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Anthracnose  
Oak Wilt

Physalospora (Bleeding Canker)  
Ceratocystis Canker  
Thielaviopsis Decline  
Atropellis Canker  
Pine Pitch Canker  
Coryneum Canker  
Kabitina Branch Canker  
Botryosphaeria Branch Canker  
Melanconium Dieback  
Verticicladiella  
Pestalotia



Mimosa Wilt  
Ceratocystis Dieback  
Dutch Elm Disease  
Palm Bud Rot  
Philalophora

Diplodia Tip Blight  
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## Gossen Industries

(800) 228-6542

Circle No. 260

Vac'n'Load gives one-pass cleanup behind virtually any front-mount mower. A powerful vacuum system eliminates the need for repeated passes. Also, tractor-pulled Versa-Vac, pulverizes and vacuums up aerator cores in a single pass.

## The Grasshopper Company

(316) 345-8621

Circle No. 261

Attachments for Grasshopper mower including heavy-duty 48 and 60-inch dozer blades, rotary brooms, snowthrowers, AERA-vators, and Tine Rakes. Quick-D-Thatch (permits removing and adding attachments in minutes without tools) Vac grass collection.

## Gravely

(910) 777-1122

Circle No. 262

Gravely Riding Tractors (14 to 20-hp models) can be fitted with Gravely rotary plow, 44-inch power brush, 3-can hopper, sun shade, ROPS, 48-inch SnowDozer blade, 40 and 48-inch Snowblowers, or wind-breaker cab. Attachments for Gravely Two-Wheel Tractors also. Sulky for Pro Series walk-behinds.

## Honda Commercial Equipment

(910) 578-5300

Circle No. 263

Get double duty from your Honda mid-size mower with the SB7038, 38-inch, two-stage snowblower and the FS7054 54-inch commercial grade sweeper. The attachments fit all 7013K, 7018Z and 7020Z commercial power units.

## Howard Price Turf Equipment

(314) 532-7000

Circle No. 264

The Turf Blazer 727, with either a 72 or 91-inch mowing deck, can be turned into a year-round performer with attachments like a 60-inch snow blower, broom, or heavy-duty snow plow, ROPS.

## Ingersoll Equipment Company

(414) 582-5000

Circle No. 265

Attachments for the Ingersoll 3000 and 4000 series garden tractors: mowers, tillers, log splitters, chipper/shredders, hydraulic vacs, dump carts, blades, snow blowers, sweepers, hitches, weights, and chains. Options for the Grazer

mower: snowblower & cab, barrel collector, grass box, and ROPS.

## Jacobsen

(414) 637-6711

Circle No. 266

Accessories for the LF-3810 lightweight fairway and heavy-duty rough mower include ROPS, grass catchers, solid front rollers, grooved front rollers, front roller scrapers, real roller scrapers, vertical mowers, and all weather cab. Similar accessories for Tri-King 3WD Triplex Mower. The Greens King V can also be fitted with a fine bristle brush, spiker attachment and front and rear roller brushes.

## John Deere

(919) 850-0123

Circle No. 267

Tractors and turf mowers, attachments and accessories. Attachments for the F1145 Four-Wheel-Drive Front Mower, for instance, include armrest kit, auxiliary hydraulic kit, 60-inch rear or side-discharge mowers, 47-inch snow blower, rotary broom, cruise control kit, headlight kit. Rotary brooms, rotary tillers, post hole diggers, backhoes and hydraulic dumps for John Deere compact utility tractors.

## Kubota

(209) 931-5051

Circle No. 268

Tractors in the 12.5 to 91-PTO-hp range. Performance-matched implements and attachments. For the B-Series tractors (17 to 24 gross hp) include rotary tillers, front loaders, mid- and rear-mount mowers, grass catchers, boxscrapers, rear blade, post hole digger and snowblower.

## Landpride

(913) 823-3276

Circle No. 269

Tractor-mounted grooming mowers, all-flex mowers, rotary cutters, rotary tillers, loaders, post hold diggers, seeders, overseeders, broadcast spreaders, powered rakes, disc mowers, rear blade, landscape rakes, box scrapers, soil pulverizers.

## Massey Ferguson

(414) 284-8669

Circle No. 270

Three series of MF Turf Tractors. MF 1200 Series (models from 17 to 40-engine-hp) can be used with MF mid-mount mowers, rotary cutters, Quick-Attach loaders and backhoe, dozer blades, box scrapers, rotary

tiller, landscape rake, disc harrows.

