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And because XL contains Surflan,® your control's also stronger than Ronstar® against crabgrass. And just as strong or stronger against many other weeds. At less cost, too.

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XL™ — (benefin + oryzalin, Elanco)
Refer to the XL label for complete use directions.
Surflan® — (oryzalin, Elanco)
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For longer-lasting, broad-spectrum weed control, excel with granular XL.

Nitrogen Source	Analysis	Source of N	Manufacturer or Distributor
QUICK RELEASE			
Urea	46-0-0	urea	several
Ammonium nitrate	33-0-0	AN	several
Ammonium sulfate	21-0-0	AS	several
Ammonium phosphate	18-46-0	DAP	several
UF reaction products			
N-Sure	28-0-0	urea/triazone solution	Triazone Corp.
Formalene Plus	30-0-0	urea/sol. methylene ureas	Triazone Corp.
FLUF	18-0-0	urea/ureaform	Cleary
Coron	28-0-0	urea/methylene ureas	Coron Corp.
Nutralene	40-0-0	methylene ureas	Nor-Am
Methylene urea	39-0-0	methylene ureas	O.M. Scott & Sons
Nitroform (Gran.)	38-0-0	ureaform	Nor-Am
Nitroform (Powder)	38-0-0	ureaform	Nor-Am
Natural organics			
Milorganite	6-2-0	activated sludge	Milwaukee Sewarage Comm.
Sustane	5-2-4	composted turkey litter	Sustane Corp.
Ringer products	6-1-3	seed & bone meals, blood	Ringer Corp.
Plant Right	3-4-3	composted poultry litter	Plant Right Corp.
IBDU	31-0-0	IBDU	Par-Ex (Estech Chemical)
Coated materials			
Sulfur-coated urea			
with sealant	varies	urea	Lesco, Purcell, others
w/out sealant	38-0-0	urea	O.M. Scott & Sons
Resin-coated urea	41-0-0	urea	Par-Ex (Estech Chemical)

Key
L = Liquid
G = Granular (Delivery form)
M = Minimal
S = Somewhat
V = Very much
F = Fair
P = Poor
NA = Not available
E = Excellent
G = Good

soil temperatures are too cool for much of the N to be released. Natural organics applied in late season would, however, leave a pool of organic N in the soil that would become available in spring.

Synthetic organics

Synthetic organic fertilizers are a class of chemically combined forms of nitrogen that includes ureaformaldehyde reaction products and isobutylidenediurea (IBDU). Ureaformaldehyde (UF) products vary in their chemical make-up, some being suitable for a late season program, some not.

A UF reaction product is a mixture of polymers (chemical chains) of various lengths. The longer the chain length, the longer it takes for microorganisms to break them down. Thus, the N is tied up, and then released over time.

Products such as Nitroform, and formulations containing Nitroform, have a large percentage of longer-chained polymers. These would provide very little available nitrogen if applied in late fall. They are better when used in warm seasons.

Scott's methylene urea products and Nor-Am's Nutralene contain a large percentage of shorter-chained polymers, and an ample amount of quickly-available N. Nearly all the N in these products will become available within a few weeks under normal growing conditions. Scott's products and Nutralene contain enough available N, however, to produce a noticeable response from a late season application.

Liquid reaction products

Several UF reaction products can be applied in liquid form from sprayers. Fluf is a flowable UF with about 75 percent of the nitrogen in quickly available form. Other products such as Formalene, N-Sure and Coron contain soluble methylol and methylene ureas, as well as free urea. Since most of the N in these products is readily available, they should all work well in a late season program.

IBDU is a synthetic organic N source containing 31 percent N, most of it as WIN. The splitting of IBDU into urea and other by-products requires the presence of water. While the release of N from IBDU is moisture dependent, it is only slightly affected by temperature. IBDU is well suited for a late season program. The best results, however, will be obtained if finer grades are used.

Coated materials

The most widely used coated fertilizer is sulfur-coated urea (SCU). The sulfur used to coat urea (a quick release N source) prevents the urea from coming in contact with water. A sealant on the outside of the sulfur seals any defects in the coating. Urea N becomes available as the sealant and sulfur coating degrade.

