high-capacity, rotary mowing.

width, for excellent maneuverability in restricted areas.

Designed for long hours of dependable service, this unit features a 20-gallon fuel tank, enough for a full day of mowing. And, the rugged 78-hp Perkins diesel and radiator are mounted up front, out of the way of clippings and debris, protected by a removable screen, for clean, cool operation.

Plus, creature comforts like power steering, conveniently located controls, and the cushioned, shock-absorbing seat with backrest, minimize operator fatigue.

The HR-15. The long and the short of high-capacity mowing. From Jacobsen. For more information, or to arrange a free demonstration, contact your Jacobsen Distributor. Remember, lease and finance plans are available.

Jacobsen Division of Textron Inc., Racine, WI 53403.
Telex: 264428.

Circle No. 218 on Reader Inquiry Card
Ground Cover Characteristics - Characteristics of each ground cover are listed in common name category. Each number listed corresponds to a particular trait below.

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
<th>Height</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aegopodium podograria</td>
<td>Goutweed</td>
<td>14&quot;</td>
<td>White flowers-June</td>
</tr>
<tr>
<td>Ajuga reptans</td>
<td>Carpet bugle</td>
<td>3-6&quot;</td>
<td>Blue flowers-May colored foliage</td>
</tr>
<tr>
<td>Arctostaphylos uva-ursi</td>
<td>Bearberry</td>
<td>4&quot;</td>
<td>Red fall foliage and berries</td>
</tr>
<tr>
<td>Armeria maritima</td>
<td>Thrift</td>
<td>6-12&quot;</td>
<td>Pink flowers-May</td>
</tr>
<tr>
<td>Asperula odorata</td>
<td>Sweet woodruff</td>
<td>8&quot;</td>
<td>White flowers-May</td>
</tr>
<tr>
<td>Arenaria verna</td>
<td>Moss sandwort</td>
<td>2&quot;</td>
<td>White flower-May</td>
</tr>
<tr>
<td>Aurinia saxatilis</td>
<td>Alyssum</td>
<td>6&quot;</td>
<td>Gold flowers-April</td>
</tr>
<tr>
<td>Calluna vulgaris</td>
<td>Heather</td>
<td>10&quot;</td>
<td>Mixed flowers-summer</td>
</tr>
<tr>
<td>Cerastium tomentosum</td>
<td>Snow-in-summer</td>
<td>6&quot;</td>
<td>White flowers-June silver foliage</td>
</tr>
<tr>
<td>Convolvallia majalis</td>
<td>Lily-of-the-valley</td>
<td>6&quot;</td>
<td>White flowers-May fragrant</td>
</tr>
<tr>
<td>Cotoneaster horizontalis</td>
<td>Rock-spray cotoneaster</td>
<td>36&quot;</td>
<td>Red fall berries</td>
</tr>
<tr>
<td>Cytisus species</td>
<td>Broom</td>
<td>18&quot;</td>
<td>Yellow flowers-June</td>
</tr>
<tr>
<td>Epipedium species</td>
<td>Epipedium</td>
<td>9&quot;</td>
<td>Pink &amp; yellow flower</td>
</tr>
<tr>
<td>Erica carnea</td>
<td>Heath</td>
<td>12&quot;</td>
<td>Pink &amp; white flowers-May</td>
</tr>
<tr>
<td>Euonymus fortunei</td>
<td>Wintercreeper</td>
<td>3&quot;</td>
<td>Colored foliage</td>
</tr>
<tr>
<td>Festuca ovina</td>
<td>Ornamental fescue</td>
<td>18&quot;</td>
<td>Blue foliage</td>
</tr>
<tr>
<td>Hedera helix</td>
<td>English ivy</td>
<td>3&quot;</td>
<td>Varied flowers summer</td>
</tr>
<tr>
<td>Hemerocallis species</td>
<td>Daylily</td>
<td>18&quot;</td>
<td>Violet flowers-June unique foliage</td>
</tr>
<tr>
<td>Hosta species</td>
<td>Hosta, funkia</td>
<td>12&quot;</td>
<td></td>
</tr>
</tbody>
</table>

**Spacing depends on the type of plant, its size, and how quickly it will spread.**

**Improved landscapes**

Ground covers reduce maintenance while improving the landscape. Besides replacing turfgrass, they can be used on steep slopes to prevent erosion and eliminate mowing.

