

# You're in control with SEVIN.<sup>®</sup>

Because SEVIN<sup>®</sup> carbaryl insecticide helps you get your grounds maintenance program under control. It effectively controls over 119 insects that attack trees, shrubs, ornamentals and turf. It's particularly effective against the damaging gypsy moth. SEVIN is available in a wide variety of formulations—including easy to measure and mix SEVIN SL carbaryl insecticide. And SEVIN is compatible with most miticides, fungicides and other insecticides. So, keep your customers' insects under control, with SEVIN.



  
**Sevin<sup>®</sup>**  
CARBARYL INSECTICIDE

UNION  
CARBIDE

SEVIN is a registered trademark of Union Carbide Corporation.  
As with any agricultural chemical, always follow instructions on the label.  
©1982 Union Carbide Agricultural Products Company, Inc.

UNION CARBIDE AGRICULTURAL PRODUCTS COMPANY, INC.  
P.O. Box 12014, T.W. Alexander Drive  
Research Triangle Park, NC 27709

Circle No. 163 on Reader Inquiry Card



# Turf Weed Identification

Germination of weed seed will occur only if the necessary environmental conditions exist; moisture, temperature, light, oxygen, etc. One significant aspect of the control mechanism of germination is each particular weed species has a definite and predictable pattern of germination. This is known as periodicity. Few species germinate freely throughout the year.

Characteristically, a large percentage of the seed of a given species will germinate when the conditions for germination are first met, with subsequent lower germination throughout the remainder of the growing season. Annual bluegrass, henbit, common chickweed, and clovers usually fit this category. Other species such as large crabgrass and goosegrass tend to germinate freely after the initial flush of seed germination.

Biennials and perennials germinating from seed also exhibit periodicity. They are treated as annuals when preemergence control is applicable.

**Biennials** require two years to complete their life cycle. In the first year, plants of this type form rosettes (radial clusters of leaves growing close to the soil) and during the second year they send up flower stalks and produce seed.

**Perennials** live for more than two years and are especially difficult to control because they reproduce by vegetative means as well as by seed. Dallisgrass, torpedograss, dandelion, wild onion, wild garlic, and nutsedges are among the more commonly occurring perennial weeds.

Once established, control of perennials becomes increasingly difficult. Perennials germinating from seed are not significantly different from annuals. However, perennials are established before the problem is usually recognized.

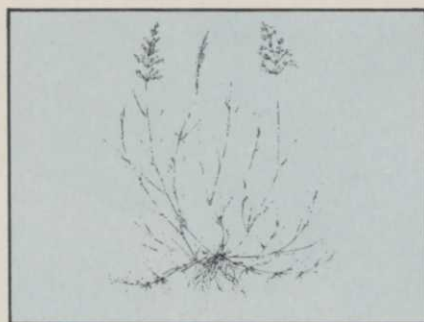
Perennials spread from specialized vegetative structures both above and below the soil surface. Effective selective control of established plants can be obtained only

with postemergence herbicides that will translocate to these reproductive structures.

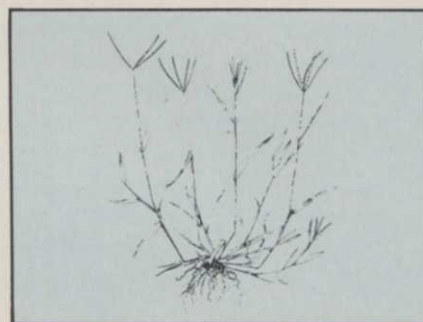
A second distinction important to weed control is whether the weed is a grass (monocot) or broad-

leaf (dicot). Herbicides are often selected by how they disrupt the life processes of either grasses or broadleaf weeds. The effectiveness of these herbicides depends greatly upon this distinction.

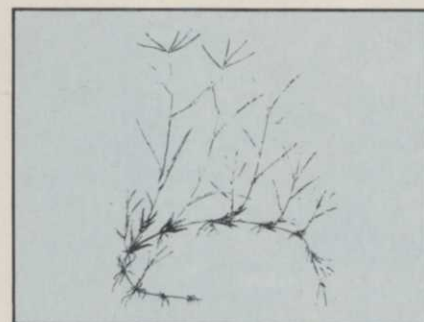
## Grasses



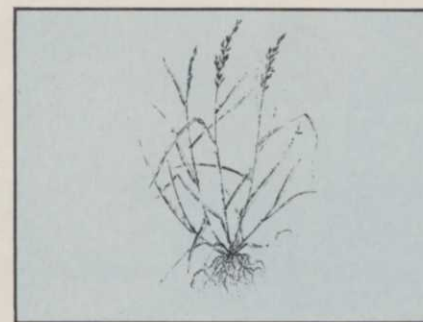
**Bentgrass** - A desirable grass in certain locations, creeping bentgrass can encroach on cool season turf consisting of Kentucky bluegrass, perennial ryegrass, and fine fescues. Bentgrass has extremely small seed and is a major target of seed producers during seed cleaning for certification. It is extremely difficult to treat lawns to remove bentgrass.