Factors that contribute to the release of N from SCU include coating characteristics, moisture, temperature and particle size.

Scott's slow-release encapsulated fertilizer (SREF) is a sulfur-coated urea without a sealant. Since defects in the coating are exposed, urea is very quickly released from the pellet. Products containing SREF would, therefore, be well suited for a late season program.

% of N as WIN	Delivery Form	Approximate length of Response	Factors affecting Release			Salt Index	Free Urea	Suitability for Late Fall
			Temp.	Moist.	pH			
0	L,G	6 wks	M	M	M	75		E
0	L,G	6 wks	M	M	M	105		E
0	L,G	6 wks	M	M	M	69		E
0	G	6 wks	M	M	M	34		G
0	L	6 - 8 wks	M	M	M	NA	28%	G
0	L	6 - 8 wks	M	M	M	NA	40%	G
25%	L	6 - 8 wks	S	S	M	NA	>16%	G
0	L	6 - 8 wks	M	M	M	NA	> 3%	G
36%	G	8 wks	S	S	M	NA		G
36%	G	8 wks	S	S	S	25		G
71%	G	10-12 wks	V	V	S	10		P
66%	L	10-12 wks	V	V	S	10		P
92%	G	10-12 wks	V	V	S	4		P
70%	G	10-12 wks	V	V	S	NA		P - F
83%	G	10-12 wks	V	V	S	NA		P
60%	G	10-12 wks	V	V	S	NA		F
89%	G,L	10-15 wks	M	V	V	5		G - E
-	G	12-14 wks	S	S	M	NA		F - G
-	G	6 - 8 wks	M	M	M	NA		G - E
-	G	10-20 wks	M	S	M	NA		F

The nitrogen sources listed in this table are often used in formulations of many sorts. The type of formulation will influence many of the characteristics listed. Every attempt has been made to provide accurate information. Exclusion of products was not intentional.

Source: Dr. Hummel

Sulfur-coated ureas produced by Lesco and Purcell have a sealant on the coating and will provide a uniform, prolonged release of N during the growing season. The rate that the coating degrades, however, depends on soil temperature.

If you plan on using SCU as a late season fertilizer, better response will be obtained from the faster-releasing, fine or microprilled grades of SCU.

Other elements

Other elements often thought to be important in a late season fertilizer program are phosphorus, potassium and iron. But are they important?

Confusion and controversy endure over the benefits of P and K in a late season fertilizer.

Right or wrong, some practices have weathered both the years, and the advances made in our understanding of late season fertilization. For example:

Use of a high phosphorus "winter" fertilizer to promote rooting in the fall and winter. There is no question that a late season fertilizer will promote rooting of cool-season grasses. The response, however, is due to nitrogen.

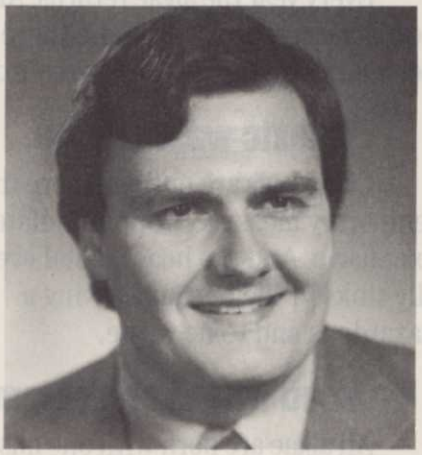
There is no evidence to suggest that phosphorus applications on established turf in the late season are beneficial. In fact, high P:K ratios may actually increase winterkill, especially with warm-season grasses. Phosphorus application should be based on a soil test.

Potassium applications in late season will improve winter hardiness. This is true, but optimum fertilizer ratios exist.

Late season fertilizers applied to cool season grasses should not exceed a 2:1 nitrogen/potassium ratio. The optimum ratio for warm season grasses (bermudagrass) is around 4-1-6 (like 16-4-25, 20-5-30).

