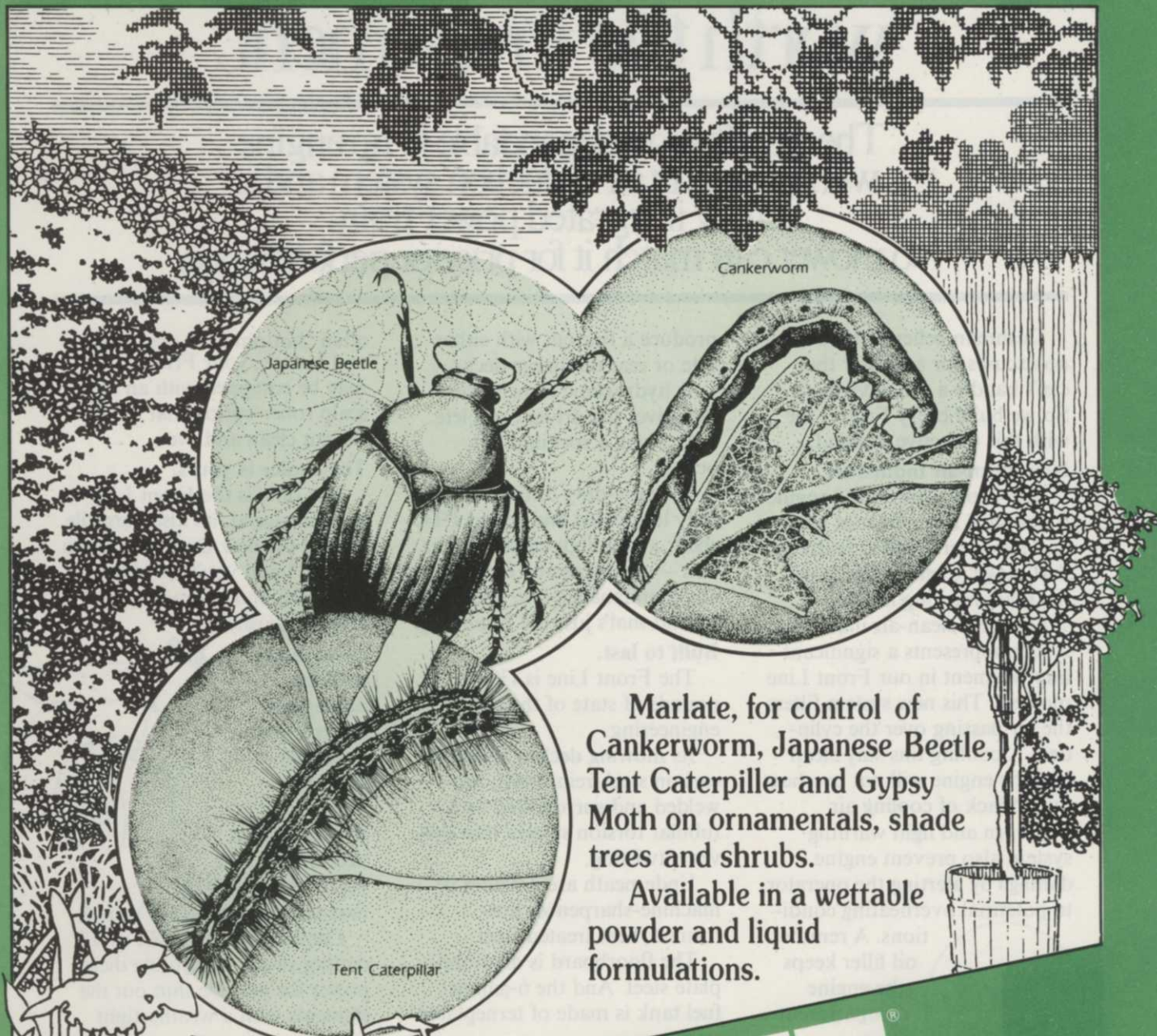


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What makes a Cushman Front Line™ worth the investment:

The world's most dependable 18-hp engine
with new clean air induction system and...
a fully integrated power train.
No mower can match it for price or performance.