**Crabgrass** - The predominant target of many turf weed control programs, crabgrass spreads by seed and by rooting at lower nodes (where stem and leaf join). This pale green grass forms dense patches damaging the appearance of a lawn. This annual grass can be controlled to great degree with preemergence herbicides.



**Bermudagrass** - Like bentgrass, bermudagrass encroaches on other desired turfgrasses. A desirable turfgrass for the South, bermudagrass can be a problem in cool-season turf. This extremely hardy grass can outperform other warm-season turfgrasses. It spreads by stolons and rhizomes. Bermudagrass turns brown early in the fall in cooler climates while other grasses remain green.



**Tall Fescue** - A coarse, hardy bunch grass often planted for utility turf. This perennial sends down roots far below other cool-season turfgrasses and consequently exhibits drought tolerance. Tall fescue can withstand poor soils and has a low fertilization requirement. These characteristics have caused researchers to develop finer bladed selections for lower maintenance lawns. It is difficult to eliminate from stands of other turfgrasses.



# WE GIVE GREENS THE KINDEST CUT OF ALL.

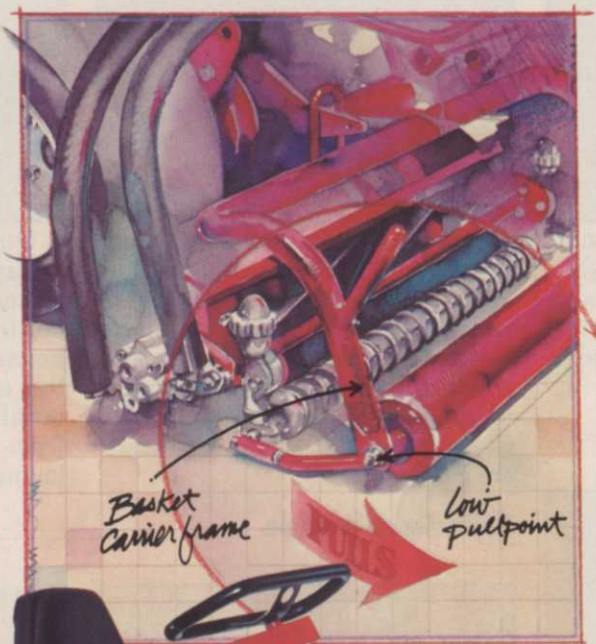
## WITH REELS THAT FLOAT.

Toro pulls out the stops to give you the kind of greensmower you want most.

One that keeps you cutting. With a quality of cut second to none.

That's why our Greensmaster 3® is the choice of the majority of America's top hundred golf courses.

This fast, agile professional gives each green a uniform cutting height, appearance and playing characteristic.



low pullpoints, that pulls rather than pushes. Resulting in balanced, fully floating cutting heads that allow the reels to float freely as they cut, unaffected by dips or bumps encountered by other parts of the machine. Or by the weight of clippings in the baskets.

