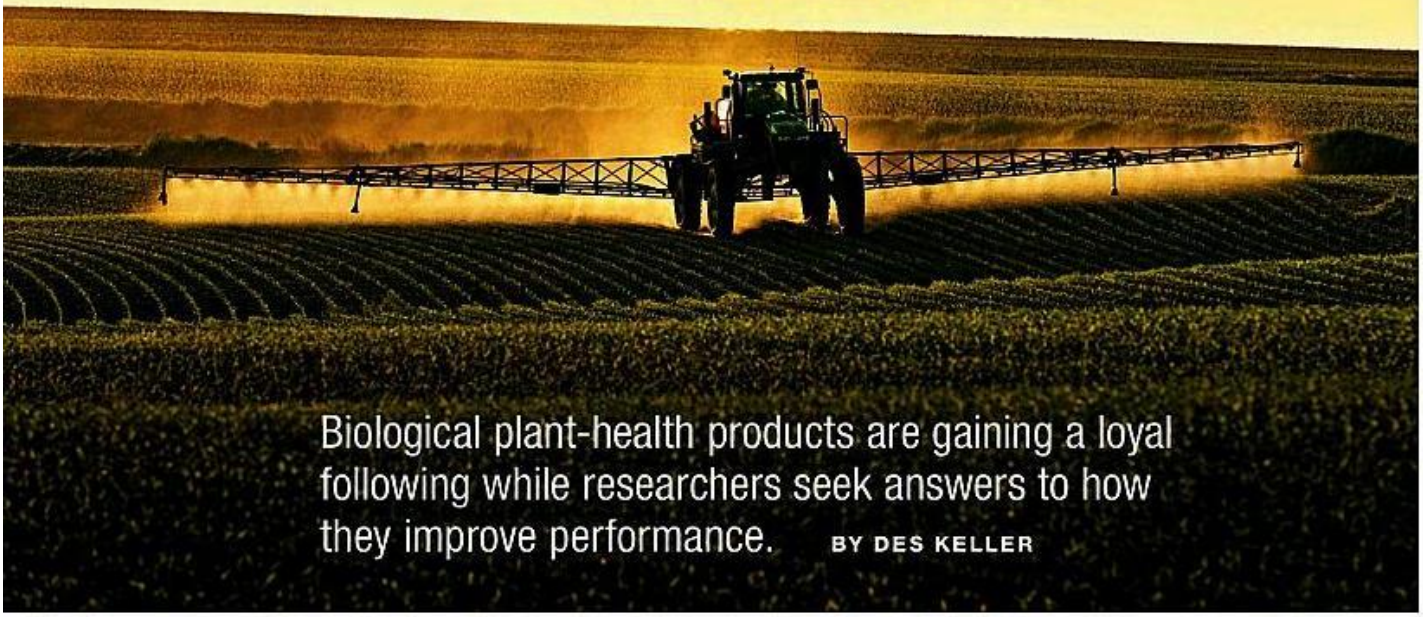
ADDITIVES Add Bushels



Biological plant-health products are gaining a loyal following while researchers seek answers to how they improve performance. BY DES KELLER

As recently as five years ago, Freddie Doub had never heard of SoySoap. Now, he applies the plant-health adjuvant to nearly every one of the 1,800 acres of corn and soybeans in the family operation, 20 miles northwest of Winston-Salem, N.C.

"I wouldn't plant a crop without it now," says Doub, gesturing to the 2½-gallon containers neatly stacked on pallets in his machine shed. If the comment sounds like a testimonial, that's because Doub was enamored enough with the product that he become a distributor for North and South Carolina, as well as Virginia.

In Doub's region, the product may be called EverGreen AG Soap. But in other areas, it's known as WakeUp, BINBUSTER or one of several other monikers. The basis for these additives goes by the general name SoySoap and is manufactured and distributed by BioBased USA, of nearby East Bend, N.C. BioBased licenses the basic product to distributors who give it their own brand name.

BOOSTS PLANT HEALTH. SoySoap is one of perhaps dozens of plant-health products either available or about to come on the market that stake some claim to improving yields—or at least maintain them under periods of plant stress. Many contain some level of fertilizer. As for particular products or the category as a whole, there is no consensus as to their value.

"I haven't seen low rates of foliar slow-release N products work as advertised," says Dave Franzen, Extension soil specialist with North Dakota State University. He says he isn't familiar with SoySoap, in particular. "Quite frankly, it's impossible to keep up with all the products out there."

CHECK RESEARCH. Ohio-based crop consultant Ed Winkle, who owns HyMark Consulting in Martinsville, agrees there are more labels than any one farmer or research center can test. He says he can't vouch one way or another for a lot of new non-conventional additives and amendments, but he is critical of the general pooh-poohing of this product category. Winkle has long been a proponent of the value of soybean inoculants.

