

BIOSTIMULANTS

A NEW WAVE FOR FERTILIZERS

THERE WAS A TIME WHEN BIONUTRITION, or biofertility as some prefer, was a misunderstood and under-appreciated approach to plant health. But as the scientific community continues to find more evidence of the efficacy of biologically-based products, so too are end-users becoming believers.

At a bionutrition conference held recently, a report released by LebanonTurf finds that there is still a lot that scientists, the academic community and turf managers don't understand about microorganisms and their interaction with soil and turf. But a number of respected members of those groups are convinced of one thing: bionutrition is now an accepted and proven form of fertility.

In its simplest form, bionutrition is the enhancement of beneficial microorganisms to the soil to facilitate nutrient availability and uptake. Exactly how that process works through the many different forms of microbial activity has mystified even those who have devoted their careers to plant science.

Less nitrogen with equivalent color

"We can't see microorganisms without powerful microscopes, and they are extremely difficult to identify and characterize," says Dr.

Roch Gaussoin, a professor of agronomy and horticulture at the University of Nebraska-Lincoln, "It's a complex and intricate system that is not widely understood."

Gaussoin's "awakening," as he calls it, came two years ago when he conducted a study of Lebanon's Greensmart Enhanced Efficiency Fertilizer, which is promoted as a product that enhances and extends nutrient performance. "The data clearly indicated an equivalent response with reduced rates of fertility," Gaussoin says. "We found that we could put down 30 percent less nitrogen and get an equivalent response in terms of color quality and digital analysis."

Bionutrition believers

Other scientists, whose research has opened up a broader discussion of various forms of biofertility, also are becoming believers. Joining Dr. Gaussoin at the conference were Dr. Robert Ames, senior staff scientist at Advanced Microbial Solutions in Pilot Point, Texas; Dr. Mike Amaranthus, associate professor at Oregon State University (adjunct) and the president of Mycorrhizal Applications, Inc, in Grants Pass, Oregon; and Robin Ross, market development scientist, Plant Science Division, at Acadian Seaplants Limited in Dartmouth, Nova Scotia. Individually

and collectively, the scientists vouched for the credibility of the bionutrition category.

"Ten years ago, the mention of 'mycorrhizal fungi' to a turf manager might have been met with a blank stare," says Dr. Amaranthus, whose work has focused on the beneficial associations most grass species form with soil organisms, including mycorrhizal fungi. "Today's turf managers are much more knowledgeable regarding the benefits of mycorrhizae, because research studies have shown us all how these specialized fungi can improve turf health."

Multiple benefits

Scientists at the LebanonTurf conference cited benefits of biological products in three categories: plant health, cost-reduction and environmental sustainability.

In addition to their below-ground benefits to plant nutrition, biological fertilizers increasingly are being recognized for their contributions to the air and water above ground. But it's their potential to sequester carbon gases that really have environmentalists excited, Dr. Amaranthus says. "Grasses are great for building carbon in the soil, which has implications for global warming. In studies, we've seen that

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these products can increase the carbon content of treated soil one percent per year, which is huge. Multiply that over millions of acres and there is the potential to reduce 27 percent of U.S. carbon emissions.

"I see at some point, turf managers are going to receive credits for taking carbon out of the air, where it does damage, and putting it into the soil, where it does all sorts of good things," Dr. Amaranthus adds.

Better understanding

As they devote more attention to biologicals, scientists are discovering more reasons for their efficacy.

"Most of these microbial soil amendments started out many years ago as individual organisms,

or maybe just a couple of organisms that were cultured artificially and then put into a product," Dr. Ames says.

"Many of the early products had very specific functions: enhancement of organic matter decomposition, for example. But as technologies evolved, products with multiple microorganisms were introduced. Later, humic acids, plant hormones and other plant stimulants were added to help the organisms survive in the soil."

The 'major evolutionary step,' Dr. Ames says, has been scientists' willingness to look more at products obtained from natural communities of organisms and their biochemical byproducts. "This has been the big step, to identify these tools to gain a better understanding of how organisms function within the soil and interact with

the plant through biochemical processes."

Dr. Amaranthus, who says he was "trained very conventionally—everything was N-P-K when I was coming along"—calls the process that delivers beneficial mycorrhizae and nutrients to the root system the "plant's freeway system."

"Once the mycorrhizal association is established, it provides increased root surface area to support the exchange of nutrients between the fungus and the grass," Dr. Amaranthus explains. "These filaments form an extensive system that absorbs water and nutrients, which are transported back to the turf root system."

"This was probably the hottest, driest summer I've ever encountered, and these biologicals saved

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our cookies," he adds.

Seaweed benefits come ashore

Although used by farmers for hundreds of years to improve crop production, seaweed is a relative newcomer to the discussion of biofertility. *Ascophyllum nodosum* is the most researched and considered the most active of all of the seaweeds. Extracts from this species promote improved root growth that, in turn, can lead to greener, more attractive turf. Ironically, this species of seaweed, which also enhances turf's ability to stand up to extreme heat and drought conditions, is found exclusively in the cold waters of the north Atlantic, mostly in the Bay of Fundy, off the coast of Canada and Maine.

"When you put extracts from the *Ascophyllum nodosum* species on land plants, they take on some of the same ability as the seaweed to tolerate stress," Ross says. In addition to increased stress tolerance, turf treated with seaweed extract exhibits greener color and a more attractive appearance (due to higher amounts of chlorophyll) along with increased root growth.

Synthetic complement

One answer the scientists do seem comfortable with is to the question: Do biological products support and work in a complementary fashion to traditional synthetic products?

"We use technologies such as slow-release fertilizers, inhibitors and coatings all in an attempt to keep more of the fertilizer available to the plant for longer periods of time," Dr. Ames says. "Biological additives are another technology to enhance fertilizer efficiency."

Biological products "enhance the effectiveness of conventional fertilizers and make those fertilizers work better," according to Ross. "If you're not using a biological product, you're completely missing the ability to bolster the plant's natural defenses, especially to drought and salinity stress."

"We've come a long way from where we were in our belief process," Dr. Gaussoin says. "And we're just on the edge of what we might be doing five to 10 years from now. But as we learn more, and manufacturers apply more of the science, I think we will see highly reputable companies producing appropriate and proven biologically active compounds that turf managers can't live without." 🌱