Small areas and wet locations where mowing is difficult, areas beneath shade trees, wooded areas, and spots with rock outcroppings are also suited to ground covers.

Ground covers play a large role in landscape design. Present day landscaping stresses simplicity. A few carefully selected plants may be widely spaced to create an interesting landscape, tied together as a unit by ground covers. The ground cover forms a green, horizontal mass that serves as a base or platform to trees and shrubs.

Ground cover can tie together the manicured and the informal, the mature and the newly-plant ed, and the various segments of the landscape.

Since ground covers discourage foot traffic, they can be used to direct the flow of pedestrians in and out of buildings or through parking areas. Some low-growing ground covers, such as sandwort, thrift, pearlwort, and thyme will even grow well between steppingstones, eliminating the need for weeding.

**Selection criteria**

When choosing ground covers, there are several items to consider—light, soil requirements, and desired maintenance levels to name a few.

Don't overlook foliage, for some are unusually colored and add certain highlights. These could include bronze or green-leaved ajuga, blue festuca, silver snow in summer, or purple wintercreeper.

Flowers-white candytuft, gold al yssum, pink creeping phlox, and blue ajuga-add needed color to the landscape.

Boston creeper has brilliant fall color, and cotoneaster has a fine display of berries.

The accompanying table outlines the characteristics of the most popular of the ground covers.

It may aid you in choosing plants woody plants will naturally be in evidence.
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SELECTIVE, PREEMERGENT
OF ANNUAL GRASSES AND
WOODY ORNAMENTAL

ACTIVE INGREDIENT:
Oxadiazon [2-tert-butyl-4,
5-isopropoxyphenyl]-\Delta^1-1

INERT INGREDIENTS

KEEP OUT OF REACH OF CHILDREN
STATEMENT OF PRACTICE
IF ON SKIN: Wash with plenty of water
IF IN EYES: Flush with water; Get medical help if needed.
See Side Panel for Additional Practice Information

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Monmouth Junction, N.J.

EPA Reg. No. 359-659
EPA Est. No. 0884

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When you're up against tough competitors like crabgrass and
goosegrass, play to win. Protect your golf turf with CHIPCO
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No other herbicide can match it for preemergent control.

No other herbicide can give you such excellent control for a
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major turf grasses — with no root pruning or inhibition. And it won't
harm nearby trees, ornamentals or ground cover either.

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CHIPCO RONSTAR G.

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hands on CHIPCO RONSTAR G herbicide.

Rhône-Pouënc Inc., Agrochemical Division, Monmouth Junction,
NJ 08852.

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Circle No. 151 on Reader Inquiry Card
Ground Cover Characteristics—Characteristics of each ground cover are listed in common name category. Each number listed corresponds to a particular trait below.

