

Bio-control research surges, new products abound

By ANDREW OVERBECK

While biological control products have gained a significant foothold in the U.S. turfgrass market, the young industry continues to re-define itself with new products, technologies and techniques almost daily.

"When you are talking biologicals you are talking about the soil ecosystem which is a new frontier that we are learning more about every day," said Rick Geise, brand manager for Nature Safe. "We are just scratching the surface right now."

Universities and companies are conducting research to determine methods to improve microbial efficacy, sustain microbial populations, identify specific beneficial micro-organisms, lengthen the shelf-life of products and combine products with traditional chemical applications.

BIOSTIMULANTS

Through a variety of delivery mechanisms, activities and organisms, biostimulants, generally, encourage healthy turf growth, increased root mass and improve soil quality to help turf survive weather- and disease-related stress.

However, new research and products are showing that some biostimulants have disease-suppressive qualities as well.

New Products

For instance, Sybron Biochemical's TurfVigor microbial product line concentrates on feeding beneficial microbes in the soil to enable turf to fight disease more effectively by increasing the plant's ability to absorb nutrients and develop a larger root mass.

"It allows the plant to turn on 'defense' genes. By inputting precursors to certain phytohormones, we can allow the

plant to choose to turn on the genes to protect itself," said Dr. Dave Drahos, research and development group leader at Sybron. "At an application rate of every



TurfVigor helps turfgrass fight disease and develop a larger root mass. Above, side-by-side plots demonstrate TurfVigor's effect on turfgrass, left, compared to untreated turfgrass, right.

two weeks, they will have a benefit at helping the plant at certain growing

points in the season that allow the plant to do much better at laying down a more branched root system that will take heat stress more efficiently and be more resistant to diseases like dollar spot."

Also new to the market is Plant Health Care's Colonize biostimulant that contains mycorrhizal fungi to stimulate the rapid colonization of turfgrass roots.

"Colonize stimulates what is already there," said President Wayne Wall. "There is often some mycorrhizal fungi on greens, but not enough to provide a benefit because it is constantly being suppressed."

According to Wall, research has shown that greens with an abundance of the fungi are much healthier, produce more chlorophyll, better absorb nutrients and are more resistant to drought.

Floratine Products Group's Floradox system includes various soil-, biological- and turf-related products that work together to enhance the activity of patho-

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Supers use biologicals with cautious optimism

By ANDREW OVERBECK

As regulations and local legislation concerning the use of chemicals and environmental pressures continue to haunt golf course superintendents, many are incorporating biological products into their maintenance regimes.

"In this business, you don't want to wait until you are forced to do anything," said Paul Reising, superintendent at Preswick Village Country Club in Highland, Mich., "because then there is no room to experiment. If your top two products are taken off the market you are screwed and your job is on the line and you have to try a product that you are not familiar with."

Reising has been using Eco Soil's BioJect system on fairways and tees and Floratine's Floradox system on greens and has met, so far, with success.

Reising used two-thirds less fungicide on tees and fairways last year and only applied fungicide once on 14 of his 18 greens.

"I am convinced that it works, and we will be going full tilt this year," he said. "But it has only been one year so I am still going to run some tests this year. It would take me a couple years to be fully convinced."

When it comes to biologicals, cautious optimism is the rule of the day.

"Try out a bunch," advised Dan Dinelli, superintendent at North Shore Country Club in Glenview, Ill. "You want to be comfortable with what the options are if you have to omit certain plant-protection products."

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Bio-control industry shaking growing pains

By ANDREW OVERBECK

Industry insiders predict that between 20 and 30 percent of chemical and fungicide revenues will shift towards biological alternatives in the next five to 10 years. Behind that growth are increasing government regulations, such as the Food Quality and Protection Act of 1996 (FQPA) that is restricting and eliminating chemi-

cals in the marketplace; increased local legislation curtailing or reducing chemical use; and increased acceptance of biologicals by golf course superintendents.