Cushman believes there are no excuses for a mower that can't handle a full day's work. So we build every Front Line with this objective in mind.

New clean-air induction.

The Front Line OMC engine is designed for industrial use and has several added features that make it better suited for the grass mowing industry.

Our new clean-air induction system represents a significant improvement in our Front Line mowers. This new system filters the air passing over the cylinders... cooling fins stay clean and the engine will not overheat due to lack of cooling air.

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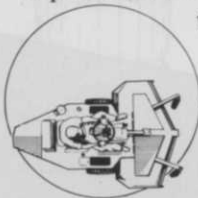
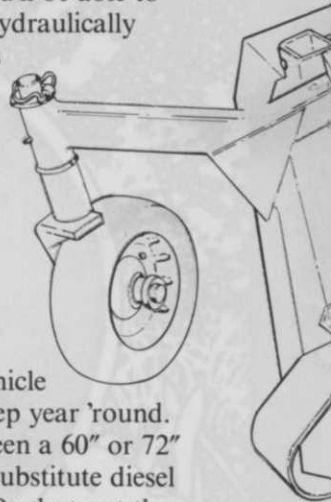
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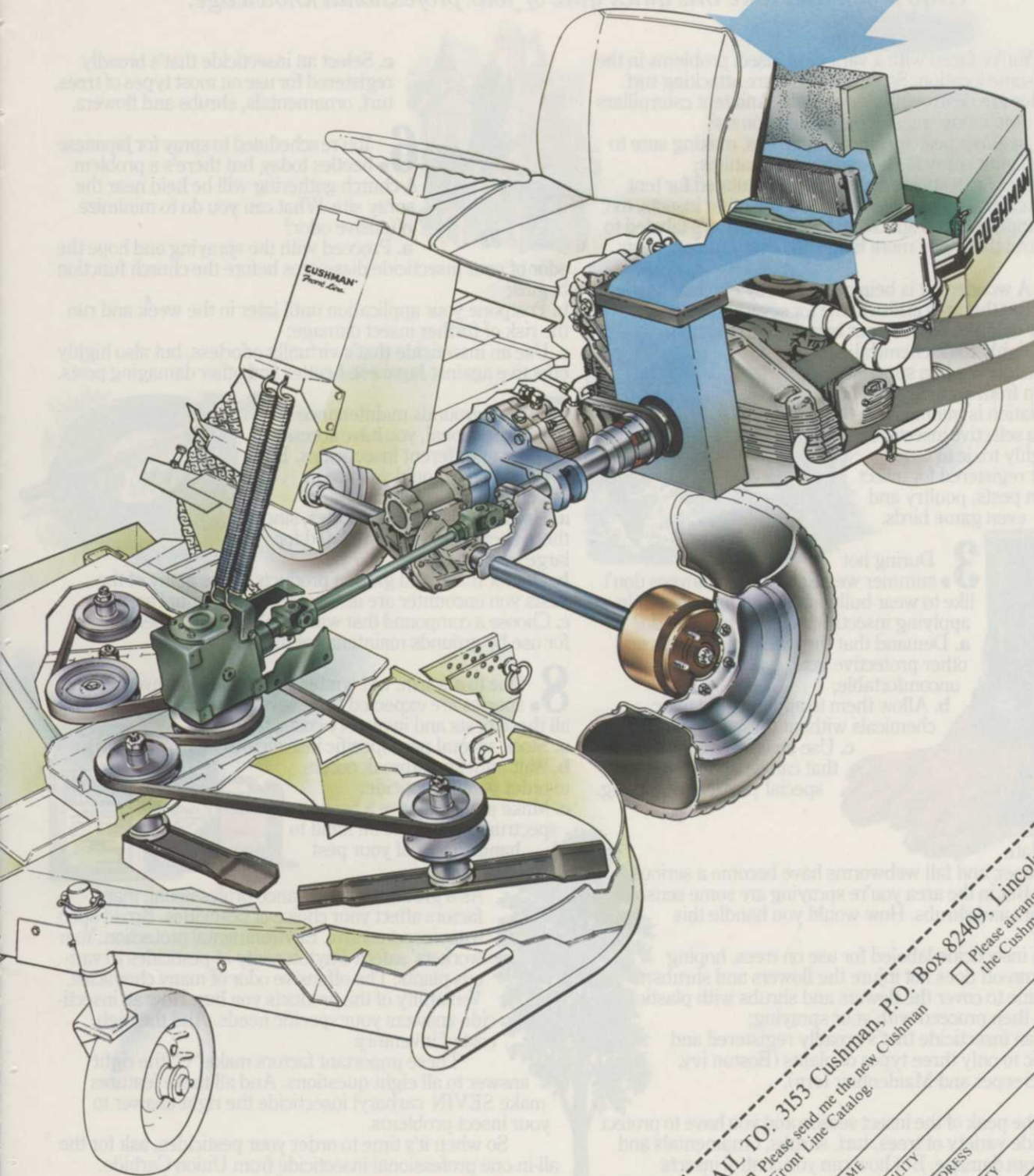
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It works harder because it's built better.

