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"We like automatic transmission because not everybody can drive a manual."  
— Gary Yunker, shop manager, Spring-Green Corp.

*continued from page 60*

maintain. We prefer automatic transmission which makes it easier to drive.

**Cost considerations:** We lease our vehicles to avoid major repair problems. Image is also important to us.

**Dream truck:** It's an F350, single wheels in the back, diesel, 4 x 4, automatic, four-door/crew cab.

**Gary Yunker, shop manager, Spring-Green Corp. of Plainfield, IL**

**Company profile:** We are a lawn and tree care franchise system with 103 franchises in 19 states. Spring-Green Corp. owns several franchises throughout the United States.

**Customers:** 85% residential.

**Services:** We are a full-service lawn and

tree care company that offers spraying, fertilizing and core aeration.

**Crew size:** One person per vehicle.

**Fleet:** Our equipment is custom-built to fit our Chevy, Ford, Dodge, and Isuzu trucks. Our Dodges are 3/4- to 1-ton pickups and our Isuzus are cabover W4s with flatbeds.

**Favorite feature(s):** Most of our trucks are Chevys. The 2500 (8,600 gross vehicle weight) and 3500 (9,200 gross vehicle weight) have a greater carrying capacity and a more durable suspension. We like automatic transmission because not everybody can drive a manual.

**Cost considerations:** We are a fleet buyer for GM, Dodge and Ford. That helps our franchisees buy more cost-effectively without any price hassles.

**Dream truck:** One that never breaks down and can be driven 200,000 miles with no repairs.

#### University campuses

**Ronald Cooper, grounds superintendent, Western Oregon University of Monmouth, OR**

**University profile:** A small regional liberal arts university with a five-member grounds department covering 133 acres.

**Services:** Everything from installation and maintenance to hauling equipment.

**Crew size:** Depends on the job, but usually small.

**Fleet:** We have several Ford S10 Rangers, four-cylinder pickups with canopies, three one-ton flat beds (a Dodge,

*continued on page 64*

- Electronic ignition.
- Heavy duty shock absorbers.
- Four-wheel hydraulic brakes.

## John Deere

**Product:** 6 x 4 Gator

#### Best features:

- 18-hp, liquid-cooled, 2-cyl. engine.
- Four-wheel drive and differential lock for extra traction.
- Shares the arc-welded unibody design and front suspension



John Deere Gator features 4wd

of the 4 x 2.

- 1,200-lb. towing capacity.
- Low ground pressure and a low center of gravity protects the turf.

**Product:** Turf General

#### Best features:

- Available in a 23.5 hp diesel and a 26 hp gas model.
- Five-speed, fully-synchronized transmission.
- Hydrostatic steering.
- Large operator station.
- A 2,650-lb. payload capacity.

## White Bear

**Product:** Whitebear TJ1010FLA

"Jumbo Cab" off-road truckster

#### Best features:

- Three-cyl. liquid-cooled 39 hp engine.
- Payload of 1,900 lbs.

- Optional body styles include a dump bed, personnel carrier, aluminum topper, scissors lift, beverage cart and a wide array of trams and people movers.


## Textron Turf Care and Specialty Products

**Product:** Cushman Jr. Turf-Truckster

#### Best features:

- A 2,000 lb.-rated capacity.
- Offers the choice of a no-rust polyethylene dump box or a 47-in. flatbed with sides and a tailgate.
- Standard hydraulic system powers the dump box/bed.
- Three-wheel turf chassis features a 17-ft. clearance circle.
- A 18 hp Kohler Command V-Twin engine.
- A durable 6.5-in. commercial duty clutch.

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◀ Ron Cooper purchases vehicles through Oregon's surplus program.

Ford and GMC) and an Isuzu cargo delivery van. We also have a full size half-ton pickup truck as well as a one-ton, 1953 International flatbed with a dump box. We mostly use Cushman utility vehicles on the campus.

**Favorite feature(s):** We don't need any more power than a four-cylinder unless we go off campus. Automatic transmission is important since many of our students can't drive a stick.

