LOOKING FOR YIELD RESPONSE

The good and the bad of field trials using biobased products.

■ Richard Keller, editor

Biobased agricultural product technology has become common as various researchers and companies have discovered non-traditional products that improve crop yields. Some are being proven to be total successes and others without proven field results have lost believers.

"There is a whole culture of enzyme products, fertilizer additives and humic matter products being promoted," said Ron Heiniger, Ph.D., North Carolina research and corn Extension specialist. "This is a new arena for me and the industry to understand how these products function."

Heiniger has recently concentrated on research into narrow-row, high-population seeded corn. Some of his graduate work involved working with plant regulators and growth stimulant products.

Each product has its own formulation, mode of action and biological activity in spurring healthy crop growth. The main separation between products being proven in the field and those that have faded is consistent yield. It is yield that justifies the added costs of product and application by growers.

"Most farmers are skeptical until they see some repeatable data," Heiniger said.

Taking a product from greenhouse to field use often proves to be a difficult step in commercializing a new biobased product. In an uncontrolled environment, some products don't consistently show positive results. Additionally, refining exactly when to apply and how much product to apply to various crops usually is a multiple year process, Heiniger noted. "One piece of data is interesting and two or three makes it much more exciting," he said.

In general, biobased products are not being commercialized by macro crop protection companies with massive research and development budgets. Some biobased product developers have to rigidly prioritize financing research and field testing to be within limited budgets.

WORD OF MOUTH EARNING BUSINESS

One company that has quickly jumped into proving its new product is Biobased USA, a North Carolina-based company. The product is SoySoap, and it was applied by about 100 farmers in northwest North Carolina in 2008. On average, the soybean growers achieved average yields of 15 to 20 bushels per acre more from SoySoap-treated fields than untreated acres, according to the company's founder Don Wilshe.

"As the news ripples out from these growers in northwestern North Carolina, more than 200 farmers in the region plan to apply SoySoap in 2009. One Extension agent called SoySoap the 'craze of the county," Wilshe said.

SoySoap was developed in 2003, but it wasn't until 2004 that researchers discovered its nano-size colloids somehow had growth-enhancing effects on plants. It has taken four years to confirm when and how to apply the product. For soybean growers, it has been determined that on Roundup Ready soybeans, its appropriate to add it to a glyphosate tank mix, so there's no extra trip across the field. Approximate cost is about $10 per acre for an eight ounce per acre rate.

Results on a wider and wider number of field crops, fresh produce crops and ornamentals is still being established within the U.S. and internationally. Biobased USA will be collecting data from field results in more than 20 states and several countries in 2009.

Seed trials and bioproduct trials often go hand in hand as the same inquisitive farmers do both on their farms. This shows Chris Weydert's large seed trial field near Bode, Iowa.

Yield increases proven on farms are what impresses most growers. The ears from this Minnesota trial of Carbon Boost-S at the top showed why the field had a 16-bushel yield advantage to a check field from which the lower ears were picked. They show kernel fill to the end of the ears and some ears even had more rows of grain.

The firm is also cooperating with universities on SoySoap trials, but few university results will be published before 2011 because of protocol to replicate trials for several years before publishing final results.

One enthusiast of SoySoap after inspecting treated wheat fields is Leon Hesser, Ph.D.; he has been a close associate of Norman Borlaug, Ph.D., the father of the Green Revolution. Hesser described the impact he saw SoySoap had on wheat. "Normally, heads of ripe wheat are about three inches long. But more than 80 percent of the heads on treated wheat I saw in North Carolina were four inches long or more. Wheat heads normally have three rows of kernels. Nearly all of the SoySoap-treated wheat heads had four rows of kernels. Normal test weight for wheat runs 53 to 54 pounds per bushel. The North Carolina wheat tested 63 to 64 pounds."

Internationally following Southeast Asia field testing, the governments of China, Vietnam, Thailand and Philippines have approved SoySoap for use in rice production. In Vietnam, where SoySoap is privately labeled as NutraGreen, field trials show it increases rice yields an average of 35 percent, Wilshe reported.

Biobased USA says the product is formulated entirely from FDA-approved food ingredients and additives; therefore, it is non-toxic. SoySoap was originally created as a highly effective cleaner for freshly harvested vegetables and fruit.

An increasing distribution network is being established for SoySoap. Wilshe said, "Individual distributors register the product under various private labels in their states. Biobased USA does not retail to the public."