For example, Soil Technologies is poised to gain some market share with the introduction of its bioinsecticide Nemastry, which recently received Environmental Protection Agency (EPA) approval.

"Nemacure, which is the most active material in the marketplace for nematodes on turf, is going to either be eliminated or restricted. Alternatives like ours have a real opportunity," said Steve Nicols, president of Soil Technologies.

While the future looks bright for biological manufacturers, the same factors that are driving the market's growth are also limiting it in the short term.

First, the industry's image has been sullied by companies marketing "snake

Organophosphates used on turfgrass that are under FQPA review

- ACEPHATE
- AZINPHOS-METHYL
- BENSULIDE
- CHLORPYRIFOS
- DISULFOTON
- ETHOPROP
- FENAMIPHOS
- TRICHLORFON

These wasps don't sting, they paralyze ... grubs that is

By ANDREW OVERBECK

LEXINGTON, Ky. — If Dr. Dan Potter gets his way, greens committee chairmen may soon find themselves approving the purchase of wasps to fight pests on their golf courses. While this may raise safety concerns among golfers, the Tiphia wasp is not concerned with human prey, but instead hones in on masked chafer grubs (white grubs) that damage turfgrass.

"These are innocuous parasitic wasps. No one would notice these things," said Potter, professor in the Department of Entomology at the University of Kentucky. "They go down into the soil and seek out the grubs,

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After seeking out a masked chafer grub, the Tiphia wasp paralyzes its victim, rolls it up into a ball and lays an egg on it. When the egg hatches the wasp larva then begins to feed on the grub...

Communities that have moved to either ban or phase out pesticides use on city- or county-owned property

- ALBANY, N.Y.
- ARCATA, CALIF.
- BUFFALO, N.Y.
- CARRBORO, N.C.
- MARIN COUNTY, CALIF.
- MONROE COUNTY, N.Y.
- SAN FRANCISCO, CALIF.
- SANTA CRUZ, CALIF.
- SANTE FE, N.M.
- SANTA MONICA, CALIF.
- SEATTLE, WASH.
- SUFFOLK COUNTY, N.Y.

oil" and making broad claims about product capabilities that don't exist. Further, an education gap exists between superintendents and the knowledge base of university and industry researchers.

The lack of an independent regulatory body to verify claims about biological control products has many in the indus-

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...One week later, the Tiphia wasp larva has polished off the masked chafer grub leaving behind only its head and skin. An effective form of pest control indeed!

New Bio-control research and products abound

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genesis related proteins that help the plants stop and recovery from disease attacks.

"Everything we do is geared towards the plant's immune system," said company President William Byrnes. "That is the basis of good health. Control is an adjunct. We want to help the plant win the war itself through

good soil and plant management. Depending upon the golf course, any list of products can go into that."

Being added to the Floradox line this year is Protesyn, a liquid organic complex that conserves plant energy and directly improves its photosynthetic efficiency by providing complete amino acids, proteins and car-

bohydrates which are needed by turfgrass that is under stress and intensive use. Photosyn, a compost tea formulation, works in concert with Protesyn to improve the health of stressed soils.

"There have been good results in California and Florida against nematodes, fairy ring in Texas and take-all patch in Scotland,"

said Byrnes. "We don't pretend that it is a fail-safe device, but along with good fertilization, water and air management and cultural practices, it is an effective tool to move down the line towards reduced reliance on chemicals."

According to Geise, Nature Safe products have also demonstrated the ability to manage disease and pest outbreaks.

"We don't claim that it is a

disease suppressant, but we claim that it can aid in disease management," he said. "We have done studies with dollar spot where the efficacy was increased and less fungicide was used." Nature Safe also is doing an ongoing study on nematode suppression.

University Research

While the disease- and pest-fighting qualities of composts and biostimulants are apparent, work is being done to identify which specific micro-organisms in composts are leading the way.



Dr. Eric Nelson

For the past five years, Dr. Eric Nelson at Cornell University has been screening organisms in composts that had suppressive qualities to identify which organisms were responsible.

