

CHANDLER PRODUCTS ENHANCE RESIDUE MANAGEMENT



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MIDWEST BIO-TECH, INC.

CROP RESIDUE: ASSET OR LIABILITY?

As crop yields continue to increase as farming technology improves, one of the biggest challenges for today's farmer is to manage more crop residue in a conservation or reduced tillage system.



Excessive amounts of residue from the last crop can clog tillage and planting equipment, provide a haven for insects and plant disease, contribute to chemical carryover, cause volunteer corn problems, and tie up valuable nutrients that could be used to support the next crop.

However, crop residue can be an **asset** instead of a **liability** if it helps control soil erosion and serves as a source of crop nutrients. The key to managing increasing amounts of crop residue as an asset is to develop a good residue decay program. The residue should provide ample ground cover to prevent wind and water erosion, yet it should not accumulate in the soil in ways that hamper field operations, restrict plant growth, or reduce the effectiveness of chemical and fertilizer inputs.

Good residue management is especially critical for no-till continuous corn where excessive amounts of crop residue can insulate the soil from the sun. This creates cold wet seedbeds that may suffer from reduced seed germination and poor chemical and fertilizer performance due to lack of contact with the soil. The excess crop residue also creates a problem at planting time due to the wet raggy stalks that plug or cling to planting equipment. Similar problems also occur in fields managed under conservation, ridge, or reduced tillage systems.

You can use Chandler Biocat 1000 to manage crop residue as an asset instead of a liability. The product can help to reduce or eliminate some of these problems while providing ample ground cover and releasing valuable nutrients to the soil.

WHAT IS CHANDLER BIOCAT 1000?

Chandler Biocat 1000 is a non-toxic enzyme product designed to accelerate the decomposition of post-harvest crop residue. The product is a liquid that is sprayed directly on corn stalks or soybean or wheat stubble after harvest.

WHAT DOES CHANDLER BIOCAT 1000 DO?

Chandler Biocat 1000 stimulates the growth and metabolism of the naturally-occurring microorganisms that break down the structural compounds in crop residue, including cellulose, lignin, sugars, starches, and proteins. The increased bacterial activity helps to reduce the problems associated with accumulated crop residue. The soil bacteria also convert nutrients in the residue to forms that are available to support the next crop. The average corn field has 100 pounds of nitrogen, 37 pounds of phosphate, and 145 pounds of potash tied up in residue from the last crop. Thus, Chandler Biocat 1000 helps to release these valuable nutrients back to the soil.

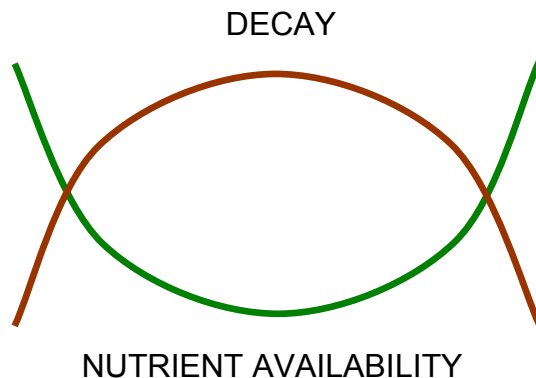


Chandler Biocat 1000 is ideal for conservation and reduced tillage programs. As shown in the photo (above), the product accelerates the internal decay of corn stalks and other residue. This leaves the outer shell of lignin-based material to serve as soil cover, but the interior of the stalk is hollow. After residue is treated with Chandler Biocat 1000, the stalks still provide ground cover for erosion control but crumble on contact with planting or tillage equipment next spring. As well, hollow or decayed stalks cannot provide a haven for insects or plant disease.

Chandler Biocat 1000 also works from one end of the stalk to another in a wick-like fashion, and the entire residue mass is decayed from the inside out. For this reason, we do not recommend that you shred corn stalks after harvest because this reduces the performance of the product.