What's your professional I.Q.?

Grab a pen and take this quick quiz of your professional knowledge.



1. You're faced with a variety of insect problems in the same location. Sod webworms are attacking turf. Beetles are destroying flower beds. And tent caterpillars are defoliating trees. What should you do?

- Use three pest-specific insecticides, making sure to clean your spray tank between applications;
- Spray a pesticide specifically formulated for tent caterpillars and hope it controls the other insects, too;
- Apply a broad-spectrum insecticide that's labeled to control these and more than 210 other problem pests.

2. A wooded lot is being attacked by elm leaf beetles. But this area is also home for several species of birds and other wildlife. What's your best course of action?

- Use a highly toxic chemical, but exercise caution when spraying;
- Refrain from spraying and hope the defoliation is minimal;
- Spray a selective insecticide that's highly toxic to target pests, yet registered for insect control on pests, poultry and even game birds.



3. During hot summer weather, your employees don't like to wear bulky safety equipment while applying insecticides. What can you do?

- Demand that they wear respirators and other protective gear, even if it is uncomfortable;
- Allow them to apply highly toxic chemicals without these safeguards;
- Use an effective insecticide that can be applied without special protective clothing.

4. It's late summer, and fall webworms have become a serious problem. But in the area you're spraying are some sensitive flowers and shrubs. How would you handle this situation?

- Use an insecticide labeled for use on trees, hoping that any run-off does not injure the flowers and shrubs;
- Take time to cover the flowers and shrubs with plastic sheeting, then proceed with your spraying;
- Apply an insecticide that's broadly registered and phytotoxic to only three types of plants (Boston ivy, Virginia creeper and Maidenhair fern).

5. It's the peak of the insect season and you have to protect a wide variety of trees, turf, shrubs, ornamentals and flowers from damage. But how can you control insects on all these plants?

- Use several different insecticides, each formulated for specific plants;
- Treat everything with a tree and shrub spray, hoping that this product does an adequate job on turf, flowers and other plants;



6. You're scheduled to spray for Japanese beetles today, but there's a problem. A church gathering will be held near the spray site. What can you do to minimize offensive odor?

- Proceed with the spraying and hope the odor of your insecticide dissipates before the church function begins;
- Postpone your application until later in the week and run the risk of further insect damage;
- Use an insecticide that's virtually odorless, but also highly effective against Japanese beetles and other damaging pests.

7. As a grounds maintenance professional, you have access to a number of different insecticides. But what criteria should you use in selecting these products?

