THERE ISN'T A GOLF COURSE ON EARTH OUR MULE CAN'T MASTER.

If you've got a tough course to care for, we've got a Pro to help you do it. The Kawasaki Mule.™

The Mule's got 4-wheel independent suspension, automatic transmission, and a reliable 18 horsepower, liquid-cooled engine for plenty of putt. And a Dual-Mode Differential for maximum drive.

It's small and maneuverable and easy on your turf. But plenty big enough to haul two guys and pack an additional 500 pounds in the tiltable, diamond-plate steel cargo bed. Total payload is a full half ton, like most of the bulky pickups you're probably using now. And with the optional trailer hitch, you can tow up to 1,000 more.

Plus you can add options like a hydraulic lift kit, turf tires, sideboards and more.

The bottom line? A Mule is high on performance and reliability and low on maintenance and operating costs. Which is par for the course, since it's a Kawasaki.

For your nearest dealer, call 1-800-543-MULE.

Kawasaki

Let the good times roll.

Embark® can reduce the mowing costs of fine turf by at least 50%.

PLANT GROWTH REGULATOR

Anyone who is involved in mowing and managing low-traffic, irrigated, ornamental turf can benefit from the experiences of those who are using this program.

Everett Mealman, President
PBI/Gordon Corporation

Last year, a number of progressive groundskeepers accepted the challenge to prove to themselves that they could successfully use an Embark-Ferromec AC® program on low-traffic, irrigated turf. We promised them that the program would reduce their bottom-line mowing costs by 50% or more during the 5 to 6-week period while the Embark is active, and in the process would enhance the color and thicken up the turf.

Of course, we knew the program would work because of tests conducted by university researchers, and the experience of Constant Care, Inc., one of the leading landscape management contractors in the entire midwest, who have been pioneering the use of PGRs on ornamental turf since 1985.

But never in our fondest dreams did we anticipate the enthusiam of the positive responses we have received.

Listen to Carl Schroeder, owner of Horticultural Consultants, Inc., of Shawnee Mission, Kansas. He says, "Now that we know what Embark can do, we will be aggressively soliciting mowing and maintenance contracts that we formerly would have shied away from because of questionable profitability."

Schroeder bases his optimism on his experience in testing the Embark-Ferromec AC program on the vast sweep of ornamental turf that surrounds the headquarters of Farmers Insurance Group . . . the largest and most visible piece of turf in the Kansas City area. "It's a tremendous 18.5-acre showcase for us," says Schroeder. "But, is it ever a *#'! to mow!

"There's a 40% slope on some areas that have to be mowed with a walk-behind to avoid ruts and erosion," says Schroeder. "You can imagine the expense! But, with the Embark-Ferromec AC program, we will be able to cut those costs in half, while at the same time improving the appearance . . . and we are hopeful that Embark will help strengthen the roots of the grass on those slopes."

This program is as simple as a, b, c.

First of all, the Embark is applied at the low rate (1 pt./A). The idea is to slow down the growth rather than to totally shut it off.

Second, it is tank-mixed with Ferromec AC Liquid Iron at a high rate (2.75 gal./A), which produces a vibrant green color before the Embark kicks in; hence no worry about discoloration. In fact, just the opposite.

Third, the Embark-Ferromec AC can be tank-mixed with Trimec® Broadleaf Herbicide, so it gets a free ride that even further improves the bottom line.

But wait! There's more good news: Embark is a true plant growth regulator, not a reformulated herbicide. Tests clearly show that when Embark shuts down seedhead development and stem elongation, the energy is redirected toward root growth.

Carl Schroeder, right, gives Everett Mealman a closeup view of the impressive and highly visible turf he maintains for Farmers Insurance Group. Millions of people who whiz by on I-435 see it as a thing of beauty, but Schroeder sees it as a monster for Embark to tame.

Constant Care, Inc. have been pioneering the use of PGRs for five years and were directly involved in the early tests of the Embark-Ferromec AC combination. Bill Gordon, above, director of commercial landscaping for Constant Care, says that nothing works like Embark.

Bill McGee, above right, general manager of Smith Lawn and Tree Company, used Embark/Ferromec AC/Trimec on this turf at Bedford Properties Industrial Park. "Within two days the tall fescue greened up and the mowing was cut in half for six weeks."

Does this look like a challenge for the amateur golfer? Yes, indeed, but it's even more of a challenge for superintendent Jerry Ducker, left, in the photo at right; and his assistant, Tom Addington.