**Cost considerations:** We never buy new because we can't afford to. I'm able to

purchase good vehicles through our state's surplus program.

**Dream truck:** A heavy duty, one-and-a-half ton truck with a swap loader — one where you could put different kinds of beds

on it with a dump box. It would also have short side racks to haul dirt or turn it into a dumpster.

**Gregg Parks, grounds superintendent, University Of Akron, Akron, OH**

**University profile:** Grounds crews cover 330 acres including 45 parking lots, three parking decks, athletic fields and buildings.

**Services:** Landscape installations to snow, litter and even gum removal.

**Crew:** 14 full-time staff persons and between six and 30 part-time temporaries.

**Fleet:** One-ton F250 dump truck, several medium size Ford tractors and large size tractors with front end loaders, five John Deere Gators and eight Cushman's.

**Favorite feature(s):** A good turning radius and automatic transmission.

**Cost considerations:** Lowest bid.

**Dream Truck:** Our Dodge 2500, as far as snow plowing capabilities, visibility, hood shape and mirror configurations. **LM**



Gregg Parks favors automatic transmission.

## Super truck

Super Lawn has just built a Super Cab truck that will hold up to seven passengers comfortably. They also have a limited number of pre-built trucks available for immediate delivery. Each pre-built truck has the basic Super Lawn Truck system already installed. Also, for the very first time, the company has two used trucks in stock — a 1999 Isuzu NPR with 51,000 miles and a 1997 Isuzu NPR with 41,000 miles. Each truck is equipped with automatic transmission and a/c. For more information contact

[www.superlawntruck.com/customers.htm](http://www.superlawntruck.com/customers.htm).

## Haul Master, Inc.

**Product:** Huskie HD

**Best features:**

- Engine — 16 hp, 480cc, overhead valve V-twin, gasoline, four-cycle, cast iron bores, premium long-life bearings and valve train
- Electronic ignition.
- 20 amp alternator with voltage regulator, 30 amp-hour battery.
- Frame — truck style, heavy wall rectangular box and channel section steel with full steel belly pan.
- Fully independent coil spring over heavy duty hydraulic shock absorbers.
- 1,000-lb.+ passenger load capacity.

## CheTech

**Product:** PUG 4x4 utility vehicle

**Best features:**

- Designed for substantial workloads or challenging terrain.

- Allows all four wheels to maintain contact with the terrain.
- A fully-articulated frame that twists and turns into the center.

## Columbia ParCar Corp.

**Product:** New models of 13 hp and commercial vehicles

**Best features:**

- The GU2400 Columbia Utilitruck has a 36-in. length bed and 2400-lb. capacity.
- The GU2400XB Columbia Extended Bed Utilitruck features a 60-in. length bed and 2400-lb. capacity.
- The C10G Columbia Tram passenger vehicle seats up to 10 people.



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# Insecticides *a la mode*

**The bugs are the same but insecticides' modes of action are changing. Learn how effective they can be**

BY DR. PATRICIA J. VITTUM

**M**ost of you are aware that the Food Quality Protection Act (FQPA) passed in 1996, and this law is impacting the availability of pesticides for use in turf and ornamental settings. Based on concerns about cumulative and aggregate exposures to pesticides, the U. S. Environmental Protection Agency determined that the registrations of organophosphate insecticides (OPs) should be reviewed first. This was in part because OPs affect the nervous systems of people and their pets, and so they tend to be more acutely toxic to vertebrates than many other classes of pesticides.

One byproduct of this governmental regulation and other trends has been the proliferation of new insecticides that have strikingly different modes of action against their target insects. While some insecticides, such as fipronil (Chipco Choice) and imidacloprid (Merit), had already been reg-

istered, other new chemistry is now under development. In addition, there are insect growth regulators like halofenozide (Mach 2). Meanwhile, several microbial pesticides have been identified and developed, and finally are reaching the market. Let's review what has been happening in each category.

