

Testing the Efficacy of Biocat 1000™ Residue Digester on Cereal Stubble (Four Lakes)

Goal

Test the efficacy of a commercial residue digester, Biocat 1000™, for residue management in fall- and spring-seeded cereals in a direct seeding system.

The grower cooperators at Four Lakes are committed to direct seeding and want to take every opportunity to improve soil health and structure on their farms. Biocat 1000™, a product of Bioburst 'n Grow, is a nutrient solution that is intended to enhance the activity of naturally occurring soil microbes that break down crop residue. In this it is different from many other residue digester products consisting of microbial organisms that act directly on the straw. These microbial products have typically not proven effective in the relatively dry climate of eastern Washington. According to Bioburst 'n Grow, Biocat had performed well in the Midwest and other regions with high rainfall, but they did not have replicated data regarding its performance in dryland eastern Washington.

The farmers at Four Lakes decided to evaluate Biocat in 2 trials: one that compared Biocat with a control treatment that lacked Biocat, and another trial that included the presence and absence of disking in conjunction with Biocat (a total of 4 treatments). In the third year, they included other Bioburst 'n Grow products. They used Colorburst™ as a foliar feed included with the post-emergent herbicide in both trials, and in the 4-treatment trial they also included Seedburst™ as a seed treatment and Greenburst™ with the starter fertilizer.

Methods

The farmers selected sites for the 2-treatment (Biocat vs. No Biocat) and the 4-treatment (Biocat vs. No Biocat) and (Disking vs. No Disking) trials. The 2-treatment trial had 5 replications and the 4-treatment trial had 4 replications. We laid out the plots in the fall of 2000, and maintained the sites and treatments in those exact locations for the next 3 seasons to provide for an accumulative effect of the Biocat.

The farmers applied Biocat following harvest at 35 oz per acre in 10 gal water to the relevant plots. Where applicable they disked the plots in the fall. Immediately following these treatments, we collected residue samples from each plot, clipping off all the standing stubble within a wire ring (measuring 1 square yard) placed randomly within the plot. We took 3 residue samples per plot for the 2-treatment trial and 2 for the 4-treatment trial. We repeated this procedure in the spring (March) at different random sites within each strip.

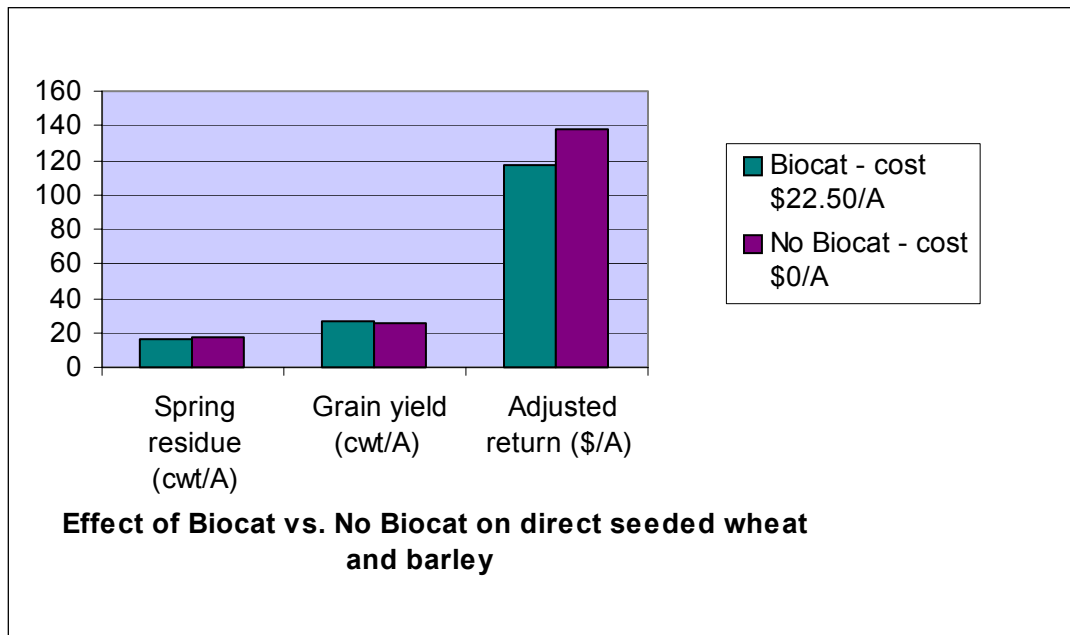
The farmers seeded all the trials with a Concord air drill with Anderson openers on 4-inch paired rows with 10-inch spacing. The crop sequence for the 4-treatment site was: 2001 - Baroness spring barley seeded into 60 bu Madsen/Eltan residue, 2002 - 377S hard white spring wheat seeded into 1 ton Baroness spring barley residue, and 2003 - 377S hard white spring wheat seeded into 40 bu 377S residue. The crop sequence for the 2-treatment site was: 2001 - Madsen/Eltan winter wheat seeded into 45 bu Alpowa spring wheat residue, 2002 - Stratus feed barley seeded into 50 bu Madsen/Eltan winter wheat residue, and 2003 - Nu Horizon hard white winter wheat seeded into 1.4 ton Stratus feed barley residue.