## New Holland North America

(717) 355-1371

Circle No. 271

New 25 and 30 Series "Boomer" compact tractors (25 & 34-engine-hp respectively), full range of implements: front loaders, rotary cutters, mid-mount finishing mowers, tillers, box scrapers, blades, rear scoops, backhoes, rakes.

## Nunes Manufacturing, Inc.

(209) 892-8773

Circle No. 272

Tractor attachments include Pull-Type Rotary Mower, Finish Cut Mower (models from 11 to 15-foot cutting widths), and vacuums.

## Power Trac (PWTI, Inc.)

(800) 843-9273

Circle No. 273

Power Trac PT-1430 with 30-hp Deutz diesel engine. Design allows tractor to articulate 45 degrees in each direction. Over 25 front-mounted attachments that can be changed quickly using quick-change pins and hydraulic couplers.

## Ransomes America Corp.

(402) 475-9581

Circle No. 274

Ransomes rotary mower "family" includes new 951D wing rotary powered with Perkins 50-hp diesel

## Scag Power Equipment

(414) 387-0100

Circle No. 275

Zero-Turn Riders, Hydro Riders, Walk-Behinds. Options include grass catcher, sulky (for walk-behinds), mulching plate, traction plus.

## Steiner Turf Equipment

(216) 828-0200

Circle No. 276

The company offers the green industry professional five tractor/mower models that can be matched with Steiner turf and landscape implements, including aerators, blades, chippers/shredders, edgers, power blowers, scoops, snowblowers, sweepers, rakes, tillers, trenchers.

## Toro

(612) 888-8801

Circle No. 277

Full line of turf and landscape care equipment to be used with Toro mowers and vehicles. Toro Multi Pro 5500 work vehicle, for instance, can be easily fitted with a spreader, sprayers, topdresser or cargo carrier. Air conditioning is standard with the 5500 operator enclosure.

## Walker Manufacturing

(970) 221-5614

Circle No. 278

Walker offers rugged Quick-



Walker mowers can be fitted with a rotary broom attachment.

engine and cutting swath up to 127 inches. By removing the deck(s) and installing a specialized adapter kit and optional accessories, the 951D, and Front Line mowers, can be used for leaf mulching and snow removal. Also feature sweeper attachments, Ransomes Core Destroyer.

Change implements for its tractors--42-inch snow blower, 46-inch dozer blade, 47-inch rotary broom. The hitch assembly replaces the mower deck and clips onto the tractor in less than a minute. **LM**

# NORTHERN WEED CONTROL

## combines cultural/chemical tools

*Once you understand your most serious weed problems you can develop a multi-pronged program, using your experience, to control them.*

by TOM FERMANIAN, Ph. D./University of Illinois



White clover can be controlled by most broadleaf herbicides



Wood sorrel with yellow flowers

**W**inter will soon be a memory. It's time to plan your strategies for the annual battle against weeds. Wouldn't it be great to not see a weed all season? There's really not much of a chance for that. A more practical goal would be to hold the weed populations down to minimal levels. Weed control depends on your management intensity. Even in the most highly managed turfs, maintaining weeds to about 1-2 percent of the turf is usually the best you can strive for. For many turfs, larger populations (4-10 percent) are more practical.

Experience is usually your best tool. Once you recognize your most serious weed problems, you can design a strategy to hold each species to targeted populations. Fortunately, most weeds with similar growth habits can be managed with a single strategy. This will allow you to manage a diverse population of weeds with only a few strategies.

### IPM

Integrated Pest Management (IPM) combines sound cultural practices with the occasional application of herbicides to manage weeds. Mowing, fertilization, and irrigation should be designed to maximize the turf's competitive potential. Cultivation, mechanical control, and sanitation can also be used to reduce or manage the expansion of weeds. IPM is generally more consistent at maintaining tar-

geted weed populations because it keeps constant pressure on weeds through competition. However, it has less margin for error because the effects of cultural practices are more subtle and long term. Consistency is the hallmark of a good IPM program.

### Mowing

Depending on the weed species, mowing can affect the development of its population. A limited number of species are generally found in turfs, particularly well established turfs, because mowing pressures reduce weeds' recuperative potential. However, some weeds, like annual grasses have adapted to low mowing heights and frequent mowing. They can often be managed by raising the cutting when possible. Adjust and sharpen mower blades to reduce potential stress on the turf. Don't remove less than one third of the leaf blade surfaces.

Timely mowing can also reduce the production of weed seeds. This can also be accomplished using plant growth regulators or collecting clippings when seedheads are present. Plant growth regulators like mefluidide are particularly effective in reducing annual grass seed production.

