

## Inoculants Promise Substantial Return on Investment

**SEED INOCULANTS HAVE** been around in one form or another for decades and the amount of information available on materials and treatment methods has grown by leaps and bounds during that time. The challenge facing biotech companies in this age of high-speed Internet, tablet computers and social media is determining how best to deliver that information to retailers and their customers.

The director of sales and marketing for one leading global bioinnovation company believes that digital technology could offer the solution.

"That is the gap: how do we communicate effectively with our customer, be it a retailer, be it a grower, be it a distributor," says Chuck Broughton, director of North American sales and marketing for Novozymes BioAg. "The knowledge is out there. The question is, how do we transfer that knowledge most efficiently?"

"It starts with social media. Growers began using social media and adopted that technology quite rapidly. We're not nearly as active in that as we need to be, in my opinion. That really could be the key to this in the future."



Chuck Broughton of Novozymes BioAg says there have been many innovations in inoculants in the past few years.

One example of such an information gap, according to Broughton, is that inoculation is no longer simply about supplying rhizobia to seeds or the surrounding soil. His company has branched into the phosphate inoculant and bioyield enhancement categories and has become increasingly focused on value-added products such as its JumpStart and TagTeam LCO technologies.

"This is no longer your grandpa's or even your father's inoculant," he says. "There's been a lot of innovation over the last three or four years. We're really taking a platform approach. It's a natural evolution of the industry. Competition is a wonderful thing. It truly makes companies rethink themselves.

"When we began this modern age back in the mid-'90s or late-'90s, it was all about granular inoculants for soybeans. It then migrated to liquid inoculants for soybeans that lasted on the seed for more than four or five days," Broughton adds.

"What companies like Novozymes and BASF in this industry are strong on is science and it is absolutely a huge advantage for our growers. When we start applying science to the bioagricultural segment that we're in, everybody wins. That's all borne out of competition. At one point a seed company said, 'Hey, could we get a bigger share of the soybean seed market by offering biological seed treatments? Inoculant technology from the 1990's were not easy to use and we recognized that and improved the 'treatability' of our products. Innovation's a wonderful thing."

As demand for seed treatments has grown, so has the number of options





Seed inoculants flew off the shelves in some parts of the country earlier this year thanks to the promise of a significant return on investment.

and products available to both retailers and growers. That presents a new challenge, especially for retailers who are doing the physical treatment of the seed: How much is too much?

“As more and more products are trying to go on that seed and are fighting for space on that seed, the retailers and growers are having to make more and more choices as to which inputs and products they are going to include in their seed treatments,” says Russ Berndt, product manager for BASF.

“You kind of reach a limit on how much volume of liquid you can actually put on the seed and get it uniformly coated and dried and make it still go through your treatment and seed-handling equipment without it becoming a sticky mess.”

So how does a retailer or producer determine the right combination of products to apply to the seed they are working with? Berndt maintains one of the key factors to consider before choosing any product is the application volume required.

“Low application volumes I think are becoming more and more important to seed treaters. As you are trying to put more of these products on, you kind of reach a limit as to how much you can put on in terms of volume,” he says.

“Obviously you’re either going to have to limit the number of different treatment products you can put on the seed or look for the products that have the lowest application volume so that you can get more products on at a time.”

Broughton says another important challenge that needs to be addressed when it comes to inoculants is the issue of compatibility. Because not all synthetic chemistry is the same, different products can produce dramatically different results in terms of their compatibility with biologicals.

For example, two different products can both contain Chemical X at the same percentage. However, the inert ingredients and the formulants in a generic product versus a branded one can be dramatically different, according to Broughton, and can similarly produce dramatically different results.

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“In one [case] the inoculant works and in the other [the chemical] kills the inoculant,” he says. “We spend a significant amount of time thinking about compatibility and how do we satisfy all the needs and requests for compatibility information. We do have the resources to perform those tests and, quite frankly, the responsibility to the industry to make sure when we make a recommendation [that] it’s the right recommendation.”

Seed inoculant flew off store shelves in some parts of the country this past spring. Little wonder when many inoculants promise a return on investment of 4:1, which can represent an additional two bushels per acre in the case of soybeans.



Just how much of an ROI an inoculant can deliver generally depends on where you are and what kind of soil conditions you are dealing with. In North Dakota a grower might see a return of 6:1, while the number might be 4:1 in Iowa.

"If you can spend a buck and make four dollars and we could make that deal today, I'm sure you would take it," Broughton says.