Experience of a golf course superintendent

Jerry Ducker, golf course superintendent of the prestigious Hallbrook Farms Country Club in Leawood, Kansas is extremely interested in the potential problem-solving power of Embark-Ferromec AC.

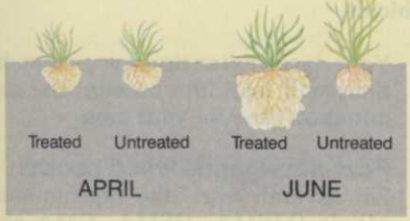
Hallbrook was designed to present a challenge. "And indeed it does!" laughs Ducker . . . "a challenge to the superintendent. For example, we've got zoysia peninsulas that extend into fairway traps that can only be mowed with hand trimmers while standing deep in sand. You can imagine what a labor-intensive job you're looking at."

With this in mind, Ducker tested Embark-Ferromec AC on some of his less-visible areas in 1988. "We're very enthusiastic about what we hope to be able to do with Embark," says Ducker.

Another Embark-Ferromec AC enthusiast is Bill McGee, general manager of Smith Lawn and Tree Company of Kansas City, Missouri. "We used it on three of the Bedford Properties Industrial Parks," says McGee. "And, within 48 hours, the tall fescue took on a rich green color, and the mowings were cut in half for six weeks."

Embark-treated grass develops deeper roots

Research shows that when grass is treated with Embark, the energy that would naturally produce seedheads and stem elongation is redirected to the roots. This phenomenon occurs regardless of whether or not the grass is mowed.



Shouldn't you try Embark?

Indeed, the evidence cannot be denied. The Embark-Ferromec AC-Trimec program is dramatically changing the economics of managing low-traffic, irrigated ornamental turf.

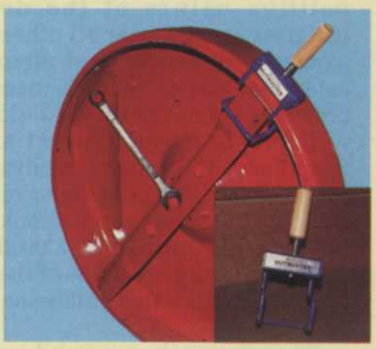
Surely you'll want to keep pace with the change and at least test the program for yourself — if only in a minor way.

If you have any questions at all about using Embark-Ferromec AC, call us toll-tree.

Toll-free 1-800-821-7925
In Missouri, 1-800-892-7281
Ask for Sales Service.

A $20.00 value for $9 when you buy Embark:

Nutbuster mower blade safety lock



This unique tool clamps to edge of mower deck to secure blade so that nut can be wrenched off quickly and safely. To receive a Nutbuster via UPS, send $9 to PBI/Gordon with your name and address and a copy of an invoice showing you have purchased one quart or more of Embark. Offer expires Nov. 1, 1989. Limit one per customer.

pbi/GORDON CORPORATION
1217 West 12th Street
P.O. Box 4090
Kansas City, MO. 64101

EMBARK®

Embark®, Ferromec AC® and Trimec® are registered trademarks of PBI/Gordon Corporation.

PLANT GROWTH REGULATOR

717-1288

Circle No. 164 on Reader Inquiry Card

COOL-SEASON WEED CONTROL GUIDE

Good turf management is still the best way to control weeds. But if cool-season weeds appear in your turf, here's how to handle them.

by Thomas L. Watschke, Ph.D., Penn State University

Any successful weed control program begins with cultural practices that favor the competitive nature of the desired turfgrass species over all others. The existence of weeds most often indicates that one or more management practices are not as they should be.

Improper mowing height and/or frequency, improper irrigation (too much or too little), improper rate and timing of fertilizer applications, compaction, pH problems, thatch and chemical injury are a few of the management factors that influence weed invasion.

Therefore, when a weed problem is identified, the proper course of action is to determine why a void existed in the turf allowing the unwanted plant to encroach in the first place. Once the reason for encroachment has been found, appropriate changes in cultural practices must be taken before and/or in combination with the proper selection and use of a herbicide.

Most weeds cannot be completely controlled with cultural practices, but herbicide activity can be greatly enhanced when the turf is managed to be as competitive as possible.

Too often, when a weed problem is identified, the first course of action is to find out what chemical is recommended for control. As a result, the reason for the void in the turf is not considered as part of the overall weed control strategy. Generally, such a weed control program utilizes more herbicides than necessary and is not as successful as it should be.