### Irrigation

Irrigation also affects the growth of many weeds. High soil moisture favors nutsedges, annual bluegrass, crabgrass, goosegrass and many other weeds. Drying out the turf or

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herbicide gets down to business. No other preemergent turf herbicide can match its spectrum of weeds controlled and cost-effectiveness. • PENDULUM brand Pendimethalin also offers greater flexibility than ever before, with a complete preemergent product line that includes sprayable formulations, combination fertilizer products and now a 2% granular formulation. • When you consider cash rebates available to you from American Cyanamid, it's easy to see that PENDULUM really does mean business. Smart Business. • To learn more about the rebate offer or for the name of the PENDULUM distributor nearest you, call 1-800-545-9525, Ext. 931.



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# MEANS BUSINESS

**TABLE 1 HERBICIDES FOR BROADLEAF WEED CONTROL IN TURF**

COMMON NAME	TRADE NAMES (PRODUCERS)	USES
2,4-D	AM-40, 2,4-D Granules, 2,4-D L. V. Ester, Solution ; (Riverdale) 2,4-D Amine 4, 2,4-D LV4, SEE 2, 4-D LV4 (Riverside/Terra International) Weedone LV4 (Rhone Poulenc)	Selective, post-emergence control of broadleaf weeds. See label for tolerant turfgrasses and species controlled.
2,4-D + dicamba	81 Selective Weedkiller (Riverdale) Four Power Plus (Turfgo/United Horticultural Supply) Lawn Weed Killer (Bonide) Triple D Lawn Weed Killer (Rockland)	Selective, post-emergence control of broadleaf weeds. See label for tolerant turfgrasses and species controlled.
2,4-D + dichlorprop	2D + 2DP Amine, Turf D + DP (Riverdale) Fluid Broadleaf Weed Control (The Scotts Co.) Weedone DPC Ester, Weedone Amine (Rhone Poulenc)	Selective, post-emergence control of broadleaf weeds. See label for tolerant turfgrasses and species controlled.
2,4-D + dichlorprop + dicamba	Strike 3 (Riverside/Terra International) Super Trimec (PBI/Gordon)	Selective, post-emergence control of broadleaf weeds. See label for tolerant turfgrasses and species controlled.
2,4-D + mecoprop	2D Amine + 2 MCPP (Riverdale) 2 Plus 2 (ISK Biosciences) MCPP-2-4D (Cleary)	Selective, post-emergence control of broadleaf weeds. See label for tolerant turfgrasses and species controlled.
2,4-D + MCPP + dicamba	Bentgrass Selective Weed Killer (LESCO) Brushfire, Brush-out, Brush-Whacker, HS-130, SNS-2000 (NCH) Granular Broadleaf Weed Killer (Lebanon) Mec-Amine-D (Turfgo/United Horticultural Supply) Three-Way Lawn Weed Killer (Rockland) Three-Way Selective, Three-Way DG (LESCO) Trimec Bentgrass Formula, Trimec Classic, Trimec Southern (PBI/Gordon) Triplet Selective, Triplet Water Soluble (Riverdale)	Selective, post-emergence control of broadleaf weeds. See label for tolerant turfgrasses and species controlled.
2,4-D + MCPP + dichlorprop	Dissolve, Triamine, Triamine Granular, Triamine Jet-Spray, Tri-Ester (Riverdale) Jet-Spray 3-Way Weed Control (The ScottsCo.) Three-Way Ester (LESCO)	Selective, post-emergence control of broadleaf weeds. See label for tolerant turfgrasses and species controlled.
2,4-D + MCPP + MSMA + dicamba	Trimec Plus (PBI/Gordon)	Selective, post-emergence control of broadleaf weeds. See label for tolerant turfgrasses and species controlled.
2,4-D + triclopyr	Chaser (Turfgo/United Horticultural Supply) Turflon II, Turflon II Amine (LESCO)	Selective, post-emergence control of broadleaf weeds. See label for tolerant turfgrasses and species controlled.
DCPA	Dacthal (ISK Biosciences) Garden, Turf & Ornamental Herbicide 5G, Turf & Ornamental Herbicide (Bonide) HS-110 (NCH) Super Dacthal 686 (Rockland)	Selective, post-emergence control of creeping speedwell and preemergence control of selected broadleaf species.
Dicamba	Vanquish (Sandoz) K-O-G Weed Control (The Scotts Co.)	Selective, post-emergence control of broadleaf weeds. See label for tolerant turfgrasses and species controlled.
Isoxaben	Gallery (DowElanco)	Selective, preemergence control of broadleaf weeds. See label for tolerant turfgrasses and species controlled.
Triclopyr	Turflon Ester (DowElanco, Monterey)	Selective, post-emergence control of broadleaf weeds. See label for tolerant turfgrasses and species controlled.
Triclopyr + clopyralid	Confront (DowElanco)	Selective, post-emergence control of broadleaf weeds. See label for tolerant turfgrasses and species controlled.