## Chemical action for results

**1. Case of nerves** — Turf and ornamental managers have used organophosphates (OPs) widely for 30 years or more, and some of the more familiar products include acephate (Orthene), chlorpyrifos (Dursban), diazinon, fonofos (Mainstay or Crusade), isofenphos (Oftanol) and trichlorfon (Dylox or Proxol). Each of these is a cholinesterase inhibitor, working on the nervous system.

How do they work? The organophosphates stop (or inhibit) cholinesterase from doing its part to end a neural impulse. The result? Impulses continue to move through the nerve, in effect poisoning the insect and

causing tremors and convulsions, difficulty in breathing or loss of bodily functions.

**2. Pyrethroid mystery** — While the precise mode of action for pyrethroids is not fully understood, they appear to affect the permeability of the membrane in the central region of a cell. Normally when an impulse moves along a cell, the cell membrane gets "leaky" and some sodium ions rush in from the surrounding body fluid, changing the cell's electrical charge. These ions then have to get back to where they started from, but if the cell membrane becomes a little "stiff," it will not allow them to return to their original positions. The cell stays in an active state, sending an impulse that really isn't there. The cell is also unable to recognize when a new impulse should be sent.

Pyrethroids appear to affect both insect and vertebrate nervous systems at this level, and many pyrethroids are toxic to fish in particular. Examples include bifen-

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thrin (Talstar), cyfluthrin (Tempo), deltamethrin (Deltagard) and lambda-cyhalothrin (Battle, Scimitar). Pyrethroids are used most commonly against surface and thatch insects (chinch bugs, webworms, cutworms) in turf or against a variety of insects in landscape plantings.

**3. Block that chloride** — Fipronil (Chipco Choice) belongs to a class of chemicals called phenyl pyrazoles. Fipronil, which is used against mole crickets in the Southeast, interferes with the passage of chloride ions through a channel in the nerve cell. Insect nerves are more sensitive to this disruption, so fipronil is much more toxic to insects than vertebrates.

**4. Bad news for suckers** — Thiomethoxam (Meridian) should be released soon by Novartis and will be marketed as Flagship in the ornamentals market. It controls a variety of sucking and chewing insects, following contact or ingestion by the target pest. It is absorbed rapidly into the vascular tissue of the plant,

so its systemic qualities will make it a good choice against several common ornamentals pests, including aphids, whiteflies and mealybugs. It is also effective against several species of white grubs. It has a relatively long residue (about 50 days in soil) and is much less toxic to vertebrates than several of the more traditional insecticides that have been used over the past 30 years.

Thiomethoxam is in the thianicotinyl class of insecticides and is considered a nicotinoid. As such, it mimics the action of acetylcholine in the synapse, so it may bind to the receiving cell, tricking it into sensing an impulse to be sent. At low doses, this leads to a stimulation of the cell, but at higher doses, the system shuts down. Insects that come in contact with the material or ingest it demonstrate altered behavior within an hour or two, stopping feeding or no longer using their antennae in a normal manner.

#### Growth regulators — mixed-up molting

**1. Too juvenile** — Insects go through a

series of molts, during which they absorb the old exoskeleton (a complex structure that serves as the outer "skin" as well as a place for muscles to attach) and produce a new and slightly larger exoskeleton. Molting is an energy-expensive process that is regulated by hormones, some of which send a signal to the insect's body to remain in a juvenile stage — for example, a caterpillar, a grub or a maggot.

As long as that "juvenile" hormone is present, the insect cannot molt to the adult stage and cannot reproduce. Several juvenile hormones have been identified and developed commercially, and are used to reduce mosquito populations (methoprene) or to control whiteflies in greenhouses (kinoprene).

**2. Hurry up and molt** — Other chemicals interfere with the process of molting itself, usually by interfering with the natural timing of producing the new exoskeleton. One such material, halofenozide (Mach 2), is called a "molt accelerating

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Insecticides in the thianicotinyl class can be used to control grub damage like this.



Damage like this from chinch bugs can be extensive unless treated with the right insecticides.