"We have plots of fescue and we have been applying compost on them and some have been suppressive, some have not and some were suppressive but aren't anymore," said Nelson.

By inoculating the plots with *pythium* and then monitoring which plots fight the disease, Nelson hopes to identify the suppressive activity and the micro-organisms.

However, this has proved difficult. "It is like finding a needle in a haystack," he said. "We can only isolate and study less than one-tenth of one percent of the micro-organisms that you can see in the soil."

Using new molecular methods to study the organisms may assist Nelson and he hopes eventually to be able to create more predictably suppressive materials.

In the meantime, he is looking at the influence of cultivars on the activity of micro-organisms. "We are going to look at what the differences are when you put them out on A-4 versus Penncross bentgrass," he said. "In agricultural crops this has made a huge difference in efficacy."

Efficacy, however, can be improved immediately by sticking to some rather simple application rules, said Nelson and Michigan State University's Dr. Joe Vargas.

"You must apply them properly," said Nelson. "You can't use the fungicide paradigm and apply them every two weeks and expect to have activity. You have to apply them frequently to maintain population levels."

According to Vargas, applying micro-organisms after dark will improve efficacy. "The organisms are damaged by ultraviolet light and desiccation,"

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BIOLOGICAL CONTROLS

Bio-controls

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he said. "By applying it as close to dark as possible, you eliminate those problems."

BIOFUNGICIDES AND BIOINSECTICIDES

Biofungicides and insecticides are also continually applied to provide a constant supply of microbes to the turf. Since live mi-

crobe populations must be maintained, product development has focused on delivery methods and product stability.

crobe populations must be maintained, product development has focused on delivery methods and product stability. The active ingredient, *Bacillus subtilis*, has been around since the 1930s, but it has not been used commercially because scientists have been unable to stabilize it outside the laboratory.

"Our solution is an organic base that has more than two years of shelf life," said Reinbergen.

Used preventatively, Companion has been shown to reduce necessary rates of chemical fungicides and achieve greater results.

Also new to the market is Soil Technologies' Nemastry and Plant Healthcare's Lepinox.

Nemastry uses an extract of chili and mustard to kill and repel nematodes and other worms. Lepinox contains active *Bacillus thuringiensis* that is effective at

controlling armyworms and sod webworms, especially when used as a preventative to attack small larvae.

WORKING WITH CHEMICALS

Despite all the research and new product developments, biological controls are still best used in concert with traditional chemicals to achieve reduce rates.

"If you can get biologicals out

there," said Vargas, "the disease comes in a lot slower and gives you a chance to go out and put down a curative spray."

Indeed, most are designed and tested to work along with chemicals.

"We have learned that you have to use the biologicals to reduce the amount of fungicides or chemicals," said Gelwix. "But they are also complementary to each other." ▽



Eco Soil's BioJect system brews up micro-organisms that are delivered to turfgrass via a golf course's irrigation system.

crobe populations must be maintained, product development has focused on delivery methods and product stability.