irrigating less frequently will give the turf a competitive edge over these water-loving weeds. Carpetweed and sand-burr compete well in dry open soils. If these weeds are a problem, increase irrigation.

#### Fertilization

The availability of nutrients in the soil affects the development of several weed species. While accurate timely fertilizations make turf a good competitor, too much fertilization can promote greater growth for some weeds. High levels of nitrogen cause annual bluegrass, crabgrass, and many other species to grow rapidly. Also, excessive fertilizations, particularly with soluble sources, can potentially injure turf foliage allowing weed invasion. Opportunistic weeds can develop before the turf has a chance to replenish the canopy. Be aware of other soil properties. Low pH or acidic soils can reduce the vigor of many turf species while encouraging the development of weeds such as red sorrel or annual bluegrass.

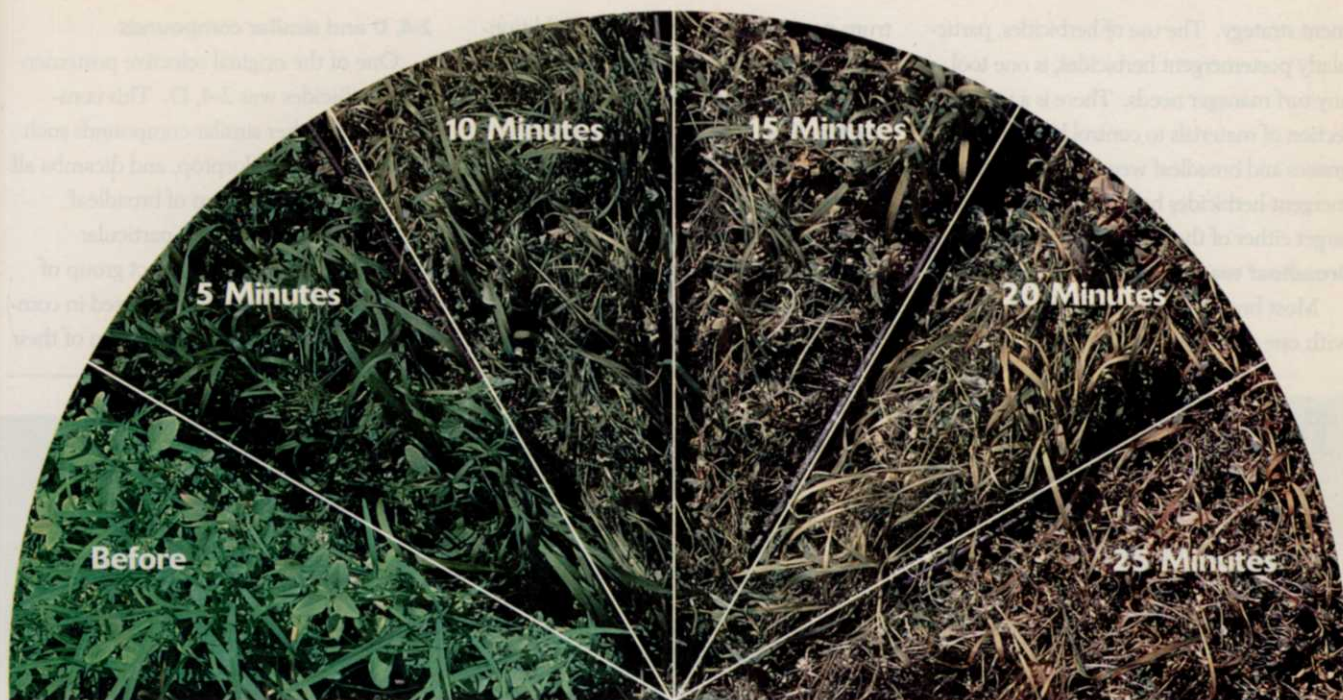
#### Cultivation/sanitation

Generally cultivation—core aeration, vertical mowing, spiking, or slicing—is beneficial for turf growth. These same practices, however, can also move buried weed seeds to the surface allowing them to germinate. Topdressing might also introduce foreign seed.