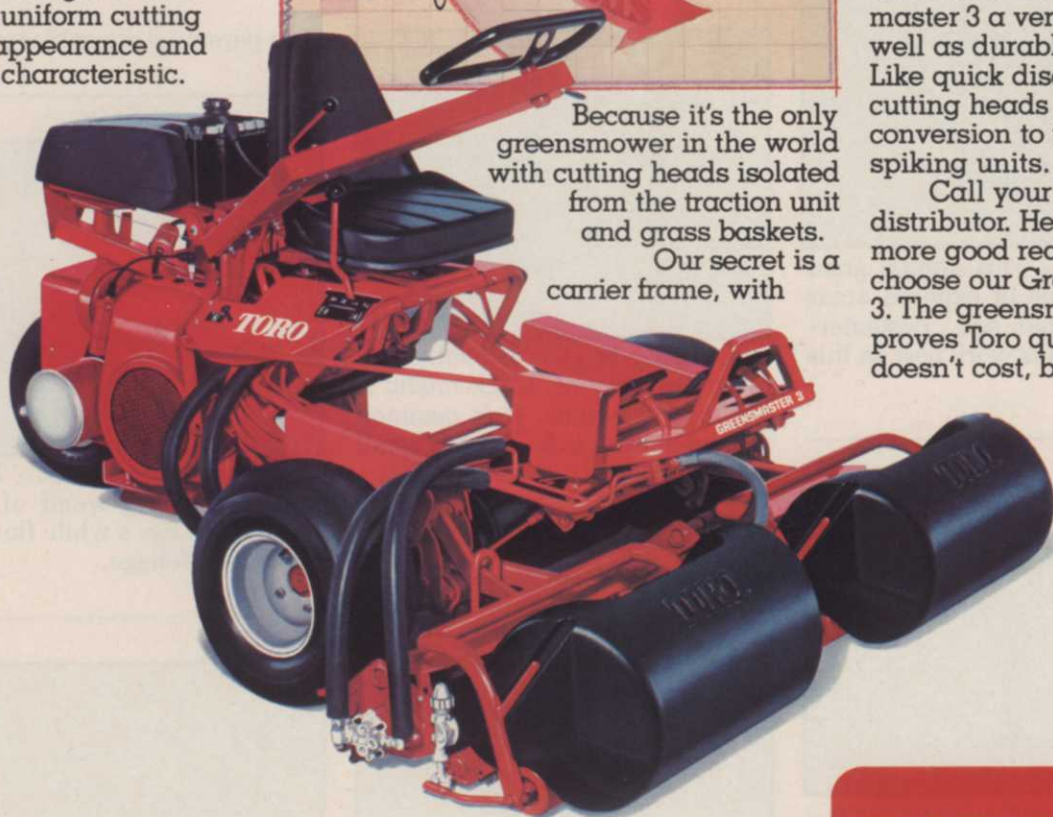
You get the kindest cut of all. Smooth. Even. Consistently superb.

Plus, other features that make the Greensmaster 3 a versatile as well as durable performer. Like quick disconnect cutting heads for easy conversion to thatching or spiking units.

Call your Toro distributor. He'll give you more good reasons to choose our Greensmaster 3. The greensmower that proves Toro quality doesn't cost, but pays.

Because it's the only greensmower in the world with cutting heads isolated from the traction unit and grass baskets.

Our secret is a carrier frame, with

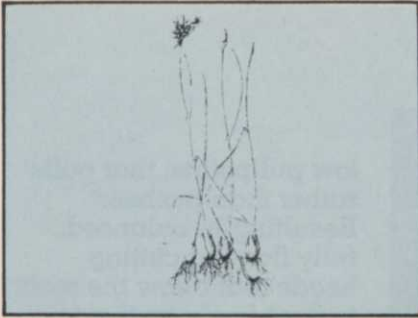


**THE PROFESSIONALS  
THAT KEEP YOU CUTTING.**

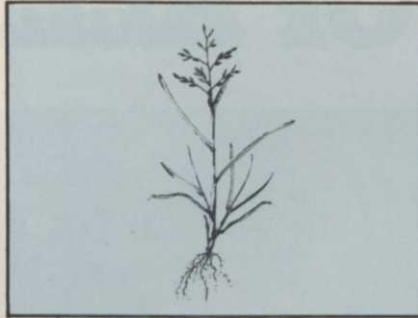
"Toro" is a registered trademark of The Toro Company  
8111 Lyndale Ave. So., Minneapolis, Minnesota 55420.



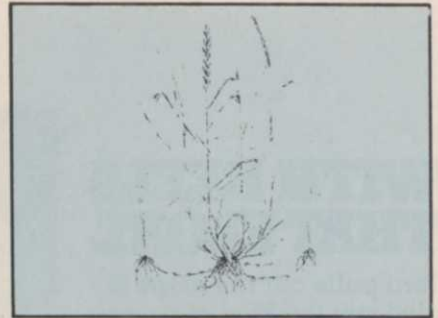
# Turf Weed Identification



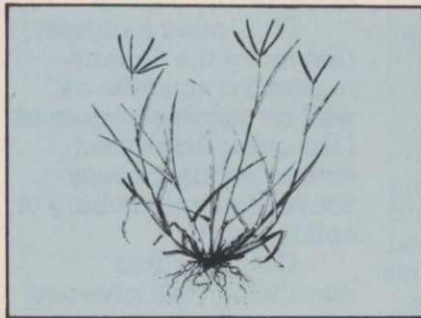
**Wild Garlic** - This perennial monocot is not a grass and spreads not only by seed, but from above and below ground bulbets. Control must stop germination of seed AND kill the bulbets.



**Poa annua** - Persistent seed-heads and blotches of summer-killed annual bluegrass make this a weed in the summer in the north and in the winter in the South. This weed thrives in well-fertilized, irrigated, and low cut turf. Its light green color and white seedheads are easily spotted.