- Use agricultural insecticides, since these chemicals are formulated for large-volume users;
- Opt for home and garden products, since many of the pests you encounter are also found in residential areas;
- Choose a compound that was developed and labeled for use by grounds maintenance professionals.



8. Due to a warm, wet winter, infestations of several insect species are expected to be severe. How can you control all these pests and inventory costs, too?

- Stock several pest-specific insecticides;
- Wait until an outbreak occurs to order your insecticide;
- Make sure you have a broad-spectrum insecticide on hand to handle most of your pest problems.



As a grounds maintenance professional, many factors affect your choice of pesticides. Broad-spectrum insect control. Environmental protection. Your workers' safety. Phytotoxicity of pesticides to various plants. The offensive odor of many chemicals. Versatility of the products you buy. How an insecticide answers your specific needs. And the high cost of inventory.

These important factors make "C" the right answer to all eight questions. And all these features make SEVIN carbaryl insecticide the right answer to your insect problems.

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Circle No. 176 on Reader Inquiry Card



WEED CONTROL GUIDE

Prepared by the staff of
Weeds, Trees & Turf



INSIDE:

- 36 TURF WEED CONTROL**
Dr. Robert Shearman and Dr. Ray Dickens team up for the latest turf weed control information.
- 66 LANDSCAPE WEED CONTROL**
Preemergence herbicides cut hand labor in plant beds greatly says Dr. Elton Smith.
- 70 AQUATIC WEED CONTROL**
For the first time, aquatic weeds are considered as well as effective cultural and chemical controls.
- 76 DIRECTORY OF HERBICIDES, MANUFACTURERS**
Use this directory to shop for herbicides and to locate distributors in your area.

TURF

by Dr. Ray Dickens and Dr. Robert Shearman

This annual project is continuously updated and expanded to provide turf and landscape managers a comprehensive, up-to-date reference for weed control.

For the 1984 edition, we have added sections on roadside and aquatic weed control. The reviewers for this issue were Dr. Ray Dickens of Auburn University and Dr. Robert Shearman of the University of Nebraska.

The core of the manual was written by Dr. Euel Coats of Mississippi State University and Dr. Elton Smith of Ohio State University. Photos and illustrations were provided by Velsicol Chemical Co., O.M. Scott & Son, the New York State Turfgrass Association and the authors.

Every turf or landscape manager faces weed problems. It is perhaps the most critical part of landscape management.

Weeds are part of the natural landscape. A lawn, garden, or man-made landscape is an unnatural state requiring regular cultural practices to maintain. If these practices aren't followed the landscape will return to its natural state in a few short years.

Once established, a man-made landscape can resist weeds best if the desired plants are healthy and vigorous. As soon as the desired plants are put under stress, weeds will move in.

Stress can come from many sources: poor soil; too much or too little shade, fertilizer, or water; compaction and damage from

people and machines; and poor location.

Maintenance practices can also cause stress. Mowing too low, fertilizing too much, applying chemicals which discourage helpful organisms, and compaction and damage caused by maintenance equipment should be corrected as part of a weed control program.

Efficiency and economy in weed control programs are obtained by reducing or eliminating the stress in conjunction with herbicide applications. Rarely do herbicides alone completely eliminate, or maintain at acceptable levels, the weeds in turf or landscape.

Efficiency may also require changing the components or design of a man-made landscape.

If the design is not worth the maintenance level required to keep it in shape, then changes can and should be made. The expense of changing the landscape can be recouped later in lower maintenance costs.

A fairly complex landscape design can be made more efficient by replacing high-maintenance plants with lower-maintenance material. Certain turf cultivars require less care and resist weeds better than others.

Control by location

Location makes a major difference in weed control techniques. Not only does the type of location matter; such as lawn, plant bed, roadside or lake; but so does the geographic location of the landscape involved.