Inspect mechanical devices or materials such as topdressing, mulches, or similar items for any plant parts, particularly weed seed that might be introduced into the turf.

#### Herbicides

Some weeds will always survive your best intended manage-



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ment strategy. The use of herbicides, particularly postemergent herbicides, is one tool any turf manager needs. There is a wide selection of materials to control both annual grasses and broadleaf weeds. Most postemergent herbicides have been developed to target either of these two large groups.

#### Broadleaf weeds

Most broadleaf weeds can be controlled with one of a large group of broad spec-

trum postemergent herbicides. Additionally, some narrowly focused or single species postemergent herbicides are available for difficult to control or unusual weed species. When all else fails, spot control is available through the use of a non-selective herbicide. Carefully check the turf tolerance of any selective herbicide. Some of the postemergent herbicides have a narrow range of tolerant turf species.

#### 2-4, D and similar compounds

One of the original selective postemergent herbicides was 2-4, D. This compound and other similar compounds such as mecoprop, dichlorprop, and dicamba all control a wide spectrum of broadleaf weeds. Each material has particular strengths in controlling a select group of species. Often times they are used in combination allowing for the reduction of their

## Temperature tip

Postemergent herbicides should be used when temperatures are moderate (<85° F) and growing conditions are good for both weed species and turf. Early fall applications are most effective. This is a time when weed species are actively transporting materials to below ground portions of the plant. Late spring/early summer applications can also be effective. Apply when soils are moist and weeds are actively growing. With summer heat and possibly drought, efficacy of postemergent herbicides will be much reduced. Most postemergent herbicides—and in particular phenoxy-containing materials—should be applied judiciously around sensitive ornamental plantings. In spring and fall, many sensitive species can be injured through drift or volatilization. Follow manufacturers labeled instructions closely. Cultural programs reduce the potential for weed invasion and population expansion. Integrate herbicides into a comprehensive turf care program. Follow manufacturers' labeled instructions.

T.F.

## CLARIFICATION

DowElanco's new Team Pro preemergence herbicide provides consistent prevention of crabgrass, goosegrass and other troublesome grassy weeds, and unsurpassed control of broadleaf weeds such as spurge and oxalis. Our reference to Team Pro in our Feb. cover story may have given the impression that the product was strictly for broadleaf weeds. -ed.

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individual single use rates through a synergistic action. Double and triple combinations of these materials provide effective control for almost any broadleaf species found in turf. Likewise the materials are formulated either as esters or amine based compounds to provide either greater control or greater turf safety, respectively. Specific combinations of these materials are presented in Table 1. While this table

is not an exhaustive listing of products, it provides a large number of the currently available herbicides.

**Non-phenoxy broad spectrum herbicides**

Two particular materials, Triclopyr and Clopyralid, are broad spectrum postemergent herbicides that can be targeted towards a wide range of weeds in many turfs. Triclopyr is often found in formulations by itself or in combinations with 2-4, D to

broaden its effectiveness across a wider group of weeds. Confront is a combination of both Triclopyr and Clopyralid which is particularly effective with many tough to control broadleaf weeds such as wild violets and creeping charlie.

**Other postemergent broadleaf herbicides**

Several additional materials are available for a smaller group of weeds or for special uses. Bromoxynil will not injure seedling turfgrasses and is often used as the initial material for cleaning up newly seeded turfs. Several materials such as Basagran, Vantage, and DCPA are targeted towards a small group of species. Manage and Basagran can be used effectively for controlling yellow and purple nutsedge.

**Grassy weeds**

For grassy weeds, particularly annual grasses, several products are available for selective control. Additionally non-selective herbicides can be used for spot control of both annual and perennial weeds.

Ethofumesate, fenoxaprop, and dithiopyr can all be used to control annual grasses after they have emerged. Each material has its own unique spectrum of species it is effective on. In general each of these herbicides is most effective when ap-

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The tall fescue on the right was cut at one inch; it contains crabgrass. The turf on left was cut at two inches.