From a chemical standpoint, pre-emergence herbicides work best on annual grassy weeds and some annual broadleaf species. Currently, benefin, benefin + trifluralin, bensulide, Dacthal, pendimethalin, oxadiazon and siduron are the primary pre-emergence herbicides labelled for use on cool-season turf.

Crabgrass, a bunch type grassy weed, can be controlled with a properly timed application of pre-emergent herbicide.

As these products are absorbed from the chemical barrier that is formed as they are dissolved in water, they suppress the emergence of germinating plants. Therefore, it is imperative that pre-emergence herbicides be applied seven to 10 days prior to expected emergence. If rainfall does not occur within two to three days, irrigation should be applied. Your local extension recommendations will take into account the germination time for your area.

Post-emergence weed control

For several years, the organic arsenicals (MSMA, DSMA, CMA and MAMA) were the primary herbicides used for the post-emergence control of summer annual grassy weeds. These materials continue to be used successfully, particularly when applied sequentially (two to three applications).

Control is rarely equivalent to that attained using pre-emergence herbicides. And, in some cases, desired

species can be injured during hot weather. Always be sure to be completely familiar with the label of any pesticide before you use it.

Recently, a new post-emergence material has been labelled for use and has provided excellent annual grassy weed control in many instances. With proper timing, one application can provide control equivalent to the best pre-emergence material. This product (Acclaim) has less potential for injury than the arsonates, but has been found to injure some varities of Kentucky bluegrass when applications are made prior to mid-June. Turf treated with Acclaim should not be mowed for a day or two and should never be treated if under moisture stress.

Broadleaf weed control

The vast majority of broadleaf weeds, regardless of life cycle, are controlled by 2,4-D, MCPP, dicamba or tri-

The best control of new broadleaf seedlings can be attained with bromoxynil.

chlopyr and combinations thereof. Most of the time, amine formulations are used and provide safe and excellent control. On occasion, ester formulations are used for more difficult-to-control species like oxalis, wild garlic and others.

Although excellent results can be attained using ester forms, care should be taken that they not be used during hot weather. When temperatures are predicted to be in the 80s, do not use esters as they can damage non-target species due to volatility.

On new seedings, the best control of broadleaf seedlings can be attained with bromoxynil, while risk to the seedling grass is minimal.

Before using other broadleaf herbicides, be sure that the turf has been mowed a minimum of three times. For best control, broadleaf weeds should be actively growing and not under moisture stress. Too often, broadleaf weeds are sprayed during hot and dry conditions and the resulting control is less than it should be.

The risk of injuring the desired turfgrass is also greater during hot and dry conditions. Broadleaf weeds vary greatly in their susceptibility to herbicidal action. For some species, ex-

HERBICIDE Guide DIRECTORY

COOL-SEASON HERBICIDES

Herbicide	Brand Name(s)	Company	Uses
ammonium sulphanate	Ammate	DuPont	Non-selective rights of way herbicide
asulam	Asulox	Rhone Poulenc	Postemergence grassy weed control for turf and ornamentals
atrazine	Aatrex	Ciba Geigy	Non-selective control in non-crop areas.
benefin	Balan	Elanco	Preemergence control of annual grasses and broadleaf weeds in established turf.
bensulide	Betasan Pre-San Lescosan Betamec-4	ICI Sierra Lesco PBI Gordon	Preemergence control of annual grasses and broadleaf weeds in established turf and established flower gardens. Safe near tulip and daffodil bulbs.
bentazon	Basagran	BASF	Selective postemergence control of nutsedge in warm-season turf.
bromacil	Hyvar	DuPont	Nonselective control of weeds and grasses in non-crop areas. Usually mixed with diuron for roadsides and rights-of-way.
bromoxynil	Buctril	Rhone Poulenc	Postemergence control of broadleaf weeds in seedling turf, established turf and non-crop areas.
cacodylic acid	Phytar Rad-E-Cate	Vertac Vineland	Nonselective control for turf renovation, edging and in plant beds.
chloramben	Amiben	Rhone Poulenc	Preemergence control in ornamentals.
chlorflurenol	Maintain	Uniroyal	Growth regulator. Also controls broadleaf weeds and vines.
copper	Cutrine-Plus	Applied Biochemists	Control algae, chara and hydrilla in potable water.
dalapon	Dalapon 85 Dowpon M	Fermenta Dow	Selective control of perennial and annual grasses in non-crop areas and ditchbanks.
dazomet	Mylone	Hopkins Ag.	Preplant sterilant for turf and ornamental beds.
DCPA	Dacthal	Fermenta	Preemergence control of annual grasses and broadleaf weeds in turf and ornamental beds.