Warm-season weed control varies greatly from cool-season weed control. The weeds, desirable plants, soil, and even herbicides may be different.

Warm-season turf weed control is rather complex primarily because the large number of species and cultivars. There are at least six turfgrasses used in the Southern United States; bahiagrass, bermudagrass, carpetgrass, centipedegrass, St. Augustine, and zoysiagrass. Three of these (bahiagrass, carpetgrass and common bermudagrass) are often weed problems in the other Southern turfgrasses.

Dichondra and kikuyugrass can be added to the list of turf species, however, they are limited primarily to areas of the Southwest that are irrigated. They are also considered weeds in some locations.

A few cool-season turfgrass species are used in the South for winter overseeding to provide color while the warm-season grasses are dormant. These include annual and perennial ryegrass, roughstalk bluegrass, creeping bentgrass and red fescue. As a result, the southern turf manager needs to develop two dif-



ferent weed control programs, one for warm-season turf and one for the overseeded cool-season turf.

Cool-season turf managers must often deal with a mixture of turf species. A mixture of Kentucky bluegrass, perennial ryegrass, and red and chewings fescues is standard. This mixture of species is one hurdle turf growth regulators have not yet cleared since the individual turf species respond differently to present turf growth regulators.

Bentgrass and tall fescue are cool-season grasses planted alone. Tall fescue, long used for utility turf, is growing in popularity as fine-leaved, turf-type varieties are developed, especially in the transition zone. Sheep and hard fescues may gain acceptance as low maintenance turfgrasses in the future. Bentgrasses are used primarily for specialty turf, such as golf greens, and become weeds when they invade standard cool-season turf stands.

Weed control around woody ornamentals and annual and perennial flowers involves a greater variety of plants than turf. Advances in preemergence herbicides for plant beds have given a boost to weed control programs that have been largely mechanical or hand labor.

Roadside weed control is also utilizing herbicides to reduce labor and mechanical control costs. Control of tall-growing plant species is necessary for driving safety.

Control of water weeds is a growing concern as lakes become recreation centers for residential developments. Respect for lakes and rivers has increased dramatically in the past decade. Care of these water areas has grown in importance.

Weed identification

Proper weed species identification and an understanding of life cycles enables landscape managers to correctly and effectively time preemergence and post-



Poa Annua



Crabgrass

emergence herbicide applications.

Many of the weed problems a landscape manager faces can be solved by knowing the weed history of the areas managed. Records should be kept to show the development of weed problems.

Weed sources are present in all soils in the form of seed, rhizomes, stolons, bulbs and tubers. Effort should be made prior to planting to sterilize the soil where practical.

This reserve of weeds should be understood by the landscape manager and controlled. Disturbing the soil for any reason may trigger a weed problem, including maintenance practices such as aeration, vertical mowing, or seeding. If possible, soil should not be disturbed during key weed germination periods and following application of preemergence herbicides.

If a weed problem doesn't conform to the weed history, then the weed was brought into the area in soil, seed, or another carrier.

Life cycles

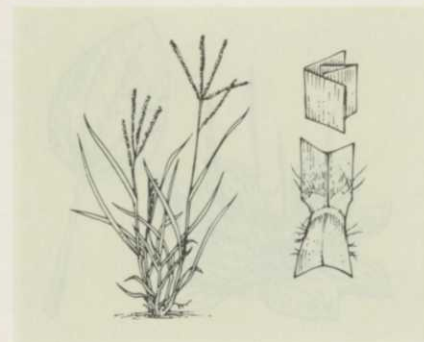
All plants can be classified according to life cycle as either annual, biennial, or perennial.

ANNUALS complete their life cycle in one growing season. They are further divided into summer and winter annuals.

SUMMER ANNUALS germinate in the spring and summer and



Nutsedge



Goosegrass

complete their life cycle during the warm growing season. Large crabgrass and goosegrass are examples of summer annuals.