Iron applications in the late season can also be beneficial. Cool-season grasses will remain dark green through much of the winter and early spring from a late fall iron application. Iron applied to warm-season grasses in the late season has more than aesthetic value. There is some evidence that iron will help improve the winter hardiness of warm-season grasses, and enhance recovery in the spring.

Iron is most effective and efficient if applied as a foliar spray. In short, plan now to improve the quality and health of our turfgrass areas by fertilizing in the late season. Take care in selecting the fertilizer sources and analysis, and be sure that you apply the fertilizer at the right time. **LM**



Dr. Hummel is associate professor of turfgrass science at Cornell University in Ithaca, N.Y.

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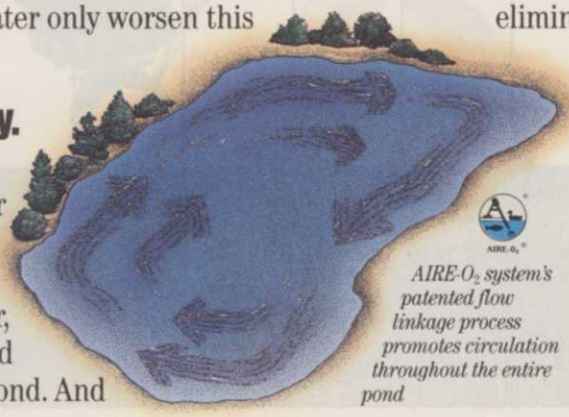

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GRUB BE GONE!

Grub control—especially with the most modern, effective insecticides—is a tricky business. Landscapers and lawn care operators are advised to meticulously follow these guidelines to avoid costly callbacks.

by Jerry Roche, executive editor

"It isn't as simple as everyone would like it to be," says Ohio State University's resident bug guru Harry Niemczyk. He is speaking, of course, about controlling lawn-munching grubs.

Keeping grub populations from damaging lawns has been, unfortunately, a hit-and-miss proposition among many professional lawn/landscape companies. Some of the problems are the fault of the applicator, some the fault of the homeowner and some the fault of the actual chemistry involved.

The first thing that should be done before applying a grub control insecticide is to check the soil pH and irrigation water pH, if possible.

"It is a problem," notes Dr. Michael Villani of Cornell University. "A lot of insecticides break down fairly rapidly in high or neutral pH."