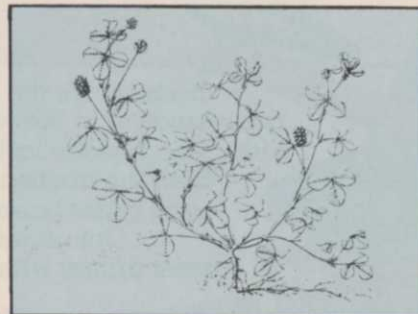


**Quackgrass** - This perennial grassy weed spreads vigorously by rhizomes and is extremely hard to control. Spot treatment with nonselective herbicides is often the only solution. Quackgrass is usually present when topsoil came from rural areas, such as in new lawns.



**Goosegrass** - This annual grass takes advantage of exposed areas with compacted soil. Postemergence treatments work best on this wiry grass.

## Broadleaf Weeds

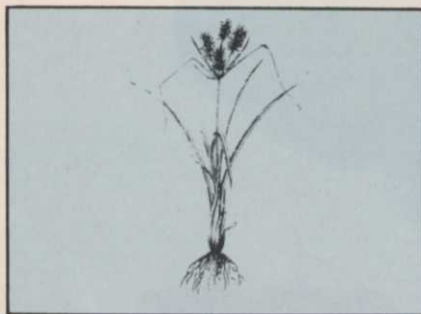


**Black Medic** - Occasionally confused with clover, black medic is an annual legume. It is common throughout the U.S. and has small yellow flowers.

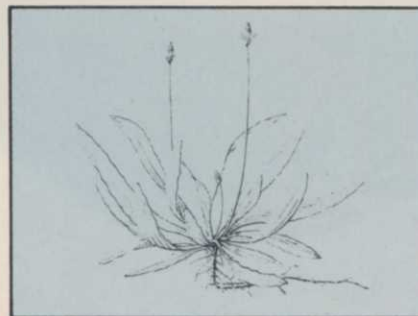
This perennial resembles plantain.



**Common Chickweed** - This annual spreading weed of shady, moist areas has a white flower and light green foliage.



**Nutsedge** - Yellow nutsedge is a major weed problem of turf. The perennial weed reproduces both from seed and underground tubers. The yellow color makes it stand out. Systemic herbicides are required to kill the tubers.

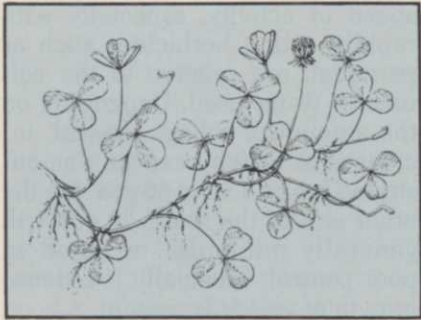


**Buckhorn** - Present in many low budget lawns and mow-only turf areas of parks. Buckhorn has a tap-root that defies hard weeding.



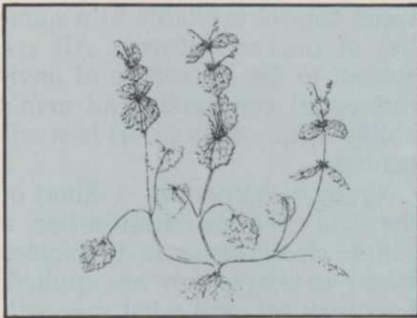
**Mouse-Ear Chickweed** - The

perennial version of chickweed prefers open sun and also has white flowers.

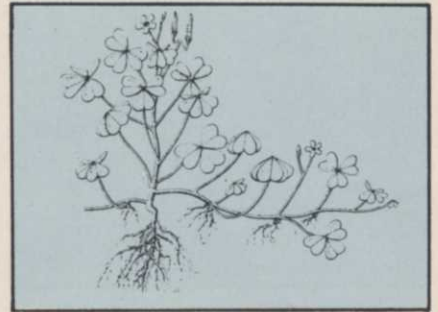


**Clover** - This perennial broadleaf embarrasses turf managers with large pink flowers in the spring and tan patches of dead foliage in the summer.

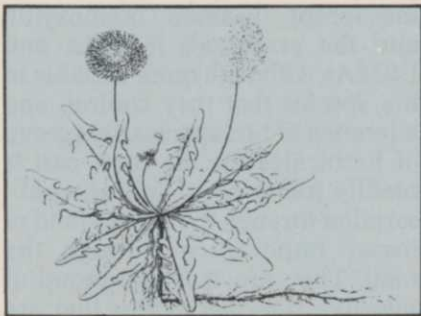
gressive spreader hugs the ground and produces a purple flower.



**Henbit** - Taller than ground ivy, despite purple flowers and scallop-shaped leaves, henbit is a winter annual most noticeable in early spring.