TIMING OF THE DECAY PROCESS

As crop yields continue to increase, farmers will have to deal with more and more residue. Thus, it is important that we understand the functions and timing of the residue decay process. The key point to consider is that the amount of nutrient available for plants is minimal at the peak of the decay process (see the diagram below). The residue decay process must be completed before the next crop season begins, or the plants will have to compete with the decay organisms for nutrients. The resulting lack of nutrients may stress the plants and hamper crop growth and grain production.



The decay organisms also tie up applied crop nutrients such as fertilizer or manure. To illustrate this point, we refer to the results of a replicated plot study conducted over a three year period by a testing organization in California. In each of the three years, Chandler Biocat 1000 was applied to fertilized and unfertilized plots where cotton was planted after corn. On the unfertilized plots, the cotton yield increased by an average of 12.5% over the unfertilized plots not treated with Biocat 1000. On the fertilized plots, the cotton yield increased by an average of 43.6% over the fertilized plots not treated with Chandler Biocat 1000. In the fertilized plot without the Biocat 1000 treatment, the applied nutrients were tied up while the corn residue decayed, and the cotton yields were low just as if the fertilizer had not been applied. When Chandler Biocat 1000 was applied to the corn stalks, the cotton yield increase was larger on the fertilized plots because the product accelerated the decay process and helped make both the nutrients in the corn stalks and the applied fertilizer available to the next crop.

HOW MUCH NUTRIENT IS IN THE RESIDUE?

The average amount of nutrient in one acre of typical post-harvest residue is:

		N	P2O5	Potash
Corn residue	5 ton	100	37	145
Soybean residue	2 ton	90	20	50
Oat straw and stubble	2 ton	25	15	80
Wheat straw and stubble	3 ton	40	10	70

It is important to note that the stated nutrient content of corn residue represents 150 BPA corn. Today, most corn fields can produce 8 to 10 tons of residue and 60-100% more nutrient content. Chandler Biocat 1000 returns these nutrients to the soil in forms that the plant can use. The biological activity also helps to form humus, the organic material in soil that improves tilth and fertility. Humus acts as a reservoir for plant nutrients and prevents the nutrients from leaching out of the topsoil.

REDUCED CHEMICAL CARRYOVER

After a normal growing season, most of the remaining chemical is carried over in the crop residue. The only general exception to this rule is a dry crop year when the chemical remains in the soil. If the crop residue is plowed under and is not decayed, then chemicals like atrazine carried over in the residue can remain active and may harm following crops for up to three years. An accelerated residue decay program can reduce problems with chemical carryover.

INSECT PROBLEMS

Chandler Biocat 1000 first works to decay the interior of corn stalks and other residue, and this action eliminates one common winter nesting place for insects, insect larvae, and eggs. The decayed residue acts like a wind tunnel and is not habitable by corn borer and other pests.

VOLUNTEER CORN AND OTHER WEEDS

One of the most common weed problems is volunteer corn, but it can be greatly reduced by applying Chandler Biocat 1000 as soon after harvest as possible. The product also works to internally decay dropped corn ears in the same way it decays corn stalks, and the cob and germ of the kernel are decayed first. By planting time, the ears lying in the field may appear to be intact, but they can no longer germinate as volunteer corn.

Chandler Biocat 1000 also decays weed residue and seeds in the field. Users consistently report that they face less pressure from insect and weed problems with each year they use the product.

NO-TILL CROP PRODUCTION

No-till farming is becoming more popular all the time, especially as more farmers choose to plant no-till soybeans in corn residue. Most users who plant no-till soybeans apply Chandler Biocat 1000 to the corn residue as soon after harvest as possible. The product is not incorporated, and the residue is left untouched until planting in order to leave the full amount of residue as ground cover. However, the accelerated decay process helps break up the stalks, and the no-till seedbed is easier to establish with less trash to clog the planting equipment.

RIDGE AND MINIMUM TILLAGE

For both ridge till and minimum tillage systems, you should apply Chandler Biocat 1000 as soon after harvest as possible. With a minimum tillage program, you should wait 5 to 7 days after application before doing any tillage (especially on corn stalks) to allow the product time to start working. With ridge tillage, the residue is left untouched until planting time.

