“Instead of corn residue becoming a trap for nitrogen, it becomes an available source of nitrogen because the Bio-Mulch speeds up decomposition and encourages the natural process of nutrient cycling in the field. It’s not doing anything magic, just speeding up what needs to naturally occur thanks to specialized enzymes and micronutrients that are in the Bio-Mulch formulation.”*

*“We’ll be expanding the Bio-Mulch treatments to thousands of potato acres in 2015. And we’re also using it on small grains and other rotations – corn to dry beans, corn to sugar beets, and corn-on-corn. These don’t have an issue in the French fry plant, but each of them has residue and will benefit from more efficient nutrient cycling.”*

Ryan Tesconi, Field Representative in the Simplot Food Group Raw Department, said corn crowns coming into the processing plant among potatoes compromises and plugs the processing equipment.

*“We also have to dump a whole batch of fries because corn crowns are considered foreign material,”* said Tesconi. *“Anything that helps us reduce foreign material coming into the plant is a real plus. Bio-Mulch seems to fit that need. And it can save growers a significant dock on their spuds, depending on how many corn crowns are in the potatoes.”*

*“Another aspect of this from the food processor side is that we’re always looking at sustainability, which is a big issue these days. So anything that results in a reduction of nitrogen applications is better.”*

Besides the cost of the nitrogen, getting it through natural nutrient cycling saves the grower fuel, time, equipment, and soil compaction involved in an extra pass over the field.

*“It’s interesting that we all thought Bio-Mulch was for helping digestion of corn residue, which it does, but now we’re more interested in the nitrogen response,”* said Ralphs.



**The size and density of corn crowns treated with Bio-Mulch (left side of tailgate) were sharply reduced in comparison with those from untreated acres at CSC Farms near Jerome, Idaho.**

### Potato Petiole Analysis BioMulch Corn to Potato Rotation Residue Management Trial

Grower’s Standard Practice			Date Sampled	BioMulch + Grower’s Standard Practice		
6/19/2012	7/6/2012	7/24/2012		6/19/2012	7/6/2012	7/24/2012
19,000	12,800	15,200	Nitrate (ppm)	23,100	16,100	19,700
0.5	0.5	0.48	Potassium	0.51	0.52	0.46
0.16	0.17	0.17	Sulfur	0.2	0.18	0.21