HERBICIDE DIRECTORY

COOL-SEASON HERBICIDES

Herbicide	Brand Name(s)	Company	Uses
dicamba	Banvel	Sandoz	Selective postemergence control of broadleaf weeds in turf and for noncrop control of brush.
dichlobenil	Dyclomec	PBI Gordon	Selective weed control in ornamental beds and for total weed control on roadsides, fencerows, etc.
dichlorprop	2,4-DP	Rhone Poulenc	Brush control and aquatic weed control.
diphenamid	Enide	Nor-Am, Upjohn	Selective control of annual grasses and broadleaf weeds in bermudagrass, dichondra and around ornamenta.s
DSMA	Methar 30 DSMA Liquid DSMA 81% Weed-E-Rad	W.A. Cleary Drexel Vertac Vineland	Selective postemergence control of sedges and grasses in turf and ditchbanks and storage yard.
diquat	Diquat	Valent	Aquatic weed control.
diuron	Karmex Dynex Diuron 80WP Urox	DuPont Vertac Drexel Hopkins	Generally used at high rates for nonselective total weed control in industrial sites.
endothall	Aquathol K Endothall	Pennwalt Pennwalt	Aquatic weed control and turf herbicide and dessicant.
EPTC	Eptam	ICI	Selective control of annual grassy weeds, nutgrass, and perennial weeds.
ethofumesate	Prograss	Nor-Am	For control of Poa annua and white clover in fairways.
fosamine	Kernite	DuPont	Brush control.
flurprimidol	Cutless	Elanco	Growth regulator that suppresses annual bluegrass.
fluazifop-butyl	Fusilade	ICI Americas	Selective postemergence control of grassy weeds in ornamentals.
fluridone	Sonar	Elanco	Broad spectrum herbicide for submersed and emersed aquatic weeds.

BROADLEAF WEEDS POST-EMERGENCE HERBICIDE COMBINATIONS

- ☐ TRIMEC
- ☐ TREXSAN
- ☐ SUPER TRIMEC
- ☐ TURFLON
- ☐ WEEDONE DPC

cellent control can result from a single application. However, it is more common that most broadleaf weeds require two applications spaced a few weeks apart. The more difficult-to-control species are rarely ever completely controlled, but the level of infestation can be greatly reduced.

Total control

The severe weather in much of the country during the summer of 1988 caused substantial turf loss in some locations. Consequently, more renovation activity existed than in most years.

Glyphosate (Roundup) is the most commonly-used total vegetation control product on the market. It provides excellent control of most unwanted

PRE-EMERGENCE HERBICIDES WITH SOIL LONGEVITY:

- ☐ BENEFIN
- ☐ DCPA
- ☐ OXADIAZON
- ☐ PENDIMETHALIN
- ☐ BENSULIDE

Nimblewill is characterized by clumps of dark blue-green leaves during the summer. Regrowth starts at the nodes of the stems in spring.

vegetation, is deactivated by the soil within a few days, and is translocated within treated plants, allowing for the control of more stubborn perennial grasses.

Overseeding can be accomplished within a matter of days after Roundup treatment. In many instances, the treated site is verticut in several directions (perhaps in conjunction with aerification) and overseeded in a broadcast manner. If vegetatively-spreading perennial grasses (creeping bentgrass, quackgrass and nimblewill) are present in the stand to be