WINTER ANNUALS germinate in the fall and late winter, complete their life cycle during the spring, and die in early summer. Annual bluegrass, henbit, and common chickweed are winter annuals.

BIENNIALS require two years to complete their life cycle. In the first year, biennials form rosettes (radial clusters of leaves close to the soil). The second year they send up flower stalks and produce seed. Musk thistle is a biennial.

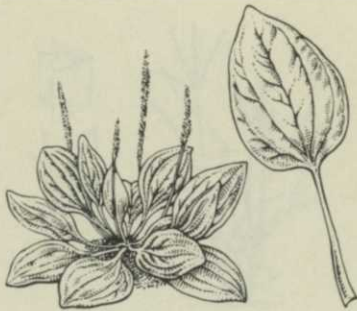
PERENNIALS live for three or more years and are especially difficult to control because they reproduce by vegetative means, by seed, or both. Perennials are often well-established before their presence is recognized. Examples are dandelion, yellow nutsedge, quackgrass, wild onion and garlic, torpedograss, and dallisgrass.

Perennials spread vegetatively by structures above and below the ground, called rhizomes, stolons, and tubers. These structures must be killed by postemergence systemic herbicides to effectively control perennials. Postemergence control is generally considered the most effective means of control, although preemergence herbicides can be used to stop perennials from spreading by seed.

TURF



Tall Fescue



Plantain (not Buckhorn plantain)



Ground Ivy



Quackgrass

Grass or broadleaf

A second distinction important to weed control is whether the weed is grassy or broadleaf. 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.

Grassy weeds include crabgrass, annual bluegrass, goosegrass, quackgrass and any turfgrass in the wrong place, such as bentgrass, tall fescue, bermudagrass or kikuyugrass.

Broadleaf weeds include dandelion, clover, ground ivy, chickweed, plantain and lambsquarter.

Grassy weeds

Annual bluegrass Persistent seedheads and blotches of heat-killed annual bluegrass make this a weed in the summer in the North and in the winter in the South. It thrives in well-fertilized, irrigated, low-cut turf. Its shallow roots and overdedication to seed production make annual bluegrass very vulnerable to high temperatures and drought. Not all types are annual, despite the name.

Bentgrass can encroach by stolons or seed into cool-season turfs consisting of Kentucky bluegrass, perennial ryegrass, and fine-leaved fescues. It has extremely small seed making it difficult to clean from contaminated lots of seed. Bentgrass is a major target of certified seed producers during production and cleaning. It is difficult to remove from lawns and must be controlled with a non-selective, postemergence herbicide such as Roundup.

Bermudagrass, like bentgrass, encroaches on other desired turfgrasses. A desirable turfgrass for the South, bermudagrass can be undesirable in other turfs. This extremely hardy grass can outperform other warm-season turfgrasses. It spreads by stolons and rhizomes. Bermudagrass goes

dormant and turns brown early in the fall in cooler climates, in contrast to cool-season turfgrasses which stay green into the winter.

Crabgrass is the predominant target of most turf weed control programs. It spreads by seed and by rooting at the lower nodes (where stem and leaf join). This pale green grass forms dense patches damaging the appearance of a lawn. Since it is an annual grass it can be controlled with pre-emergence herbicides.

Goosegrass is an annual grass sometimes called silver crabgrass. It is particularly troublesome in thinned turfs in compacted, wet soils. Preemergence control has been variable, but some of the newer herbicides hold promise for effective control. Goosegrass can be controlled with postemergence herbicides if these materials are applied in the early stages of its development.

Kikuyugrass is a serious problem on golf courses on the Pacific Coast. It spreads by seed and rhizomes at an amazing pace. The only control so far is non-selective postemergence herbicides.

Nutsedge is a major turf and crop weed. It is difficult to control because it is a perennial that spreads by seed and nutlets or tubers. Yellow nutsedge has a light-green to yellow-green color that contrasts with the color of the desired turfgrass. Purple nutsedge is a related species which is a serious problem in the South.