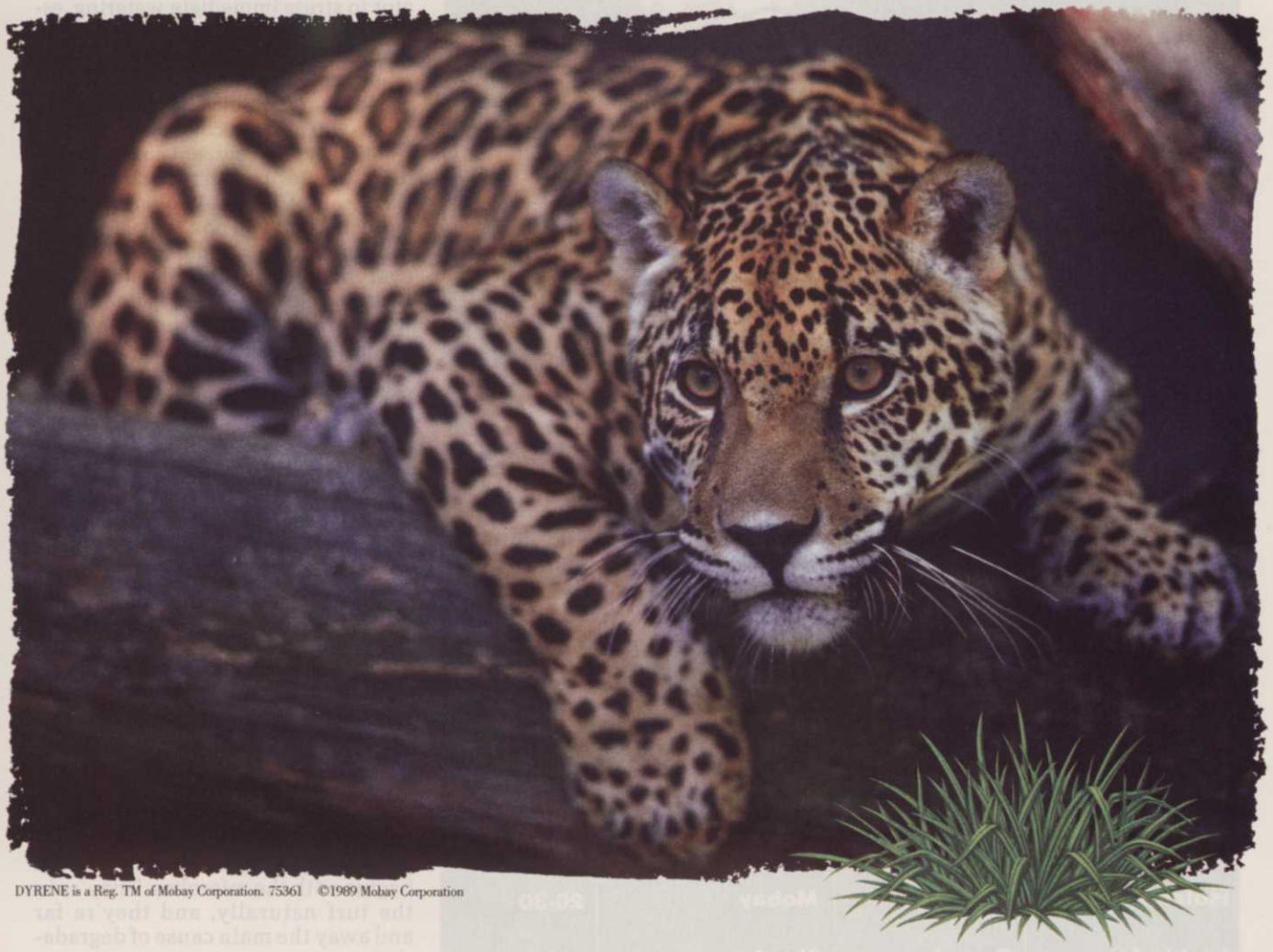
"Treating at the right time is also important," Villani adds. "People who treat in New York State in the spring have had trouble with control. And there isn't a manufacturer who will guarantee control of grubs if you put the material down in June or July."

With many new products, residual activity is not as long as older products, Villani continues, because of environmental considerations. This creates a smaller "window" of effective application. "Materials work under the best conditions, but there's very little margin for error now," says the Cornell entomologist. "You just don't have a leeway any more."

According to most experts in the North, early August is a perfect time to treat for grubs for control the rest of the year and into the next spring. Treatment can be made as late as mid-September. But because this is usually a time of extreme heat and drought that drives the grubs deeper into the soil, Niemczyk recommends "irrigation several hours before treatment and a thorough soaking afterward."

Insecticide applications made during the day—many times when homeowners are not present—also cause problems. If homeowners water at all, it is when they return at the end of the workday, at which time the insecticide may already be dried on the turf

Some Things in Nature Were Meant to Have Spots. Your Turf Just Wasn't One of Them.



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SOME INSECTICIDES FOR GRUB CONTROL IN TURF

COMMON NAME	TRADE NAME	MANUFACTURER	TOXICITY [1]
beniocarb	Turcam	Nor-Am	40-179
carbaryl	Sevin	Rhone-Poulenc	246-283
chlorpyrifos	Dursban	Dow	96-270
diazinon		Ciba-Geigy	300-400
ethoprop	Mocap	Rhone-Poulenc	62
isazophos	Triumph	Ciba-Geigy	40-60
isofenphos	Oftanol	Mobay	20-30
trichlorfon	Proxol	Nor-Am	250

Rat oral LD_{50} in g/kg[1]

Source: Farm Chemicals Handbook

leaf blade.

"You must insure proper watering," says Ciba-Geigy technical representative Don Wilson.

When he was working for ChemLawn, Wilson saw many instances when insecticides would be applied first thing in the morning but the client's landscaping service would mow and remove clippings before the lawn was watered.