**TABLE 2 HERBICIDES FOR POSTEMERGENCE GRASSY WEED CONTROL IN TURF AND NON-SELECTIVE APPLICATIONS**

COMMON NAME	TRADE NAMES (PRODUCERS)	USES
Bentazon	Basagran T/O (BASF) Lescogran (LESCO)	Selective, post-emergence control of nutsedges and some broadleaf weeds
Chlorsulfuron	TFC (LESCO)	Selective, post-emergence control of tall fescue in Kentucky bluegrass, fine fescues and bentgrasses
DCPA	Dacthal (ISK Biosciences) Garden, Turf & Ornamental Herbicide 5G, Turf & Ornamental Herbicide (Bonide) HS-110 (NCH) Super Dacthal 686 (Rockland)	Selective, post-emergence control of creeping speedwell and preemergence control of selected broadleaf species
Diquat	Aquatate, HNS-210, Vegetrol, Watrol (NCH) Reward (Zeneca)	Non-selective, post emergence contact herbicide
Dithiopyr	Dimension (LESCO, Rohm andHaas)	Selective, post-emergence control of annual grasses and preemergence control of selected broadleaf species.
DSMA	DSMA 4 (Riversde/Terra Intematonal) DSMA Slurry (Drexel) Methar 30 (Cleary)	Selective, post-emergence control of annual grasses
Ethofumesate	Prograss (AgrEvo)	Selective, pre & post-emergence control of selected annual grasses and broadleaf species
Fenoxaprop	Acclaim (AgrEvo)	Selective, post-emergence control of annual grasses
Glufosinate-ammonium	Finale (AgrEvo)	Non-selective, post emergence herbicide
Glyphosate	Avail (LESCO) HNS-220, Hoedown, Quick Claim, Trailblazer (NCH) Roundup DryPak Roundup Pro (Monsanto)	Non-selective, post emergence herbicide
Halosulfuron	Manage (Monsanto)	Selective, post-emergence control of sedges, such as yellow & purple nutsedge
MCPA	MCPA-4 Amine (Riverdale)	Selective, post-emergence control of annual grasses
MCPA + MCPP + dicamba	Eliminate (LESCO) Hat Trick (Turfgo/United Horticultural Supply) Tri-Power Dry, Tri-Power Selective Herbicide (Riverdale)	Selective, post-emergence control of broadleaf weeds. See label for tolerant turfgrasses and species controlled
MCPA + MCPP + dichlorprop	Triamine II, Tri-Ester II (Riverdale)	Selective, post-emergence control of broadleaf weeds. See label for tolerant turfgrasses and species controlled
Mecoprop (MCP)	Certi-CM, Chemweed 265, HS-t67 Milpro 360 (NCH) MCP (Cleary) MCP-4 Amine (Riverdale) MCP-4K (Tudgo/United Horticultural Supply) Mecomec (PBI/Gordon)	Selective, post-emergence control of broadleaf weeds. See label for tolerant turfgrasses and species controlled
MSMA	Crabgrass Killer (Bonide) Daconate 6, Daconate Super (ISK Biosciences) Drexar 530 (Drexel) MSMA (Bonide, LESCO) MSMA Turf (Turfgo United Horticultural Supply) 912 Herbicide, 120 Herbicide (Riverside/Terra International) Super Crabgrass Killer (Rockland) Weed Hoe (Monterey)	Selective, post-emergence control of annual grasses
2,4-D + MCPP + MSMA + dicamba	Trimec Plus (PBI/Gordon)	Selective, post-emergence control of annual grasses. See label for tolerant turfgrasses and species controlled
MSMA + cacodylic acid	Broadside, Moncide (Monterey)	Selective, post-emergence control of annual grasses.
Sethoxydim	Vantage (BASF)	Selective, post-emergence control of annual grasses in fine fescues.

plied to young grass seedlings. As with the broadleaf herbicides, the grass seedlings should be actively growing under good conditions.

**Non-selective herbicide**

For tough to control weeds or perennial grasses non-selective materials such as Roundup Pro, or Finale can be used effectively. These applications will remove both the unwanted weeds and any underlying turf. They should be made only during periods of the year when the weeds are actively growing and ample opportunity is available for renovation or re-establishment of the turf.

**Potential new herbicides**

At the time this article was written, there did not appear to be any new postemergent herbicides for the turf landscape. This might change as spring arrives. One potential new herbicide is from AgrEvo. It has been evaluated under the name of Preclaim for a range of formulations collectively known as AGR 40500. This herbicide is a new formulation containing both fenoxaprop and pendimethalin. With both Acclaim and pendimethalin one application might control existing crabgrass plants and prevent the development of a new population. I have evaluated these materials over the past two season and have observed excellent control of between 90-100 percent of the crabgrass population. **LM**

—Tom Fermanian is Associate Professor of Turfgrass Science, Dept. of Natural Resources and Environmental Sciences, University of Illinois