There is a compendium of university research that does exist for these products and has been compiled by Iowa State University at **extension.agron.iastate.edu/compendium/index.aspx.** Any product with at least two site-years worth of university data is referenced with results. Search by brand name, or, what might be more helpful, type in the property of the product's action, such as root stimulator or phosphate inoculant.

"One of the things I caution growers when they ask about a new product is, 'Do the promoters discount university testing,' " Franzen says. "If they do, that's a red flag." ▶

SoySoap was developed by BioBased USA's owner, Don Wilshe, and is comprised of food-grade additives as active ingredients. The company touts the product's all-natural ability to make any plant use nutrients more efficiently, act as a tank-mix surfactant to optimize pesticides and help crops sustain growth through dry spells.

Because of its unheralded development by a small company, SoySoap may be one of the most intriguing, but hardly the only, relatively new plant-health additive working the market. Texas-based StollerUSA has been selling Bio-Forge for several years and recently launched Bio-Forge ST, a seed treatment. And Dow hopes to introduce Invinsa, a foliar spray touted for its ability to help crops sustain health through stresses like drought, within the next several years.

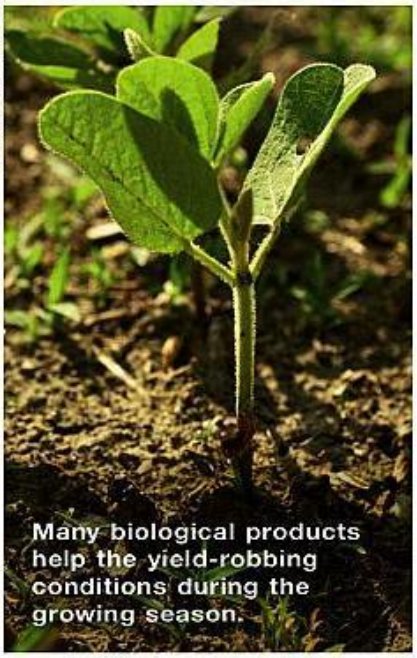


PHOTO: JIM PATRICO

Many biological products help the yield-robbing conditions during the growing season.

ADDED PERFORMANCE. That there are more of these products on the market testifies to a couple of factors. First, there are simply more discoveries made about plants all the time—mysterious and otherwise—as to how they deal with stress and about the timing and mechanisms through which they use nutrients. Second, the economics make it worthwhile to explore more options.

"At the current price of soybeans, there are lots of people interested in getting as many bushels as possible," says Jim Dunphy, long-time crop specialist at North Carolina State University, who conducted field trials last year using SoySoap. "An extra 2 or 3 bushels of soybeans per acre is more valuable."

Whatever the brand name, SoySoap is slowly building a base of dedicated customers. Dale Lenz used SoySoap on nearly 2,400 acres of corn and soybeans near Vail, Iowa.

"This has worked out really well for us," Lenz says of WakeUp. He applied it on a limited number of acres in 2009 before using it farmwide in 2010. In side-by-side strip trials, Lenz has seen average yield increases using WakeUp of 1 to 3 bushels per acre in soybeans and 2 to 5 bushels in corn. With an application cost of about $6 per acre, the economics are easy enough to justify.

More important, he says, is WakeUp's ability to allow plants better use of glyphosate, foliar fertilizer, micronutrients or whatever is sprayed with the adjuvant. "Any yield increase after that is extra profit," Lenz says.

He has used WakeUp three ways: mixed with glyphosate, mixed with foliar fertilizer and alone as foliar spray. He used it with glyphosate on soybeans at the V3 stage and at the V6 stage on corn. When he sprayed the product alone, he used it at the V2 or V3 stage of both crops.

"Given today's commodity prices, you're crazy if you don't try new products, because there is no better time to make it work," Lenz says. He says he plans to test StollerUSA's Bio-Forge ST.

Dunphy and colleagues conducted field trials with SoySoap on soybeans at four locations in North Carolina in 2009. Overall, the foliar-treated crops averaged more than 2 bushels per acre more than non-treated. "But most of that increase came from one site with the other three showing little advantage," he cautions. Foliar applications of different formulations of SoySoap produced less than 1-bushel-per-acre response in four replicated tests in 2011.

The spotty results didn't surprise Dunphy, though he says the findings are encouraging. "This is one reason there hasn't been widespread acceptance of these [foliar plant-health sprays]—they can be difficult to manage." There can be uncertainty as to when is the optimum time to spray or whether they are best used in conjunction with something else.

LITTLE RESPECT. SoySoap and products like it have been called snake oil by skeptics. BioBased USA's Wilshe doesn't run in the mainstream of the agri-chemical industry. In a brief interview and a series of short e-mails, Wilshe described SoySoap as a nanoscale particle product that operates in the realm of "agri-physics and not agri-chem."

Even Dunphy admits he isn't exactly sure how the product functions but says his role is to "verify whether this stuff works and how we manage it. The fact that it didn't come from conventional research at a major company doesn't bother me much.