HERBICIDE DIRECTORY

COOL-SEASON HERBICIDES

Herbicide	Brand Name(s)	Company	Uses
glyphosate	Rodeo	Monsanto	For control of emerged aquatic weeds and broad leaf weeds in or near aquatic sites, such as ditchbanks.
glyphosate	Roundup	Monsanto	Nonselective, short-term herbicide for turf renovation and total weed control along fences and plant beds.
imazaquin	Image	American Cyanamid	Experimental herbicide for turf
imazapyr	Arsenal	American Cyanamid	Broad spectrum systemic industrial herbicide
linuron	Lorox	DuPont	Short-term control of annual weeds in roadsides and fence rows.
mefluidide	Embark	PBI Gordon	Growth regulator that suppresses Poa annua.
metham	Vapam	ICI	Preplant soil fumigant killing weeds, weed seed, insects and fungi.
methyl bromide	Dowfume	Dow	Fumigant for pre-plant control. Also kills weed seed.
metribuzin	Sencor	Mobay	Postemergence control of goosegrass in warm-season turf.
MCPP	MCPP Mecomec MCPP Chipco Turf Herbicide	Fermenta PBI Gordon WA Cleary Rhone Poulenc	Selective broadleaf weed control in turf. Often combined with other herbicides.
MSMA	Daconatel Broadside Ansar Weed-Hoe	Fermenta Vertac Drexel Vineland	Postemergence selective control of crabgrass and broadleaf weeds in turf. Also, grassy weed control in ditchbanks, roadsides, industrial areas.
napropamide	Devrinol	ICI	Selective control of weeds in ornamental beds and containers. Experimental combination with Betasan for season-long crabgrass control in turf.
oryzalin	Surflan	Elanco	Preemergence control of weeds in established ornamentals and warm-season turf.
oxadiazon	Ronstar	Rhone Poulenc	Preemergence control of weeds in ornamentals and turf.

HERBICIDE DIRECTORY

HERBICIDES OF COOL-SEASON GRASSES

oxyfluorfen	Goal	Rohm & Haas	Selective control of weeds in ornamentals.
paraquat	Paraquat	Valent	Nonselective control of weeds in rights-of-way, industrial areas and fencerows.
pendimethalin	Proturf Weedgrass Control Pre-M	Lesco	Preemergence turf herbicide for control of grassy and broadleaf weeds.
picloram	Tordon	Dow	Systemic, long-term killer of woody plants and broadleaf weeds.
prometon	Pramitol	Ciba Geigy	Nonselective herbicide with long residual for industrial weed control.
pronamide	Kerb	Rohm & Haas	Poa annua control in warm season grasses. Also weed and grass control around woody ornamentals and Christmas trees.
sethoxydim	Poast	BASF	Postemergence control of grassy weeds around broadleaf ornamentals.
siduron	Tupersan	DuPont	Preemergence control of annual grasses in newly seeded turf areas.
simizine	Princep	Ciba Geigy	Selective control of annual grasses and broadleaf weeds in established bermudagrass. Also, used in industrial and aquatic weed control.
sulfometuron-methyl	Oust	DuPont	Non-selective industrial and selective in bermudagrass.
tebuthiuron	Spike	Elanco	Brush control and total vegetation control in non-crop areas.
trifluralin	Treflan	Elanco	Selective preemergence weed control in established ornamentals and under asphalt.
triclopyr	Garlon	Dow	Systemic control of woody plants in rights-of-way and industrial sites.
2,4-D	2,4-D	Dow Fermenta Rhone Poulenc Vertac	Selective control of weeds in turf and numerous other areas. Usually mixed with other herbicides.
Vorlex	Vorlex	Nor-Am	Preplant fumigant. Broadleaf weed control in established turf.

SOURCE: Dr. Tom Watschke

renovated, do not verticut for at least 10 days after treatment to allow for a more complete translocation of the Roundup into the vegetative organelles.

In some circumstances, a turf manager may have the need to fumigate a seedbed prior to planting. Seed of certain unwanted species may be known to exist in the site or insect and/or disease problems may require fumigation for control. Most commonly, methyl bromide is used for fumigation. It is extremely toxic and would require application by a licensed applicator.

For best control, broadleaf weeds should be actively growing and not under moisture stress. Too often, broadleaf weeds are sprayed during hot and dry conditions and the resulting control is less than it should be.

For large areas, fumigation is best accomplished by commercial applicators who have the right equipment and can perform the task efficiently and safely.

Poa annua control

Most turf managers desiring to control *Poa annua* use one of two methods. If the desired species is perennial ryegrass, then the best course of action is to use ethofumesate (Prograss). This product has provided spectacular control in mixed *Poa annua*/turf-type perennial ryegrass stands.

When *Poa annua* is unwanted in combination with creeping bentgrass, the most successful course of action has been to use paclobutrazol (Scott's TGR). Spring and fall applications of this product have resulted in dramatic increases in creeping bentgrass populations over as little as a two-year period.