In 2003, the farmers used Seedburst (2 oz dry/100lb seed) sold as an additional seed treatment and Greenburst (10 oz/A) with the starter fertilizer on the Biocat strips in the 4-treatment trial. In both trials they also included Colorburst (8 oz/A) with the post-emergent herbicide with the intent of increasing yield and chemical uptake.

Results and Discussion

Figure 5 summarizes the effect of Biocat treatments, and Figure 6 shows the effect of disking on wheat and barley crops at both trial sites for 2001 and 2002. The 2003 data is not included in these charts because the growers included additional products that year. The complete data is shown in Appendix Table 4. Residue and grain yields are in cwt/A in order to use the same scale for the whole graph.

Figure 5. Effect of fall applications of Biocat residue digester on subsequent wheat or barley crops at Four Lakes, WA, from 2001 to 2002.



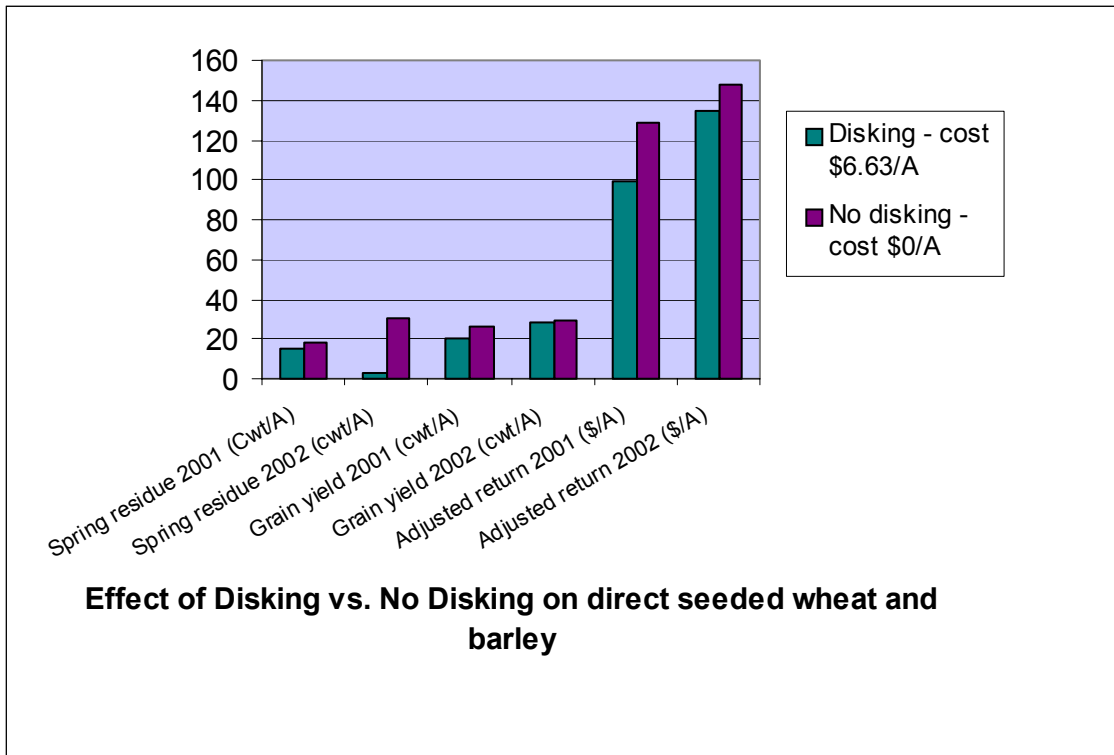
Adjusted return was the gross economic return on a treatment less the cost of the Biocat or disking treatment *only* (no seeding, herbicide, harvest costs). The cost for Biocat treatments was the cost of the product (\$18/A) plus application cost (\$4.50/A). The cost of disking was \$6.63/A, which was a *total cost* that included ownership, depreciation, fuel, maintenance, and wear and tear on the equipment.

