

Bridging the Biostimulant Gap

The heated debate over efficacy may finally be reaching the end

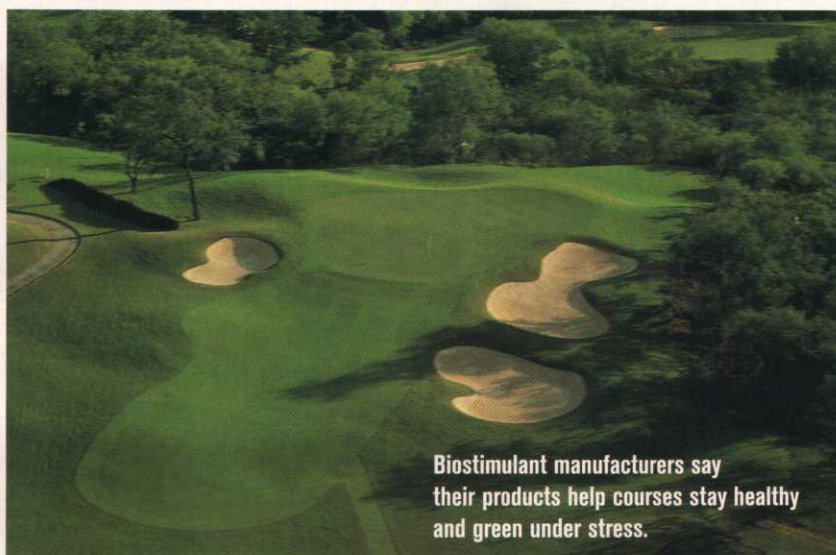
By Frank H. Andorka Jr.
Managing Editor

For more than 10 years, Keith Karnok has asked questions about biostimulant use by superintendents. The turfgrass professor at the University of Georgia did it again in February at the GCSAA Conference and Show in San Diego, telling superintendents, "We cannot shortcut the time-proven, research-based principles of turfgrass management [by using biostimulants]."

While Karnok stands by those sentiments and amplifies them often in frequent presentations to superintendents' groups, he always gets the same question at some point: Would he use biostimulants if he were a superintendent?

"The answer is a qualified, 'yes,'" Karnok admits. "If I had fine-tuned my fertility program and felt completely comfortable with my agronomic plan, then I'd ask the manufacturers to see their research and do some test plots on the course to see if the products do what they say they're going to do. Then, if I had money left over in my budget, I'd consider them."

Karnok's admission shows how far biostimulants have come in the industry. Five years ago, some superintendents viewed biostimulants with suspicion, thanks to slick salespeople who oversold the products as a cure for all turf problems. Now with more research to back up toned-down claims, many superintendents use them as a regular part of their maintenance programs. In fact, Bob Weltzein, marketing manager for the Roots Plant Care Group of



Biostimulant manufacturers say their products help courses stay healthy and green under stress.

MIKE KLEMMIE

Novozymes/Roots, groans when he hears *Golfdom* is doing an updated article on the debate.

"It's really over," Weltzein says. "There is hardly a superintendent out there anymore who doesn't use them in some form or another."

Well, it's not *quite* over. Researchers like Karnok and others still wonder how well biostimulants perform under real-world conditions, while manufacturers fire back that the current research is conclusive enough. But given the acrimony over the past decade, the two sides of the biostimulant debate are closer together than ever before, and the eventual end of the battle may be in sight.

What is a biostimulant?

Bert McCarty, professor of agronomy at Clemson University and author of the 2001 book *Best Golf Course Management Practices*, writes that the term biostimu-

lant is "an ambiguous term used to encompass non-nutritional growth-promoting substances such as microbes, plant growth hormones, soil conditioners and microbe energy sources." McCarty's definition is certainly comprehensive, but it may be *too* comprehensive when it comes to evaluating commercially available biostimulants because few are strictly non-nutritional.

Karnok says most biostimulant products contain some combination of the following ingredients: plant hormones, microbes, humates, mycorrhizae, and/or vitamins/enzymes. The problem is most biostimulants also include some nutritional components, which troubles academics like Jack Fry, a professor of turfgrass management at Kansas State University.

"You can't just test the products the companies give you," Fry says. "You have to separate the purported active ingredi-

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ents from the nutrients. Otherwise, you can't clearly identify the cause and effect."

Karnok concurs. "It leads some of us to wonder if you could get the same results by tweaking your nutritional program instead of purchasing the extra materials."

Erik Ervin, a turfgrass professor who followed in the footsteps of Dick Schmidt, a biostimulant advocate at Virginia Tech, says he would be happy to supply Karnok with his research studies. Ervin, who has replicated and refined much of Schmidt's work, says the evidence is clear that biostimulants have a positive effect on turfgrass systems separately from the nutritional components of the products.

"I came to the whole biostimulant issue as a skeptic, so I did an experiment where I burned off all the organic materials so only the nutrients remained," Ervin says. "When we applied them to the test pots, we saw no effects at all."

Ervin adds that the amount of macronutrients supplied when using these products at label rates would often not be adequate for even spoon-feeding purposes. Biostimulants should be used to supplement a good fertility program — not replace one. "The levels of nutrients in the seaplant or humic acid extracts used in our studies aren't high enough to produce the benefits we see by themselves."

Bill Byrnes, president of Floratine Products, empathizes with academic researchers' objectives.