Postemergence herbicides are most effective for nutsedge control. BASF Wyandotte is promoting Basagran specifically for yellow nutsedge control. Repeat herbicide applications are necessary since no systemic herbicides are available for nutsedge in turf.

Quackgrass is a hard-to-control perennial that spreads vigorously by rhizomes. Quackgrass is often introduced during establishment when contaminated topsoil is used. No selective control exists. Quackgrass must be controlled using spot treatment with

a nonselective herbicide.

Tall fescue is a bunch-type grass with short, stubby rhizomes. It does not creep, like red fescue. This grass tolerates poor soils and has a low fertilization requirement making it more able to survive poor locations than Kentucky bluegrass or perennial ryegrass. Tall fescue is often used in low-maintenance sites where drought tolerance is important.

Tall fescue is difficult to remove from other turf stands it encroaches. Small infestations can be eliminated by digging them out. More extensive infestations require spot treatment with a non-selective, postemergence herbicide. Recent research has shown selective control may be possible for tall fescue in Kentucky bluegrass turfs. The products used in the research are not currently labelled for turfgrass use.

Wild garlic is a perennial grass-like weed that spreads by seed and underground bulbets. Some preemergence herbicides prevent its spread by stopping seed germination, but these materials have little or no effect on the bulbets. Postemergence, systemic herbicides are most effective for wild garlic control since they are readily translocated to the bulbets.

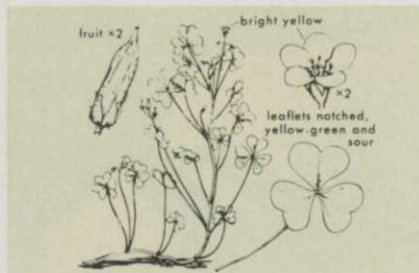
Broadleaf weeds

Black medic is occasionally confused with clover. Black medic is a winter annual. It is common throughout the U.S. and has small yellow flowers.

Buckhorn plantain is a perennial present in many low-budget lawns and mow-only areas of parks. Buckhorn has a taproot that defies hand weeding.

Common chickweed is a winter annual that is common growing in moist, shaded areas. It is succulent in growth, light-green in color and has small white flowers.

Mouse-ear chickweed resembles common chickweed in its spreading growth habit, but it is



Yellow Wood Sorrel



Speedwell



Spurge



Heal-all

perennial and has fuzzy leaves.

White clover is a perennial broadleaf weed with white to pink flowers. Its familiar-shaped leaves spread close to the ground.

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

Ground ivy is sometimes called creeping charlie. It is a perennial that persists on poorly-drained, shaded sites. A member of the mint family, ground ivy hugs the ground and produces a purple flower.

Henbit is taller than ground ivy with purple flowers and scallop-shaped leaves. It is a winter annual most noticeable in early spring.

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

Lambsquarter is a summer annual with light-green to gray-green foliage. It can be a severe problem in newly-seeded or infrequently-mowed turfs. Mowing helps control lambsquarter.

Plantain has broad leaves which lay flat on the surface of the

soil. This perennial sends up tall purple stalks containing seeds.

Red sorrel is a tenacious perennial with arrow-shaped leaves. It spreads by roots and rhizomes and can quickly overtake desirable turf weakened by acid soil or low fertility. Alkaline soils can discourage red sorrel.

Yellow wood sorrel is also known as 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 difficult.

Speedwell is an example of a plant that was introduced for use in rock gardens and subsequently escaped to become a weed. There are both annual and perennial types of this weed. White to purple flowers bloom above heart-shaped seedpods.

Annual types are controlled with pre- and postemergence herbicides. Perennial types are controlled with spot treatment of postemergence herbicides.

Spurge is a term used by turf managers for both prostrate and spotted spurge. Both contain spots on their upper leaves, milky sap in their branches, and have a spread-