"So we used to leave behind a packet of information with the invoice," Wilson remembers. "We'd put a fluorescent orange sticker on the invoice saying, 'CAUTION: Failure to water immediately will result in poor control.' It was very effective for us, especially with mole cricket control in Florida.

"The orange stickers are outstanding; they get the customer's attention and show him or her that you're concerned."

Wilson suggests knocking on the client's door before and after application of a grub control, if possible, to explain what applications were made. He also says that handwritten notes left behind work better than printed material.

"If a company really wanted to go above and beyond the call of duty," Wilson notes, "a phone call that night to remind the customer to irrigate helps."

Bob Staib, sales representative for Nor-Am Chemical, knows of some companies that call ahead of time to schedule grub treatments. That way, the homeowner will be home during treatment and can water immediately afterward.

"It behooves the lawn care operator to stress immediate watering, especially if the materials are liquid; granular materials aren't quite as immediate," Staib says.

Another problem is that no product yields 100 percent control.

"Eighty to 90 percent control is the norm," notes product specialist Tom Davidson of Rhone-Poulenc. "In the ag business, if you don't get 99 percent control, you're not doing well. Most everybody in the turf business has gotten used to 80 to 90 percent, but when you get this level on some populations, it just isn't enough." Davidson says that more than eight to 10 grubs per square foot will result in visible turf damage.

Another problem is what Dr. Niemczyk calls "microbial degradation."

According to Niemczyk and Dr. Adam Krause, also of Ohio State, "hungry" microbes in turf can adapt to residues of certain insecticides and quickly use the molecules of the compounds as an energy source. The phenomenon, seen before in herbicides, is known as enhanced microbial degradation.

"We found that microbes in the soil and thatch—fungi, bacteria and actinomycetes—are very important in the fates of insecticides," Niemczyk says. "Whenever you apply a compound to turf, degradation begins with the microbes. They're in the turf naturally, and they're far and away the main cause of degradation.

"But the bottom line is that once the adaptation is complete, applying the material to the turf is no longer effective."

Two ways for landscapers or lawn care operators to increase the efficacy of these insecticides are rotating them and timing their applications more accurately.

"Resistance to insecticides has not been a big problem," Staib says, "but it's probably a good idea to alternate products, especially those that have shown tendencies toward microbial degradation."

Says Niemczyk: "The whole phenomenon is still poorly understood. We have to find out a lot more to see if it's going to be a long-term problem."

The bottom line for effective grub control: test the soil pH, put the right material down at *exactly* the right time, and *make sure the client waters* as soon as possible after application. Those factors insured, adequate grub control is probably insured as well. **LM**

