

# 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!



# Owls and golf courses may be mutually beneficial

By MATTHEW D. SMITH and  
Dr. COURTNEY J. CONWAY

**R**ICHLAND, Wash. — In an effort to reverse population declines of burrowing owls, Washington State University Professor Courtney J. Conway is collaborating with the United States Golf Association (USGA) and five golf courses in southeastern Washington to determine if the courses can provide suitable nesting locations for the owls. If successful, the project could prove to be beneficial to owls and golf courses throughout North America.

Burrowing owls inhabit short-grass, open country such as prairies, deserts and grasslands. Owls typically nest in abandoned burrows of fossorial mammals such as badgers, prairie dogs and ground squirrels. Burrowing owl populations are declining throughout North America and reduction in the number of suitable nest burrows is one factor commonly thought to limit owl populations. Thus, burrowing owls are considered a species of special concern throughout the United States and are endangered in Canada and several Western states. This designation has attracted the attention of wildlife agencies, conservation groups and the USGA.

Attracting nesting burrowing owls has potential benefits for golf courses. Their diet includes small rodents such as voles, mice and pocket gophers, as well as insects such as locusts, beetles and crickets. Hence, burrowing owls may help to control populations of species typically considered pests by golf courses.

Golf courses have the potential to contribute significantly to burrowing owl conservation and recovery efforts because they have the open, short-grass conditions that owls typically prefer. However, golf courses lack one critical component: nesting burrows.

Conway approached the USGA to fund a project to test whether artificial burrows would attract owls to nest on golf courses. The project is funded by a three-year \$75,000 grant through the USGA's Wildlife Links program and receives additional support from Washington State University, Washington Department of Fish and Wildlife, U.S. Bureau of Land Management, U.S. Fish and Wildlife Ser-

vice and the Lower Columbia Basin Audubon Society. Conway and his field assistants, along with golf course grounds crews and local volunteers, are installing 150 artificial nest burrows on Canyon Lakes, Columbia Point, Horn Rapids, Meadow Springs and Sun Willows golf courses.



Project Coordinator Matthew D. Smith digs a trench for an artificial owl burrow that is situated just 33 feet from the 16th green at Canyon Lakes Golf Club in Kennewick, Wash. (above). A pair of burrowing owls (inset).

vice and the Lower Columbia Basin Audubon Society.

Conway and his field assistants, along with golf course grounds crews and local volunteers, are installing 150 artificial nest burrows on Canyon Lakes, Columbia Point, Horn Rapids, Meadow Springs and Sun Willows golf courses.

Artificial burrows are constructed by

attaching 10 feet of irrigation tubing to an upside-down five-gallon bucket, and then burying the structure three feet underground. The last three feet rise quickly to the surface and the small, exposed opening serves as the entrance. The area left exposed is less than one square foot and does not interfere with typical golfer or maintenance activity. If owls really are limited by the availability of suitable nest

burrows, these structures may allow the local population to expand. The data gathered from the study will identify situations that nesting owls will and will not accept. Of particular interest is understanding what level of golfer activity the birds will tolerate.

Conway and his team have installed 30 artificial burrows since the project began

in February and 150 burrows are planned to be installed by August. Once installed, the new burrows are checked each week to determine whether owls are using the artificial structures. Occupancy is obvious because resident owls leave tell-tale signs which include small regurgitated pellets and a few feathers at the entrance. Conway is simultaneously monitoring the occupancy rates of another 150 artificial burrows in the area (ones not on golf courses) and 150 natural burrows. This data will allow him to compare burrow occupancy and reproductive success of the golf course burrows with both natural and artificial burrows in more natural settings.

Burrowing owls are unique in that they are active and visible throughout the daylight hours. Two of the partner courses already have natural burrows with resident owls present each year.

"Many of our golfers look for the owls when they play, and, in fact, if they don't see them, people will come and ask why they weren't there," said Nick Rodriguez, superintendent at Horn Rapids Golf Course.

The end product of this study will be to publish and distribute a pamphlet to superintendents throughout the breeding range of the burrowing owl. The information will describe how and where to install burrows and the benefits associated with them. Ultimately, the aggregation of golf courses can significantly contribute to the conservation of this species.

Matthew D. Smith, project coordinator for the burrowing owl study, graduated from Earlham College in 1997 with a bachelor's degree in biology.

Dr. Courtney J. Conway is a wildlife ecologist in the Department of Natural Resource Sciences at Washington State University. He has a bachelor's degree in wildlife biology from Colorado State University, a master's in zoology from the University of Wyoming, and a Ph.D. in ecology from the University of Montana. He has published more than 20 manuscripts and book chapters summarizing his research on the effects of environmental and land-use changes on populations of rare animals.

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## Wasps as grub control

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paralyze them, roll them into a ball and lay an egg on their backs. Then the wasp grub slowly devours the white grub."

In areas that have strong natural wasp populations Potter has found patches where three-quarters of the white grubs were parasitized.

"These wasps can be a pretty significant mortality agent against masked chafer grubs," said Potter. "But right now we know little about them."

Along with a two-year \$42,950 grant from the United States Golf Association, Potter and entomology graduate student Michael Rogers are studying how the wasps locate white grubs, how they can be attracted to golf courses and how maintenance practices can be adjusted to encourage healthy wasp populations.

Preliminary studies indicate that at close range the wasps locate white grubs by sensing vibrations in the ground.

"At long range, we speculate that wasps are homing in on plant odors that are produced by damaged turfgrass," said Potter. "Root feeding would create an odor bouquet that is different and the wasps hone in on the damaged plant to find the grubs."

In order to build up natural populations on golf courses, Potter is looking at which wildflowers attract the wasps.

"Wasps use flowering plants as a source for

nectar and carbohydrates, so we are going to determine which of these plants the wasps like to visit and perhaps we can augment their populations by including these plants in landscape plans," he said.

Potter has also experimented with a more rudimentary method of attraction — spraying turf with a diluted sugar solution. "We were able to attract dozens of wasps to the site, which we assume would then parasitize the grubs, but we haven't verified that yet," said Potter.

Altering turf management regimes can also help to build and sustain wasp populations. Potter has worked with Mach 2 and Merit insecticides and determined that both are compatible with the preservation of beneficial insects.

"However, we have to work with them and not knock them out," he said. "The wasps are the most active in late August to mid-September and if you don't spray then you won't kill them."

Instead, Potter recommends spraying preventatively early in the season and working around the life cycle of the wasps to encourage healthy grub-fighting populations.

"This study is part of an overall effort to understand why insect outbreaks occur on courses and to learn how to work with the golf course environment to encourage as much natural pest control as we can get," said Potter.

The wasp study will be taking place over the next two summers and Potter expects final results to be available in the winter of 2001. †