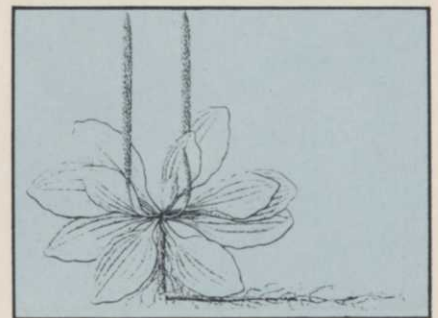
**Oxalis** - This perennial broadleaf spreads by rooting at the nodes and by seed from pods following flowering. Small yellow flowers mature into long, narrow seedpods. Selective control is ineffective.



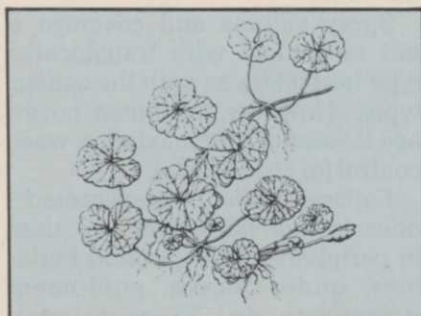
**Dandelion** - This perennial is famous for its taproot and yellow flower which later becomes a puffy seedhead in late spring.



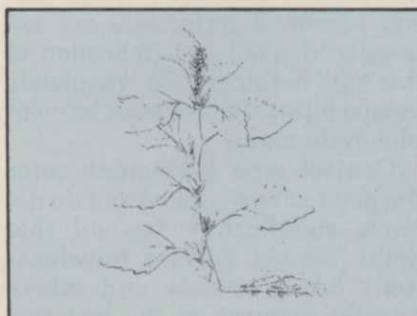
**Heal-All** - This hairy-leaved perennial is common in new and poorly maintained lawns throughout the U.S. It can spread beneath the level of mower blades.



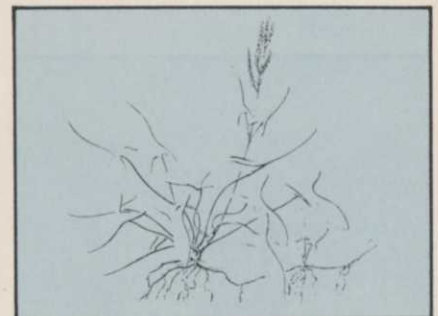
**Plantain, broadleaf** - Hosta-like leaves of this perennial surround tall purple stalks containing seeds. The leaves, unlike hosta, lay flat on the surface of the soil.



**Ground Ivy** - This perennial can dominate in poor, shady soil. A member of the mint family, this ag-



**Lambsquarter** - A summer annual of large size if not mowed. Foliage is bright light green.

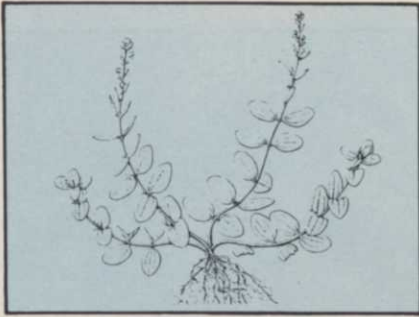


**Red Sorrel** - This tenacious perennial has arrow-shaped leaves and spreads by roots and rhizomes. It can quickly overtake desirable turf weakened by acid soil. Alkaline soils can discourage Red Sorrel from getting established.

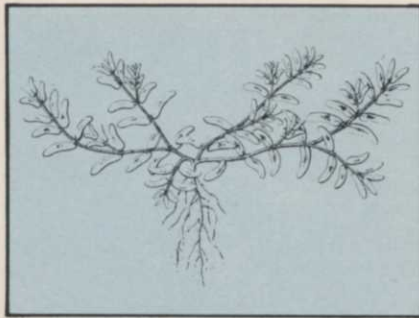
(continued on page 36)



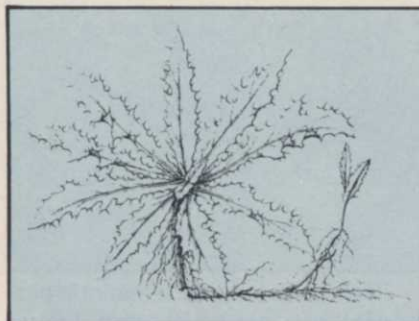
# Turf



**Speedwell** - There are both annual and perennial members of this weed family. White to purple flowers bloom above heart shaped seedpods. Spot treatment is often the only control once established.



**Spurge** - The leaves of spurge contain a spot in the center of the upper surface. The seed of this heavy producer germinates in early spring. The spreading branches of this annual contain a milky substance.



**Sow Thistle** - This annual has flowers similar to dandelion but its leaves have spines on the edges and deeper indentations. Selective control is effective.