Poa annua is discolored by such treatment, but the discoloration is not long lasting, and as the amount of creeping bentgrass increases, the amount of discoloration on site decreases. **LM**

Professional Series

New Ideas in Irrigation That You Can Use Today

The Hunter Professional Series presents an expanding line of extremely versatile sprinklers for turf and landscape. These innovative sprinklers represent the culmination of more than 30 years of design and development, and are available in three different types.

Hunter R-Type The newest member of the Professional Series family is a multi-stream rotary sprinkler that applies graceful wands of water to turf and landscape. The R-Type is gear driven for quiet operation and has 18 different arcs of coverage. It is available as a closed case 4" pop-up and a shrub model.

Hunter G-Type A single stream gear-driven rotary sprinkler, the G-Type is available in 4" and 12" closed case pop-ups and a shrub model. All G-Type sprinklers are supplied with 12 interchangeable nozzles.

Hunter S-Type A pop-up spray head, the revolutionary S-Type incorporates a built-in nozzle capable of adjusting both the arc of coverage and the discharge rate of the sprinkler at the same time or independently.

Two-Year Warranty All Professional Series sprinklers are backed with an over-the-counter, exchange warranty (not prorated).

◀ R-Type Pop-up

Popular Sprinklers from the Professional Series

G-Type | R-Type | S-Type

Hunter®

Circle No. 133 on Reader Inquiry Card

Member IA The Irrigation Association

Hunter Industries ☐ The Irrigation Innovators
1940 Diamond St. ☐ San Marcos, CA 92069 ☐ 619/744-5240 ☐ Telex: 9103335694 Ans. HUNTER IND SM ☐ FAX: 619/744-7461

HERBICIDE COMBINATIONS

Herbicide	Brand Name(s)	Company	Uses
2, 4-D plus MCPP	Chipco Turf Kleen Cleary Scotts II SDS Tee Time Lescopar	Rhone Poulenc WA Cleary OM Scott Fermenta Andersons Lesco	Broadleaf weed control in established turf.
2, 4-D plus dicamba	Scotts I Banvel Plus Lesco Selective Herbicide	OM Scott Sandoz Lesco	Selective postemergence control of weeds in turf.
2, 4-D plus MCPP plus dicamba	Three-way Trimec Trexan	Lesco PBI Gordon Sierra	Selective, broad spectrum control of weeds in turf.
2, 4-D plus MCPP plus dicamba plus MSMA	Trimec plus	PBI Gordon	Broad spectrum postemergence control of broadleaf weeds and annual grasses.
2, 4-D plus dichlorprop	Weedone DPC	Rhone Poulenc	Selective postemergence control of weeds in turf.
2, 4-D plus dichlorprop	Weedone DPC Amine	Rhone Poulenc	Broad-spectrum, selective, postemergence control of weeds in turf.
2, 4-D plus dicamba plus dalapon	Banvel Plus	Sandoz	Broad spectrum, post-emergence turf weed control.
2, 4-D plus prometon	Vegemec	PBI Gordon	Selective postemergence control of weeds in turf.
2, 4-D plus triclopyr	Turflon-D	Dow Chemical	Selective postemergence turf herbicide for broadleaf weeds.
Balan plus Ronstar	Regalstar	Regal Chem.	Broad spectrum pre-emergence control of weeds in turf.
amitrol plus simazine	Amizine	Rhone Poulenc	Season-long control of weeds and grasses.
MSMA plus cacodylic acid	Broadside	Crystal	Nonselective, broad spectrum weed control.
diuron plus sodium chlorate plus sodium metaborate	Chlorea	Rhone Poulenc	Nonselective weed and grass killer.
benefin plus oryzalin benefin plus trifluralin	XL Team	Elanco	Preemergence control of annual grasses and broadleaf weeds in established turf.
bensulide plus oxadiazon	ProTurf Goosegrass/ Crabgrass Control	OM Scott	Broad-spectrum pre-emergence control of annual grasses.
bromacil plus diuron	Rout Krovar	Hopkins DuPont	Wide range control of weeds in industrial sites and rights-of way.
MSMA plus dicamba	Mondak	Sandoz	Noncropland general weed control.
prometon, simazine anc chlorate	Pramitol	Ciba Geigy	Full-season weed control in industrial sites.
tebuthiuron plus trifluralin	Spike Treflan	Elanco	Non-selective, season-long, preemergence and postemergence control of weeds industrial and non-cropland areas.

SOURCE: Dr. Watschke

Note: These tables represent a partial list of available herbicides