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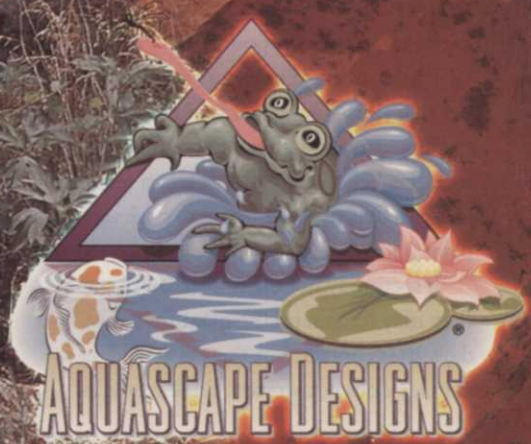


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compound" because it induces an immature insect to molt before that insect has had an opportunity to store up the energy reserves it will need to complete the process. The insect is doomed to fail — it may begin the process but abort it in the middle, so it may end up with characteristics that are, for example, part first instar and part second instar.

The insect stops feeding shortly after it encounters the material and usually dies within two or three weeks. One advantage of a molt accelerating compound is that vertebrate animals do not have an analogous process — in other words, we don't molt. So Mach 2 is considered much less toxic to people and their pets than most other insecticides currently on the market.

Mach 2 is used in turf settings against several species of white grubs (although the application rate varies with species) and appears to have good activity against several turf caterpillars as well.

### Feeding deterrents

Some compounds induce insects to stop feeding shortly after they come in contact with the material. These compounds are called "feeding deterrents," some of which may be distasteful and cause the insect to move on to a more tasty meal. Others may repel an insect from landing on a plant. Still others actually interfere with the physiology of the insect, plugging up its digestive system and making it impossible to feed further. Such insects die quickly after exposure to the compound.

Pymetrozine (Endeavor) is a new product that causes aphids or whiteflies to cease feeding, usually within a few hours of contact. It is believed to affect certain feeding muscles that the insects use to suck up plant juices.

Insects may not die immediately and they may remain on the plant for a few days after contact, but they stop feeding so damage does not worsen. Endeavor is la-

### LM'S TAKE:

## Using the *new* insecticides

1. Products will continue to evolve from more naturally occurring substances or processes.
2. Because of this, new products will continue to become more species-specific (targeted).
3. More and more "traditional" products will come under increased scrutiny in the EPA's evaluation of products for the Food Quality Protection Act.
4. This will encourage even more reduced rates of toxicity for products on all species — from humans to beneficial insects.
5. More "targeted" insecticides are becoming much more concentrated and potent at smaller amounts because of their modes of action. What used to require gallons might only require ounces now.
6. Don't expect prices to drop, however. The cost of finding, developing, testing and getting approval for new products is higher than ever.

beled for use as a foliar spray in greenhouses, landscape ornamentals and some nursery settings, among other sites. It has a short residual (will not remain active for a long time on the plant) and has a low level of toxicity to beneficial insects, including honey bees and various predatory insects.

### A 'biorational' product

Spinosad (Conserve) is a byproduct of a soil actinomycete (a bacterium), *Saccharopolyspora spinosa*, which has become a popular tool for use in integrated pest management programs. It is effective against several species of caterpillars, but it is relatively specific so it has minimal impact on several beneficial predatory insects.

While it affects acetylcholine receptors on the receiving nerve cells, it appears to do so in a manner that is markedly different than products like organophosphates — and it does *not* appear to interfere with the receptors in vertebrates to the same degree. As a result, it is much less toxic to mammals and other vertebrate nontarget organisms.

When an insect encounters Spinosad, it is incapacitated almost immediately. There are indications that insects are less likely to

develop resistance to Spinosad than to some other insecticides.

### Making a choice

With the recent addition of several new kinds of insecticides to the turf and ornamentals market, you now have lots of options. Each new product has some strengths, and can be incorporated into an IPM program. Some are selective and have minimal impact on nontarget organisms, while others are much less toxic than some of the older, more traditional materials. Experiment with the new compounds and determine which ones meet your own needs most effectively. **LM**

— The author is associate professor in the Department of Entomology of the University of Massachusetts, Amherst, MA