



The Value of Accelerating Corn Residue Decay with Chandler Biocat 1000

Introduction: Many of our customers use Chandler Biocat 1000 to manage problems with excess crop residue above the soil surface, and these benefits include fewer problems with residue clogging planting and tillage equipment, less wear on tires, reduced pressure from weeds and volunteer corn, and diminished habitat for residue-borne diseases and insects. These customers also noticed improvement in their soil health and fertility, but these changes were harder to measure in past. Thanks to new tools like the Solvita CO2 respiration test, we can now precisely measure the biological impact of the Chandler products. In this paper, we report the results from three separate on-farm tests conducted in 2016 and 2017. In each case, Biocat 1000 was applied to corn stalks at 16 ounces per acres, which costs about \$10 per acre. The first study shows the early benefits from a spring application, and the other studies show the full-season benefits.

Corn Stalks Treated in the Spring (Champaign County, IL)

Test Summary: One of our long-term customers applied Chandler Biocat 1000 (16 ounces per acre) to most of his corn stalks in mid-May, 2017, and parts of the field were left untreated. He planted no-till soybeans one week later, and all of the beans received an in-row (2 X 2) treatment of Chandler Soil (8 ounces per acre). Five weeks later, the farmer noticed there was less residue in the areas treated with Biocat 1000, and the treated corn stalks and cobs were very brittle. To measure the differences in decay activity across the field, we collected soil samples from the treated and untreated plots one week later. The average soil test results from the treated and untreated plots are:

Biological activity measures	Treated	Untreated	Increase
Solvita CO2 respiration	110.6 ppm	88.3 ppm	+25.3%
Soil health score	29.4	21.4	+37.4%
Soluble carbon	186.5 ppm	202.4 ppm	-7.8%
Total available nitrogen	57.6 ppm	49.2 ppm	+17.1%
Mineralizable nitrogen	82.6 lb/acre	69.1 lb/acre	+19.5%
Total available phosphorus	48.5 ppm	44.2 ppm	+9.7%
Inorganic potassium	165.0 ppm	166.5 ppm	-0.9%

Remarks: The conditions for biological decay were very favorable in eastern Illinois during May and June, and Chandler Biocat 1000 still generated over 25% more microbial activity in the treated plots. Note that there was less soluble carbon in the treated plots because the larger microbial populations consumed more carbon as energy. Although more microbial activity also requires more nitrogen, the decay organisms released more N than they need, and the treated plots had more nitrogen and phosphorus after six weeks. There is almost no change in the potassium values because much of the K is in the lower corn stalk that takes longer to decay. If we value the additional N and P released at commercial fertilizer prices, we find that the value added by Biocat 1000 in just six weeks is worth about two times the product cost:

Nutrient	Added amount from Biocat 1000	Fertilizer value
Nitrogen	30.2 lb/acre	\$10.59
P2O5	19.9 lb/acre	\$7.94
Total value of additional nutrients released in 6 weeks		\$18.53

Corn Stalks Treated in the Fall (central Michigan)

Test Summary: During late October, 2016, Chandler Biocat 1000 was applied to corn stalks in half of the field at 16 ounces per acre, and the entire field was treated with Chandler Soil at 16 ounces per acre. Soybeans were planted in May, 2017. We collected soil samples from the plots in September, 2017:

Biological activity measures	Treated	Untreated	Increase
Solvita CO2 respiration	71.0 ppm	66.4 ppm	+6.9%
Soil health score	13.7	11.4	+20.2%
Soluble carbon	242.3 ppm	217.7 ppm	+11.3%
Total available nitrogen	28.7 ppm	22.6 ppm	+27.0%
Mineralizable nitrogen	42.6 lb/acre	32.7 lb/acre	+30.3%
Total available phosphorus	31.1 ppm	27.8 ppm	+11.9%
Inorganic potassium	264 ppm	209 ppm	+26.3%

Remarks: Although most of the decay activity was finished by early September, the treated plots had higher levels of CO2 respiration, soil health, and soluble carbon. The untreated plot had good nutrient levels because it had been sprayed with Chandler Soil, and the soil had more than half of the N and P and all of the K required to produce 200 BPA corn. However, Biocat 1000 released even more nutrients from the residue over the 10 months after treatment. If we value the additional N, P, and K released at commercial fertilizer prices, we find that the value added by Biocat 1000 in 10 months is worth about six times the product cost:

Nutrient	Added amount from Biocat 1000	Fertilizer value
Nitrogen	22.9 lb/acre	\$8.02
P2O5	14.8 lb/acre	\$5.93
K2O	132.0 lb/acre	\$46.20
Total value of additional nutrients released in 10 months		\$60.15

2016 Corn-on-Corn Residue Trial (Hancock County, IL)

Test Summary: Chandler Soil and Biocat 1000 were applied to corn stalks (16 ounces per acre of each product) during the first week of May, 2016, and three treated and three untreated plots were planted to corn one week later. In early September, we collected soil samples from the plots, and the average test results are:

Biological activity measures	Treated	Untreated	Increase
Solvita CO2 respiration	110.9 ppm	108.0 ppm	+2.7%
Soil health score	78.8	51.4	+53.3%
Soluble carbon	691.6 ppm	162.2 ppm	+326.4%
Total available nitrogen	334.2 ppm	99.8 ppm	+234.9%
Mineralizable nitrogen	164.9 lb/acre	147.7 lb/acre	+11.6%
Total available phosphorus	30.0 ppm	28.1 ppm	+6.8%
Inorganic potassium	130 ppm	116 ppm	+12.1%
Harvested corn yields	205.0 BPA	200.0 BPA	+5.0 BPA

Remarks: By early September, the biological activity in all plots remained high (over 100 ppm CO2), and there was only a slight difference in CO2 because the decay activity was largely complete. Based on the other measures, there had been more active decay in the treated plots during the season. In particular, the soil health score in the treated plots was over 50% higher, soluble carbon was over 300% higher, and available N was over 200% higher. Also, the treated plots produced 5 BPA more corn.