"Plants are awfully complex entities," he continues. "We think we know what goes on inside a plant, but, in reality, we may actually know very little." History is replete with discoveries at least partially stumbled upon, he adds, "and the major players don't dominate everything."

Researchers with South Dakota State University conducted trials in 2009 using several products, such as BINBUSTER, VAULT and JumpStart, on soybeans. None of the yields using those products surpassed those of the control crops.

Jerry Carlson, BioBased USA's director of communications, says the 2009 South Dakota tests applied SoySoap's BINBUSTER XP at the late ▶

North Carolina farmer Freddie Doub applies SoySoap, a plant-health adjuvant, to nearly every acre on his farm. PHOTO: DES KELLER

V3 stage rather than the recommended V1 to V2 stages. Additionally, he says, the version of SoySoap used then is not the product now on the market.

That so-called biological products are sometimes viewed skeptically by U.S. researchers is not unusual, according to some who market these products.

"I guess it's part of the burden we all bear," says Novozymes U.S. Marketing and Sales Manager Dorn Severtson of the blanket criticisms (see "The Plant-Health Competition"). "The university system in general in the U.S. has not embraced biologicals as compared to South America or Australia," he says. "I think this reluctance is due to the fact the time [for these products] hasn't arrived yet."

THE PLANT-HEALTH Competition

Several new or upcoming foliar sprays and seed treatments are designed to help kick-start a crop's growth, speed the plant's use of fertilizer and pesticides and/or help sustain the growth during stresses like drought. Here are some additional biological products.

BIO-FORGE ST. Houston, Texas–based StollerUSA introduced a seed-treatment version of its plant performance foliar spray in Bio-Forge, an antioxidant that works by purging plant cells of excess ethylene, the chemical naturally given off by plants when under stress or that have reached maturity. By doing this, Bio-Forge allows a plant to either continue developing or at least maintain condition.

"Stoller[USA] has devoted the past 10 to 15 years to understanding how to control and regulate stress biology metabolism in plants," says General Manager Wayne Smith. As a seed treatment, this new Bio-Forge ST will enhance germination and root development—particularly in cold, wet conditions often encountered in the Midwest. The product can be applied to seeds at a rate of 2 ounces per 100 pounds of seed.

OPTIMIZE 400, TORQUE AND RATCHET. All three products from Novozymes use a unique "LCO [lipo-chitooligosaccharide] Promoter Technology" molecule to enhance the plant's natural growth processes. Seed- and soil-applied products like Optimize for soybeans and Torque for corn aid root development and early-season growth. Ratchet is foliar spray for corn and soybeans that enhances plant growth and photosynthesis.

These products complement Novozymes' existing line of microbial-based, fertilizer-enhancing treatments like JumpStart, which can be used on corn, soybeans, winter wheat, sorghum and other crops. JumpStart helps make more phosphate available to the plant.

HEADSUP. Bayer CropScience will license HeadsUp Plant Protectants Inc. seed-treatment technology for use as part of a soybean seed treatment. It plans to introduce the product for the 2012 season. HeadsUp utilizes a naturally occurring plant substance that triggers a soybean's defenses against diseases like Rhizoctonia and Fusarium. Initially, the product will be granular, with a liquid version in the works.

"Bayer has a long history of working with biological products," says Paul Hewitt, seed treatment product manager. "We put them through a rigorous screening process to determine those that offer the best value to the grower." Bayer CropScience introduced VOTiVO, a biological seed treatment for soybeans, corn and cotton, for 2010. VOTiVO uses beneficial bacteria to block the plant from nematodes.

INVINSA. Syngenta will introduce this foliar spray after 2012. Invinsa prevents the natural plant hormone, ethylene, from triggering stress responses in crops during, say, a moderate drought period. According to the company, field trials have shown yield increases of 5 to 10% when Invinsa is used during mild to moderate heat and drought stress compared to crops without Invinsa. The first crops on which it will likely be used are corn, cotton and rice.

PROACT. Plant Health Care, Inc., has several Harp-N-Tek natural products under the name ProAct that use the Harpin protein to trigger plant growth and self-defense against disease. Applied at a half-ounce per acre, the company claims its extensive field trials show a 7-bushel-per-acre yield bump in corn. ProAct can be used with postemergence herbicides but is also compatible with fungicides, insecticides and foliar nutrients. There is also a version of the product for soybeans, cotton, rice, small grains and other crops.

VAULT HP. Iowa-based Becker-Underwood is one of the pioneers of biological additives with its line of soybean inoculants/treatments. VAULT HP uses Integral biofungicide—a bacteria that inhibits the growth of disease-causing pathogens like Fusarium and Rhizoctonia. By covering the root surfaces, these bacteria block pathogens. The treatment is applied at 2 fluid ounces per hundredweight of seed.