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.

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White clover can be controlled by most broadleaf herbicides

Wood sorrel with yellow flowers

Winter 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 targeted 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

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 Ciassic, 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 sandburr 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 aerification, 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-

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 spectrum 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 nonselective 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.*

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-

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 nut-sedges 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 Horicultural 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 (MCPP)	Certi-CM, Chemweed 265, HS-t67 Milpro 360 (NCH) MCPP (Cleary) MCPP-4 Amine (Riverdale) MCPP-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**

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