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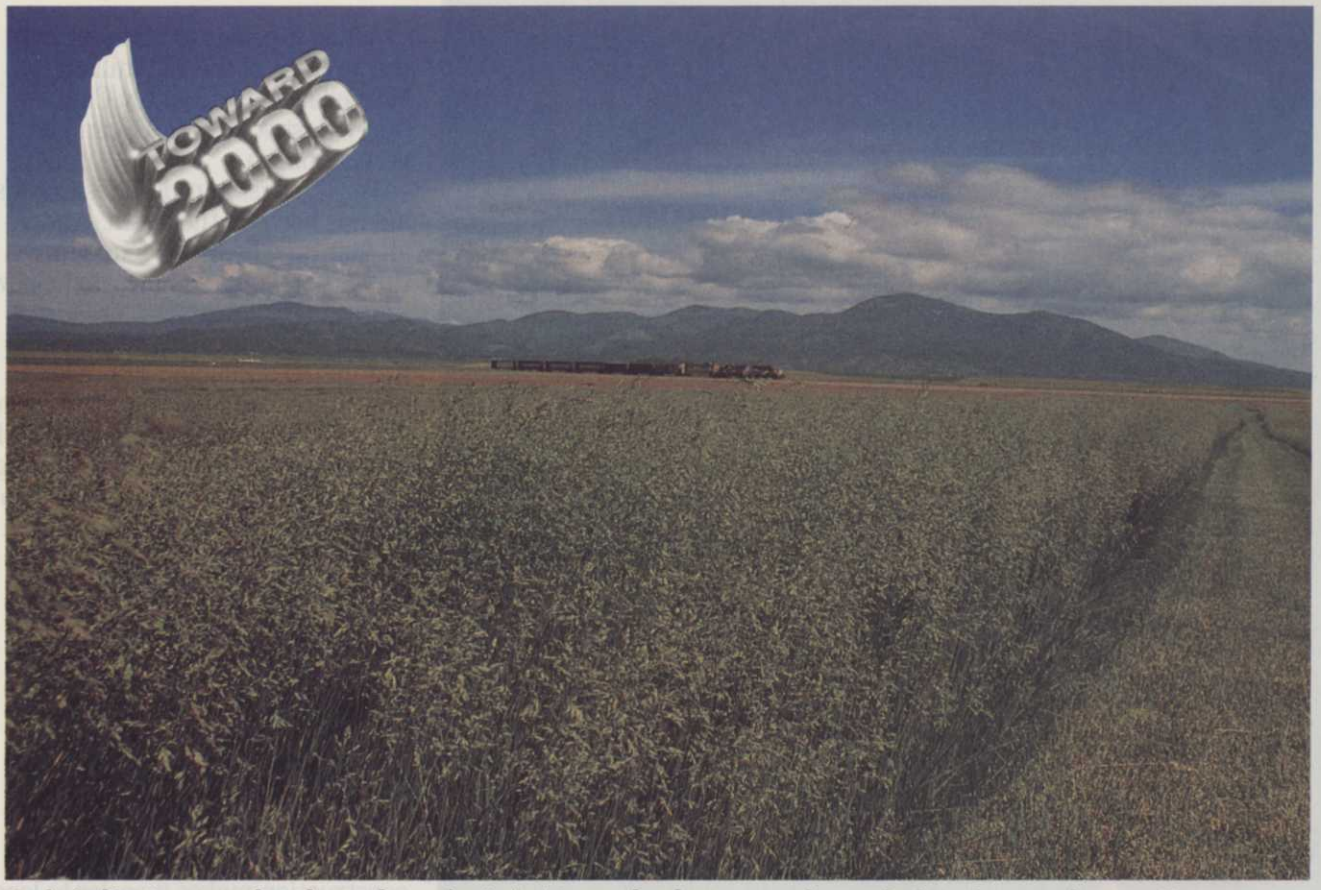

Early indications are that the 25 days of rain in May make the 1990 seed crop the best in several years. Oregon seedsmen say they'll need all the seed they can get to meet increasing demand.

SEED RESEARCH: OPENING NEW DOORS FOR THE TURF MARKET

A week in and around Oregon's Willamette Valley convinced our editor that already good turfseed is getting even better.

by Will Perry, managing editor

Three days and hundreds of turf plot squats into this year's annual trek through seed country, I began to wonder: *How many varieties of turf can there possibly be?*

My notebook was already full. I had traveled from Dawn to Midnight, across the Amazon to Aspen; I saw a Cowboy and an Apache; a Patriot near a Rebel; a Thoroughbred, Jaguar, Birdies and a Falcon. And for each there were dozens of other still nameless varieties waiting to compete for limited acreage this coming season.

Ongoing research in the Pacific Northwest—where most of the nation's turfseed is grown—may well mean denser, lower-growing, drought-, heat-, cold-, stress- and disease-resistant turf for landscapers and golf course superintendents.

Researchers insist the landscaper is, or will be, more likely to find a turf variety ideally suited for particular needs. And, unlike recent years, it appears as if there will be plenty of seed available in coming months (see LANDSCAPE MANAGEMENT's annual "Seed Availability Report" in the October issue).

New science

Proprietary seed is considered a new avenue of research, especially when compared to older agriculture research in crops such as corn and soybeans.

"When you look at turf breeding programs, you have to realize that they're only in their infancy," says Craig Edminster, marketing manager of International Seeds of Halsey, Ore. "Today's turf doesn't need as much fertilizer, requires less oxygen, can go for longer periods without mowing,