## Herbicides

Herbicides are chemicals used to kill or inhibit the growth of plants. There are many kinds of herbicides for general and specific weed control available in a number of packaged forms. All are subject to the influences of environmental conditions and man's ability to use them to his best advantage.

*Types of herbicides* — Short of the rigid chemical classification, a simple classification of herbicides based on where they are applied, how they act, and what they will control is perhaps most useful.

### I. Foliage Applied

#### A. Contact

1. Selective
2. Nonselective

#### B. Translocated

1. Selective
2. Nonselective

### II. Soil Applied

#### A. Short residual

1. Selective
2. Nonselective

#### B. Long residual

1. Selective
2. Nonselective

*Foliage applied - contact - selective* herbicides are of little importance in turf or landscape.

*Foliage applied - contact - nonselective* herbicides used in turf landscape include paraquat and cacodylic acid (Phytar 560). These herbicides will kill all green and growing foliage contacted by spray solutions. Foliage of plants such as dormant bermudagrass, zoysiagrass, and other warm season perennial turfgrasses are not usually affected by application of this type herbicide. To completely escape injury, foliage must be completely dormant.

Contact type herbicides enter the plant where applied and do not move significantly beyond that point (limited upward translocation). Spray volume and subsequently coverage of the leaf surface of the target plants is very critical for maximum control. Extremely low volume applications

will often result in inadequate coverage and will kill the upper layer of the foliage canopy. Regrowth occurs in a comparatively short period of time.

With contact herbicides increases in control and possibly in speed of activity, especially with rapidly acting herbicides such as paraquat, are relative to the volume of water used. Depending on the amount of foliage present, increases in activity can be demonstrated beyond 50 to 60 gpa. On the other end of the scale, 20 gpa will generally minimize, or result in poor control, especially if a dense growth of weeds is present. A good compromise is perhaps 30 to 40 gpa.

*Foliage applied - translocated - selective* herbicides are absorbed into and move to points beyond the point of entry and kill plants. The most common herbicides in this group are the phenoxys (2,4-D, mecoprop), dicamba, bromoxynil, and the arsenicals (MSMA and DSMA). Although quite variable in the species that they control, and tolerance of turf species, this group of herbicides for the most part is readily translocated following absorption through the foliage (and of lesser importance through the root). They are the only group of selective type herbicides that are effective on perennial weeds. They are more effective than contacts since translocation (downward) of the herbicide to reproductive structures can take place following uptake by the foliage of the plant.

Spray volume and coverage is not as critical with translocated type herbicides as with the contact types. However, adequate coverage is essential for maximum weed control (of 30 to 40 gpa).

*Foliage applied - translocated - nonselective* herbicides are used in peripheral areas (around buildings, under fences, equipment storage lots, etc.). These materials are applied to the foliage of the target species and generally control

*continued on page 39*



For information contact:

**J & L ADIKES, INC.**  
Jamaica, N.Y. 11423

**NORTHRUP KING CO.**  
Minneapolis, MN. 55413

**VAUGHAN-JACKLIN CORP.**  
Bound Brook, N.J. 08805  
Downers Grove, IL. 60515  
Post Falls, ID. 83854

**ROTHWELL SEEDS LTD.**  
Lindsay Ont., CAN K9V 4L9



**\$ FOR \$**  
**POUND FOR POUND**  
**NOTHING EQUALS**

**Adelphi\***  
KENTUCKY BLUEGRASS

THE GREENER KENTUCKY BLUEGRASS™

\*U.S. Plant Pat. No. 3150



# Nothing costs less than Subdue. Because so little goes so far.



**Subdue gives turf the best protection against Pythium blight and damping-off for the least cost.**

Nothing costs less to use than Subdue® to control Pythium blight and damping-off. Because it only takes 1½ fluid ounces of Subdue to cover 1,000 square feet for 10 to 21 days, on established turf.

And nothing works as well because Subdue has two-way action against Pythium blight and damping-off. First, Subdue works systemically, to protect your turf from the inside

out. Second, Subdue works on contact to control Pythium in the soil.

Subdue will give you control in both established turf and newly-seeded turf. And Subdue's systemic action gives you longer-lasting control than other fungicides. So you not only save on Subdue's low rate, you also save on maintenance and labor costs.

That's why Subdue is the best protection you can get. Because so little goes so far.

Ciba-Geigy, Ag. Div.,  
Box 18300, Greensboro,  
NC 27419



# Turf

all weed species present. Many of the foliage applied translocated selective herbicides above may become non-selective at extremely high rates. More often than not at higher rates they behave as contact type herbicides.