Another notable evolution in inoculants, he adds, is that seed treatment has become as much about science as it has about art, pointing to Novozymes' JumpStart technology as an example.

The science comes into play when a company such as Novozymes works with its customers to help them meet their end goals. For example, say a customer wants an inoculant to last on its canola seed for up to four months. Novozymes will review the products and the recipe the customer is putting on that seed and let them know everything there is to know about compatibility.

"The art part of it is where in that process can we put on the inoculant," Broughton says. "When we get answers to those types of questions, we can get that life on the seed and we validate it. We don't just say, 'Sure, if you want six months we'll give you six months.' We work through the process and then validate it in our labs at the end to make sure that our recommendation is right."

How long an inoculant can be on a seed and remain effective depends on a number of factors, according to Broughton. Those factors include:



Many soybean inoculants promise a return on investment of 4:1.

- the robustness of the inoculant formula
- its compatibility with other products in the mix on the seed
- how the product is applied to the seed
- storage condition of the seed after the inoculant has been applied

In the case of soybeans, inoculants can be applied to the seed and remain effective for between three and 120 days while canola treatments can last between five days and five months, Broughton adds.

Still, Berndt emphasizes that it's important to remember inoculants have a limited lifespan and that seed, especially in the case of soybeans, needs to be treated with fresh rhizobial inoculant each year.

"Growers have kind of grown up with this impression that if I've had soybeans the

last few years in that field, there is still rhizobia in there," he says. "This may be a true assumption ... [but] a lot of times those rhizobia have kind of ... selected themselves through a natural selection to be good at surviving in the soil and not necessarily being a good nitrogen-fixing rhizobia for the plant. They're more out for themselves."

And don't expect the pace of innovation to slow any time soon when it comes to inoculants. Many companies, including BASF and Novozymes, are continuing to work on new or improved biological-based products and are in the process of trying to obtain registration from the Environmental Protection Agency.



# Demand for Higher Yields Helping Drive Appetite for Inoculants

It's fair to say that Toby Ripberger has more than a passing interest in seed inoculants and the impact they can have on production.

Ripberger is the coordinator of Beck's Hybrids' Practical Farm Research division. As such, it's his job to oversee the company's agronomic-based research aimed at providing producers with best management practices on how to grow their crops as efficiently as possible and improve their bottom line. He says the increased attention being paid to inoculants should hardly come as a surprise.

"I do believe [demand] has grown," Ripberger says. "I think it has to do with the fact as we strive to gain yield and higher productivity off the same number of acres we're currently farming ... we're trying to find every little way that we can to manage those acres to be as productive as possible.

"We also have to keep in mind the fact that if a piece of ground hasn't had the bacteria and hasn't had soybeans there, we want to make sure and introduce that when we are bringing that crop into the land ... [and] into the soybean cropping rotation."

Beck's operates five Practical Farm Research centers, with two in Illinois and other sites in Indiana, Kentucky and Ohio. Most of the company's studies focus on new technologies as well as concepts



Toby Ripberger is the coordinator of Beck's Hybrids' Practical Farm Research division.

and ideas generated by farmers. The results are showcased at regular field events hosted by Beck's and are also published in an annual report as well as being posted online.

Ripberger agrees that it can be difficult for producers to choose the right kind of treatment with so much information on the subject now available online. The key, he says, is for them to provide their retail partners with as much specific information about their operation as possible.

"I think there can be a ... gap in information sometimes but we're doing the best we can to get the information ... out to our customers," he says. "Of course everybody is going to be

looking for something a little different depending on their soil type and their growing area so they should make sure they get the information that is relevant to their area and environment."

Ripberger says the PFR farms have performed some studies on inoculants, most of which have centered on cases of taking something out of pasture and putting it back into cropland or a new farm that's been growing corn year after year where bacteria from soybeans isn't present.

Innovations in seed treatments such as polymer extenders have provided more options when it comes to inoculants, Ripberger adds.

Compatibility remains a key issue when it comes to mixing inoculants with other compounds such as fungicides and pesticides. Ripberger stresses it's something both retailers and growers need to be aware of.

"Since we are using live bacteria, whether it be mixing it with other treatments and things of that nature, we just have to know our limits—which bacteria we're using and also the treatments so they can live together," he says. "Some of the companies out there that have inoculants have been working on that and continue to improve that so I think ... [making] those strides towards the capability of mixing and longer shelf lives will be of benefit."