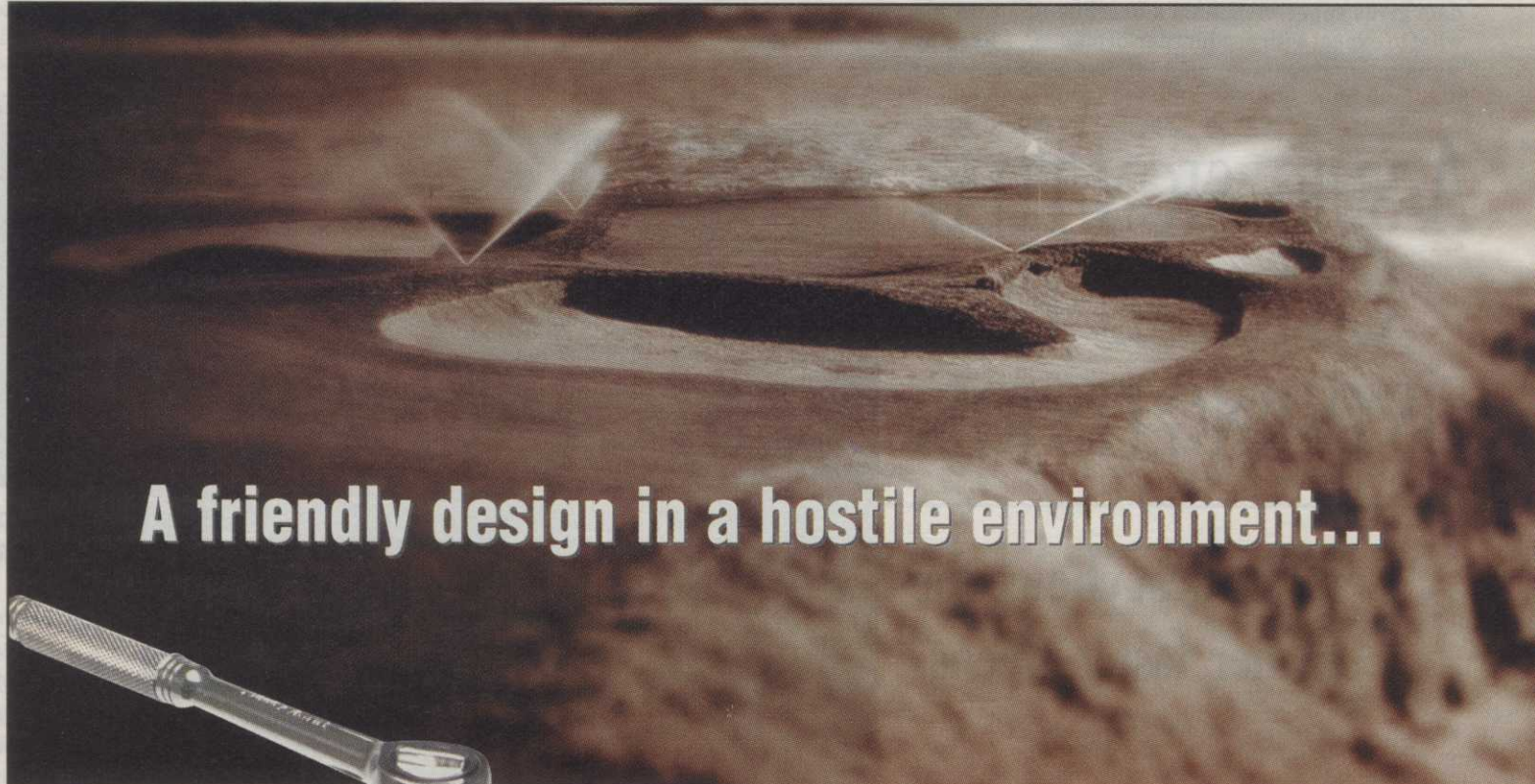
"The challenges are having it produced at the right times, in the right quantities, the right temperatures and conditions," said Max Gelwix, president and chief operating officer of Eco Soil.

Eco Soil's BioJect system, which is being used on 384 courses nationwide, provides on-demand readiness for the production of biologicals that improve soil and turf health and provide preventative disease and pest control. Last year it introduced the Fresh Pack system, a concentrated mixture of biologicals that is shipped to courses overnight to be used within 48 hours, thus eliminating shelf-life issues. The system is ideal for smaller applications and is being used by more than 1,000 courses.

Eco Soil is also concentrating on cataloging and determining the value of the more than 2,500 microbes that it acquired from the purchase of Agrium last summer. "We will learn which bugs have beneficial aspects in terms of growth promotion and biological controls," said Gelwix.

Stability and consistency were the major concerns for Growth Products when developing its new biofungicide Companion.

"When we started looking at biological control, we looked more at the solution because stability was the most impor-



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