More pertinent examples of these foliage applied-translocated non-selective herbicides are dalapon (Dowpon), amitrole, and glyphosate (Roundup). In many respects, although somewhat of an oversimplification, this group of herbicides differs from the translocated-selected types only in that they are nonselective.

*Soil applied - short residual - selective herbicides* include the widely used preemergence herbicides DCPA, benefin, bensulide, atrazine, simazine, and pronamide. Pronamide and simazine applied to the soil also control established annual bluegrass (post-emergence). Maximum residual activity of these herbicides is a matter of weeks to a few months as compared to the long term residual herbicides in which control for several months would be expected.

Application technique, as with all types of herbicides, is important. While volume of spray solution is not as critical as with postemergence herbicides, even distribution is necessary for uniform effective control. These herbicides (preemergence) represent our best approach to the control of annual and biennial or perennial weeds germinating from seed. Where effective, these herbicides eliminate the competition effects that are encountered from the time of germination to the time of control where postemergence herbicides are also used.

*Soil applied - short residual - non-selective herbicides* are the temporary soil sterilants. They are usually referred to as fumigants and include methyl bromide and metham (Vapam). They are active in the vapor forms. Methyl bromide is a gas at atmospheric pres-

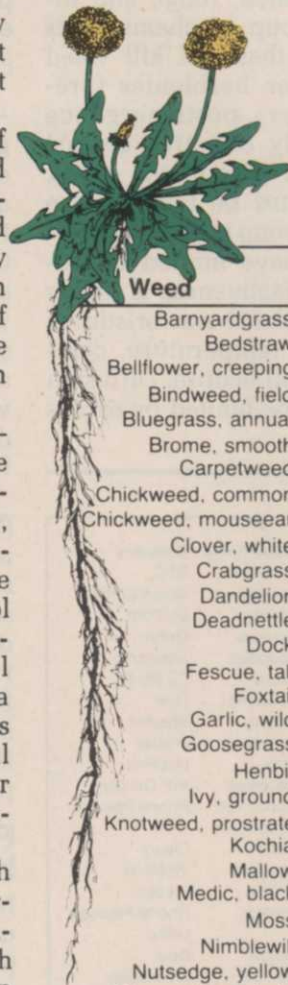


CHART 1  
Growth and treatment periods

Weed	SPRING			SUMMER			FALL			WINTER		
	Early	Mid	Late	Early	Mid	Late	Early	Mid	Late	Early	Mid	Late
Barnyardgrass												
Bedstraw												
Bellflower, creeping												
Bindweed, field												
Bluegrass, annual												
Brome, smooth												
Carpetweed												
Chickweed, common												
Chickweed, mouseear												
Clover, white												
Crabgrass												
Dandelion												
Deadnettle												
Dock												
Fescue, tall												
Foxtail												
Garlic, wild												
Goosegrass												
Henbit												
Ivy, ground												
Knotweed, prostrate												
Kochia												
Mallow												
Medic, black												
Moss												
Nimblewill												
Nutsedge, yellow												
Pigweed, prostrate												
Plantain												
Puncturevine												
Purslane, common												
Quackgrass												
Sanbur												
Shepherdspurse												
Sorrel, red												
Speedwell												
Spurge, prostrate*												
Thistle, Canada												
Thistle, musk												
Vervain, prostrate												
Violets												
Waterleaf (nyctelea)												
Woodsorrel, yellow												
Yarrow												

— Active period of plant growth. Varies from year to year and from north to south.  
 — Apply preemergence chemicals.  
 — Apply postemergence treatments. Approximate periods may vary two weeks from season to season. Use granular or wax bar formulations of 2,4-D, Banvel D, Silvex, and 2,4,5-T from late spring through early fall.  
 \* Preemergence herbicide applications should be made a second time in late June or early July.



sure while metham, although formulated in liquid form, is converted to a toxic gas in the soil. Because of their volatile nature, both compounds require some kind of sealing to prevent evaporation into the atmosphere. Methyl bromide must be applied under a gas-tight cover (usually plastic) while vapam can be sealed by watering (irrigation), although weed control is more consistent if the soil is sealed with plastic following application.

Both herbicides are excellent for killing vegetative structures of perennial plants such as bermuda-

grass, nutsedge, and torpedograss and are effective on a large number of weed seed, fungi, and insects. This group of chemicals is the only one that will kill weed seed. All other herbicides (pre-emergence or postemergence types) are only effective against germinating or germinated seeds, i.e., growth must be taking place for this latter group to be effective.

Fumigants have limited usefulness. Their effectiveness is highly dependent on the characteristics of soil moisture, temperature, compaction, and soil texture. Diffusion of vapors can be limited by excess

moisture and/or compacted soils. And fumigants are extremely expensive. However, in certain turf establishment situations there is no alternate to these herbicides.