In both cases, you can save trips across the field by eliminating a pass with a stalk shredder or drag to break up the stalks. The decaying residue provides ground cover over the winter to prevent soil erosion but is more manageable in the spring.

Bt CORN RESIDUE

Farmers are now planting more acres to Bt corn varieties in order to control corn borer and rootworm. One key disadvantage of the Bt corn varieties is that they generate more residue, and the Bt corn stalks are harder to break down. Chandler Biocat 1000 can help you manage the heavier amounts of Bt corn residue by accelerating the decay process.

DOUBLE CROPPING

Apply Chandler Biocat 1000 to the residue from the first crop as soon after harvest as possible. The product will help make nutrients from the first-crop residue available for the second crop, and the residue from the first crop is less likely to hamper germination or early growth of the second crop.

HOW MUCH PRODUCT IS REQUIRED?

It is important that all applications of Biocat 1000 be made **as soon after harvest as possible**. The natural components of the product require both heat and moisture to accelerate the decay process. Earlier fall applications will tend to benefit from more warm weather before the onset of winter. The biological activity stimulated by the product becomes dormant (but is not killed) at 38 degrees Fahrenheit, and the

decay activity doubles with each 10 degree rise in temperature above this level. You may find that it is in your best to apply Biocat 1000 after you harvest each field and before you move on to the next field.

The amount of moisture present in the residue is also a critical factor to the effectiveness of the product. Although we generally recommend that you apply the product with at least 20 gallons of water per acre, this moisture (by itself) is not enough to support the decay process. If the residue is especially dry and has little or no remaining sap or moisture in the stalks, the rate of residue decay will be hampered.

Spring applications of Chandler Biocat 1000 have proven to be very effective in accelerating stalk decay, but late applications may not provide the best control of volunteer corn.

Recommended Application Rates

Corn Residue

Up to 150 BPA	10 ounces per acre
150-180 BPA	12 ounces per acre
180-200 BPA	14 ounces per acre
Over 200 BPA	16 ounces per acre

Soybean and Small Grain Residue

8 to 10 ounces per acre

Product Coverage and Cost per Acre

One gallon of Biocat 1000 will cover the following areas at the stated rate. The per-acre cost is based on purchase of gallon jugs at the full retail price:

Per-acre rate	Coverage	Cost per acre
8 ounces	16 acres	\$5.60 per acre
10 ounces	13 acres	\$7.00 per acre
12 ounces	11 acres	\$8.40 per acre
14 ounces	9 acres	\$9.84 per acre
16 ounces	8 acres	\$11.25 per acre

The per-acre cost will be lower if you buy in larger unit sizes, and Chandler Biocat 1000 is also available in 2.5 gallon jugs or in 30 gallon drums. The per-acre cost will also be lower if you buy during our Fall Discount Program (September and October) or our Pre-season Discount Program (December to March).

Chandler Biocat 1000 may be applied by itself or in a tank mix, and the product is compatible with most commonly used liquid fertilizers and pesticides. We do recommend that you test all new tank mix combinations for compatibility before application. The product should be applied with enough water (10-20 gallons per acre) to provide good coverage of the crop residue. However, as noted above, the residue must have some moisture content to help the decay process, and the water used to apply the product is not adequate for this purpose.

USERS REPORT THESE BENEFITS

- More nutrients available for the next crop
- Leave more residue protecting the soil
- Residue is more manageable – you have fewer problems with wet, raggy stalks
- Less pressure from weeds
- Fewer insect problems
- Manage heavy Bt corn residue
- Saves trips, time, and fuel
- Reduce volunteer corn problems
- Better able to comply with federal conservation provisions
- Non-toxic – you can pasture treated stalks
- Increased profits with higher yields and reduced production costs

Limited Warranty

Sellers' and Manufacturers Warranty is limited to replacement of defective product.

Neither seller, nor manufacturer shall be liable for any injury, loss or damage directly or consequentially arising out of the misuse or inability to use the product.

All other warranties unless from the manufacturer, whether expressed or implied, are hereby disclaimed.

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