"But delivering product value demands recognition of the many nutritional and 'non-nutritional' elemental interrelationships in plant growth

processes and addressing them with synergistic components," Byrnes says. "They are interconnected."

While Karnok concedes that Byrnes may be right, he says he'd still like to test the active ingredients separately. "It would remove some of the doubts that still remain for superintendents."

The debate over research

One of the thorniest questions in the biostimulant debate is what constitutes appropriate research. When explaining the benefits of their products, companies often cite internal testing by their research-and-development departments as well as university research they've funded.

Byrnes says Floratine has supported and cooperated with more than 15 universities in many trials and continues to do so. "Even so, all our product development research is on real-life turf stress conditions because helping superintendents is what matters," he adds.

Weltzein says Novozymes/Roots has done more than 100 studies at 16 universities.

Geoff Simril, sales manager for Milliken Turf, scoffs when critics say there hasn't been enough research. He says there's plenty of basic and applied research that shows that the use of seaplant extract, humic acids and amino acids can help keep turf healthy under stressful conditions, and that similar products have been used in agriculture for years with success. "The body of scientific evidence is actually pretty overwhelming, so I don't understand that line of argument," he adds.

Weltzein says he believes the current research proves biostimulants work, but

he wishes it would explore the relationship between biostimulants and traditional nutrition programs. "We believe biostimulants allow superintendents to reduce nutritional inputs significantly, but we've had a hard time finding a researcher willing to push it that far," Weltzein says.

But critics, and even some supporters, acknowledge that at least some of the research might not hold up in the field. Christina Wells, a professor at Clemson University, says she doesn't doubt the research that proves biostimulants provide benefits to turfgrass under controlled greenhouse conditions. But she wonders about whether the research adequately mirrors what actually happens on golf courses.

"There's been some controlled science that shows promise," Wells says. "That doesn't make the research any less valid in its conclusions, but it's not real-world conditions."

Even Ervin, who says his greenhouse research proves that biostimulants work, says he'd like to duplicate his results in the field but has had trouble doing it.

"Right now, it's a fairly accurate representation to say that most published biostimulant research has been done under controlled environment circumstances," Ervin says. "We've been able to see some successes in field trials — small increases in root mass under moderate stress conditions — but nothing I'd want to stake my professional reputation on."

Karnok says the available research shows some biostimulants work with certain varieties under certain conditions, but that doesn't mean they would work for *all* varieties under *all* conditions. "With so many different varieties of turf, it's hard to see how biostimulants could be treated as a one-size-fits-all solution to any problem," he says.

Wells says more research needs to be funded so products can be tested under actual golf course conditions, but she says the money for such research is scarce. "As researchers, we're always constrained by the priorities of the funding agencies," she adds.

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Backing for Biostimulants?

In a recent online survey, *Golfdom* asked its readers how they use biostimulants.

- 49%** use them as part of their regular maintenance programs.
- 7%** use them frequently as a supplement during times of severe turf stress.
- 24%** use them occasionally as a supplement to normal cultural practices.
- 20%** never use them because they have too many questions about their effectiveness.

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Biostimulants

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Superintendents could push for more funding from the USGA and other funding organizations. "If superintendents demand research, then the money will follow," she says.

Gary Grigg, former superintendent and vice president/agronomist of Grigg Bros., a foliar fertilizer and biostimulant manufacturer, says the industry segment won't boom until suppliers provide more independent university research.

"The bottom line is that the people superintendents listen to — the university professors — are still skeptical about the products in many ways," Grigg says. "Companies need to involve them more aggressively if they want to succeed."

Grigg is quick to add that he's not saying university researchers have a monopoly on good research.

"There are a lot of former academics in the research-and-development departments at these companies that do good work," he says. "But superintendents are more likely to trust research done by outsiders."

The ideal use

Floratine's Byrnes says anyone labeling any product as a cure-all is both unethical and economically unsound.

"Well-designed biostimulants are simply tools which can supplement turf's resources to handle stress," Byrnes says. "There are no silver bullets."

The manufacturers say biostimulants should be used as part of a regular maintenance program to build up the plant's tolerance for stress.

Milliken's Simril says today's greens are always under stress because of lower mowing heights, so superintendents shouldn't wait until a drought or other environmental factors force them to go to biostimulants.

"The question of when stress begins for turf has changed significantly over the years," Simril says. "Low-mowing itself stresses the turf by eliminating photosynthetic areas. You can't decide at the last minute to use these products because they don't give you instant results."

Biostimulants make the plant tougher by stimulating antioxidant production. They also may stimulate root growth, increase photosynthetic rate and capacity, and increase stress tolerance and disease resistance, Simril says.

But not everyone believes superintendents should use biostimulants so broadly. Instead, Wells suggests that biostimulants may be more like prescription medications.

"Under specific stress conditions, biostimulant use may be beneficial," Wells says. "But without further research under real-world conditions, we don't have enough information to write specific prescriptions."

Which brings the debate back to Karnok. He says that in an era when superintendents are looking for every angle to give them an edge, biostimulants are a nice safety net.

"I wouldn't rely on them to take care of all your problems, but they're not hurting anything," Karnok says. "As long as you're not skimping on other items like fertilizer and pest control materials and you can afford them, I'd cautiously consider them."

Ultimately, each superintendent will have to evaluate how useful biostimulants are in their individual situations.

"Superintendents will have to try them to see if they work for them," Grigg says. "That's the best kind of testing there is." ■

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