*Soil applied - long term residual - selective and non-selective.* Both groups will be combined in this discussion. Although certain examples could possibly be given of the selective type, for the turf user this group constitutes the non-selective soil sterilants. Their use is very limited in turf facilities and specifically are used in peripheral areas (to the turf or ornamentals where total vegetation control is desired and are usually effective for several months.

Bromacil (Hyvar®), karbutylate (Tandex®) and borate compounds are just a few examples of soil sterilants. These are active via the soil. Several mixtures of these and other compounds containing materials such as amitrole to give quick foliage kill are also available. Lateral movement of soil sterilants into turf areas can be a significant problem.

## Factors Affecting Herbicide Activity

Most herbicidal failures aren't failures of the herbicide. Conditions (temperature, moisture, timing, application method, herbicide selection, etc.) are usually responsible for most "failures" we hear about. If we understand the conditions necessary for maximum effectiveness of a herbicide, many of the variables contributing to "failure" can be minimized.

To be most effective, herbicides must be applied at the appropriate time in relation to germination or growth of the target species. Herbicides may be applied in a number of ways but basically for applications to turf we are dealing with those that are applied directly to the target weed (post-emergence) and those that are applied to the soil (pre-emergence). In both cases we are making applications in es-

*continued on page 44*

## Herbicides and Manufacturers

Chemical	Brand Name	Company	Chemical	Brand Name	Company
amitrole	Amitrol-T	Union Carbide	Ethofumesate	Prograss	BFC
asulam	Asulox	Phone Poulenc	fenac	Fenatrol	Union Carbide
atrazine	Atratol	Ciba Geigy	fosamine	Krenite	Du Pont
benefin	Balan	Elanco	glyphosate	kleenup	Ortho
bensulide	Betamec	P.B.I. Gordon		Roundup	Monsanto
	Betasan	Stauffer	linuron	Lorox	Du Pont
	Pre-San	Mallinckrodt	methyl bromide	Dowfume	Dow
bentazon	Basagran	BASF	metham	Vapam	Stauffer
bromacil	Hyvar	Du Pont	metribuzin	Sencor	MoBay
bromoxynil	Brominal	Union Carbide	monuron	Urox	Hopkins
cacodylic acid	Phytar	Crystal	MCP	Mecomec	PBI Gordon
chloramben	Amiben	Union Carbide		Chipco Turf Herbicide	Rhone Poulenc
chlorpropham	Furloe	PPG		MCP	Cleary
dalapon	Dalapon	Diamond Shamrock	MSMA	Weedhoe	Vineland
dazomet	Mylone	Hopkins	oryzalin	Surflan	Elanco
DCPA	Dacthal	Diamond Shamrock	oxadiazon	Ronstar	Rhone Poulenc
dinoseb	Premerge 3	Dow	paraquat		Ortho
	Dynamyte	Drexel	picloram	Tordon	Dow
Devrinol		Stauffer	prometon	Pramitol	Ciba Geigy
dicamba	Banvel	Velsicol	pronamide	Kerb	Rohm & Haas
dichlobenil	Casoron	Thompson Hayward	siduron	Tupersan	Du Pont
diphenamid	Enide	Tuco/Upjohn	simazine	Princep	Ciba Geigy
DSMA		Crystal	tebuthiuron	Spike	Elanco
dinitrophenol	Dinitro	Thompson Hayward	trifluralin	Treflan	Elanco
diuron	Karmex	Du Pont	triclopyr	Garlon	Dow
diquat	Ortho Diquat	Ortho	Vorlex		Nor-Am
endothall	Endothall	Pennwalt			
EPTC	Eptam	Stauffer			
<b>Combinations</b>					
Amizine		amitrol and simazine		Union Carbide	
Banvel plus		dicamba and 2,4-D		Velsicol	
Broadside		dicamba and 2,4-D, dalapon		Velsicol	
Chlorea		MSMA and cacodylic acid		Crystal	
		diuron, sodium chlorate, sodium metaborate		Rhone Poulenc	
Fenamine		amitrole, fenac, atrazine		Union Carbide	
Hopkins Rout G-8		bromacil and diuron		Hopkins	
Krovar		bromacil and diuron		Du Pont	
MonDak		MSMA and dicamba		Velsicol	
Pramitol 5PS		prometon, simazine, chlorate		Ciba Geigy	
Tordon		picloram and ammonium sulfate		Dow	
Trimec		2,4-D, MCP, and dicamba		PBI Gordon	
Urox		monuron and TCA		Hopkins	
Vegemec		prometon and 2,4-D		PBI Gordon	
Weedmaster		dicamba and 2,4-D		Velsicol	
Weedone		dichlorprop and 2,4-D		Union Carbide	