NEVER A STOPPING POINT

When it comes to biobased products, Stoller USA, is a leader with a wide array of products. One that has recently proven itself in row-crop production is Bio-Forge, but still not everything is known about the product's capabilities.

Large-scale success in increasing corn yields using Bio-Forge has been confirmed by years of university trials. Application in various ways during different growing seasons have shown yield improvements from 4 bushels per acre to 40 bushels per acre, according to company data.

Heiniger is one researcher who thought he knew quite a bit about Bio-Forge's ability to stimulate root growth, but this year he was surprised by late-season plant health improvements that resulted in between about 20 to 30 bushel per acre average yield improvements extrapolated from replicated plot work.

Stoller USA describes Bio-Forge as "an antioxidant with growth-enhancing co-factors that works with the plant's natural ability to overcome toxins and increase resistance to insects and diseases."

Until 2008, Heiniger had only applied Bio-Forge in furrow and in a two by two band (two inches from the seed row and two inches deep). In 2008, it was used as a foliar product. "We did a late application test looking at applying it about the same time that you might consider applying a foliar fungicide," Heiniger explained. "We got surprising results from applying it at R1 and R2 in a year when we had a lot of stress in the fields from heat and drought."

The researcher was aware that Bio-Forge can show some impact on disease from seeing its effect on wheat scab. "We did not rate ears for ear rot damage, but it may have been a part of the picture. We are certainly going to try this again and get some more data."

Heiniger has been working with Bio-Forge since 2006. And true to form with any of the bioproducts, it has been a trial and error process. "We had to run a number of different rates to get some root response, not too much or too little but just right to get the response we needed."

There is no doubt that the product is regulating auxin production, increasing the amount of auxin the plants produce, and this shows up in the physical measurement of roots.

"Bio-Forge is a product from which I've seen enough consistency that I can recommend it to growers." Those recommendations are basically for in-furrow application.

As for the foliar disease control and late-season plant health aspects, Heiniger said, he is excited about the product outperforming foliar fungicides on narrow-row corn (20 to 24-inch rows) in 2008. Those results will give him plenty to investigate in 2009 and 2010.

NOT AFRAID TO REPORT EVERYTHING

Carbon Boost is another product that the Floratine Biosciences (FBS) company is working hard to prove can

provide consistent yield response in row crops. Again the challenge also appears to be determining exactly when to apply the product at what rate and whether it will perform year in and year out under all weather conditions and soil types.

FBS has geared up with new staff and field representatives to focus on the Corn Belt because the product already has proven results in specialty crop production. The company is not turning back in proving Carbon Boost's worth to corn farmers. The company should also be given credit for openness in sharing successes and less than optimal results.

"We have compiled two years worth of research utilizing Carbon Boost-S on corn that consistently shows higher yields more than 85 percent of the time," said John Bradley, vice-president technical sales development. "We also have seen more consistent yields at or near planting when Carbon Boost-S is placed near the seed, and it almost always increases the effectiveness of starter fertilizers."

Carbon Boost is touted as being able to enhance the uptake efficiency of nitrogen, phosphorus, potassium and micronutrient fertilizer components, "giving plants a greater nutritional boost than the application of fertilizers alone." Yield increase will determine farmer interest, and FBS hopes that word of mouth will have growers asking for it from their ag retailer.

FBS is focusing on getting the product into the hands of farmers and ag retailers for real-world comparisons of techniques that show results, or don't.

Dick Gerhart, Dutch Creek Farms, Fairmont, Minn., applied Carbon Boost-S on three fields, side dressed with 32 percent nitrogen. The Carbon Boost-S was dribbled on when the corn was approximately waist high. All three fields were strip tilled in the fall and non-irrigated.

Here is an example of trying to push the envelope in determining if Carbon Boost works other than near planting. Not all the field data had been compiled as this article was being written, but one field showed a 16-bushel-per-acre increase over the control, and the other one didn't show significant results. The farm has consistently harvested 200-bushel-per-acre yields without Carbon Boost. Of course, erratic results trigger questions of why.

Yet another trial by Chris Weydert, Weydert Ag, Inc., Bode, Iowa, looked at the product being applied late in the season with Headline fungicide and Capture insecticide. Such a combination that late in the season was "inconclusive in terms of defining the response from yield maps." But again, this was weeks after planting and the proven response timeframe. AG