Across both trials and for both years (Figure 5), the Biocat and No Biocat treatments had very similar residue levels in the spring (Biocat was applied in the fall with the intention of breaking down residue over the winter). Also, grain yields for both treatments were statistically the same, i.e., Biocat did not provide any yield or residue management advantages. At a cost of \$22.50/A (for the product plus application costs), the adjusted return for the Biocat treatments was significantly less than for the No Biocat treatments.

The costs for the additional products used in 2003 were: Seedburst \$3.50/A, Greenburst \$6.00/A, and Colorburst \$6.00/A. We analyzed the data from these 2 trials separately (Appendix Table 5). For the 2-treatment trial that included Biocat and Colorburst vs. the check, there was no significant effect on yield from the bio-additives, but the extra cost of these products (\$28.50/A including Biocat application) significantly reduced the adjusted return (\$246.15/A vs. \$274.40/A for the check). In the 4-treatment trial,

the combined additional products did provide a statistical yield benefit in this season, but the additional costs made the adjusted returns significantly less (\$21.91/A) for this treatment (Appendix Table 5).

Figure 6. Effect of fall disking on subsequent wheat or barley crops at Four Lakes, WA, from 2001 to 2003.



We have shown the effects of the disking treatment for each year (Figure 6) because the differences were not consistent for both seasons. However, the trends were similar in both 2001 and 2002. The disked strips tended to have lower levels of residue in the spring, but the size of this difference was not consistent across years. Disking in the fall significantly reduced grain yield and adjusted return for the spring crop the following year. This reduction was greater in 2001, which was a dry year, and the disking probably increased moisture loss and reduced crop yield, and also test weight of the grain.

In 2003, the disking data was analyzed separately from the other years because of the additional products applied (Appendix Table 6). Disking in this season provided a significant yield advantage (321 lb/A). But, while the adjusted returns tended to be greater (\$13.69/A) for disking in this season, this difference was not statistically significant and might not be repeatable.

Observations and Conclusions

The farmer cooperators noticed the straw that was treated with Biocat disintegrated well when harrowed. In 2003, they dug some plants to show at a field tour and the roots did look bigger and healthier from the plots treated with the Biocat and companion products. In 2002, we sent soil tests for analysis by Soil Foodweb, Inc., who did a qualitative, microscopic examination of the microbes present in the samples. They noted that so far the Biocat had not effectively encouraged the growth of beneficial microorganisms.

Overall, the years of the study were dry and not ideal for testing Biocat. However, the economics of a product needs to benefit the farmer, and the trials clearly did not demonstrate economic benefit from using Biocat and its companion products, though they did increase crop yield in 2003 only.