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
<th>Height</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iberis sempervirens</td>
<td>Candytuft</td>
<td>12&quot;</td>
<td>White flowers-May</td>
</tr>
<tr>
<td>Juniperus chinensis sargenti</td>
<td>Sargent juniper</td>
<td>6-12&quot;</td>
<td></td>
</tr>
<tr>
<td>Juniperus conferfa</td>
<td>Shore juniper</td>
<td>6-12&quot;</td>
<td></td>
</tr>
<tr>
<td>Juniperus horizontalis</td>
<td>Creeping juniper</td>
<td>6-12&quot;</td>
<td></td>
</tr>
<tr>
<td>Lamium species</td>
<td>Lamium, Nettle</td>
<td>6&quot;</td>
<td>Yellow &amp; pink flower colored foliage</td>
</tr>
<tr>
<td>Liriope spicata</td>
<td>Liriope</td>
<td>8&quot;</td>
<td>Purple &amp; white flowers variegated foliage</td>
</tr>
<tr>
<td>Mesembryanthemum</td>
<td>Ice plant</td>
<td>6&quot;</td>
<td>Varied flowers spring &amp; summer</td>
</tr>
<tr>
<td>Lysimachia nummularia</td>
<td>Moneywort</td>
<td>2&quot;</td>
<td>Yellow flowers-June</td>
</tr>
<tr>
<td>Myosotis scorpioides</td>
<td>Forget-me-not</td>
<td>4&quot;</td>
<td>Blue flowers-May</td>
</tr>
<tr>
<td>Pachysandra terminalis</td>
<td>Pachysandra, spurge</td>
<td>6&quot;</td>
<td>Insignificant flower</td>
</tr>
<tr>
<td>Phlox subulata</td>
<td>Creeping phlox</td>
<td>6&quot;</td>
<td>Pink flowers-May</td>
</tr>
<tr>
<td>Sagina subulata</td>
<td>Pearlwort</td>
<td>4&quot;</td>
<td>White flowers-summer</td>
</tr>
<tr>
<td>Saponaria ocymoides</td>
<td>Soapwort</td>
<td>3&quot;</td>
<td>Pink flowers-summer</td>
</tr>
<tr>
<td>Sedum species</td>
<td>Stonecrop</td>
<td>5&quot;</td>
<td>Varied-spring &amp; summer</td>
</tr>
<tr>
<td>Thymus vulgaris &amp; serpyllum</td>
<td>Thyme, Mother of Thyme</td>
<td>2&quot;</td>
<td>Rose flowers-May</td>
</tr>
<tr>
<td>Tiarella cordifolia</td>
<td>Foamflower</td>
<td>8&quot;</td>
<td>White flowers-May</td>
</tr>
<tr>
<td>Veronica officinalis</td>
<td>Speedwell</td>
<td>4&quot;</td>
<td>Blue flowers-summer</td>
</tr>
<tr>
<td>Vinca minor</td>
<td>Periwinkle, myrtle</td>
<td>3&quot;</td>
<td>Lavender flowers-May</td>
</tr>
</tbody>
</table>

1. SHADE Plants for low light conditions.
2. DRY SOIL Plants for poor, dry soil. These will generally become pests where growing conditions are good, so use them with caution.
3. WET SOIL Plants that will tolerate wet conditions and poor drainage.
4. RAPID INCREASE When funds are slim, time is tight and space is large, use plants that will grow rapidly and cover the ground in short period of time.
5. LOW GROWERS Plants for neatly trimmed areas close to buildings.
6. EVERGREENS Most desirable as they supply a green cover over the ground the entire year.
7. HIGH MAINTENANCE These will require extra care, such as trimming or pruning, so be prepared.
8. LOW MAINTENANCE Plants requiring little attention.
9. FOR SLOPES Those with a heavy root systems that will hold soil in place.
10. FOR THE SEASHORE Plants that will tolerate salt air.

Ground covers are beneficial wherever a uniform, growing carpet is needed without having to cope with the maintenance of turfgrass.

Planting
Even though you can plant ground covers throughout the growing season, early spring is the ideal time.

Spring plantings will be well established by winter, which will help protect them from freezing and thawing. Steep banks should be mulched with salt hay or straw until the ground cover is well established.

Spacing depends on the type of plant, its size, and how quickly it will spread.

One plant per square foot is a good rule for herbaceous material with further distance for larger woody plants. Closer spacing results in faster cover, but it is more costly. Small bulbs can be added when planting ground covers for spring color in between.

Once established, a ground cover needs little maintenance. Keep well weeded while growing, and weeding will not be needed in the future.

Watering and fertilizing requirements of most ground covers are low. Some plants may become aggressive and can be kept out of paths and turfed areas with brick or metal edgings. If they become overcrowed, they should be thinned out.

When a quick, temporary ground cover is needed, select an annual flower. The most reliable are sweet alyssum, portulaca, annual vinca, lobelia, annual candytuft, and annual phlox.

More information on ground covers is available free of charge from Bedding Plants Inc., a non-profit trade association that distributes information on the selection, planting, and care of annuals and perennials.

For your copy, send a self addressed, stamped envelope to Ground Covers, 210 Cartwright Boulevard, Suite W, Massapequa Park, NY 11762. WT&T
Bayleton.
Because beauty this fragile needs protection this powerful.

Every flower is unique. As unique as a snowflake, and just as fragile. Easy prey for the spoilers—powdery mildew and other fungus diseases.

To protect your precious plants, there is powerful ®BAYLETON 25 Turf and Ornamental fungicide. Nothing else works better or lasts longer.

BAYLETON works so well because it works systemically, inside the plant. And that means control is not only effective, but lasting—up to 30 days and longer.

To prevent or cure such diseases as powdery mildew, flower blight, leaf blight, and rust in both nursery stock and greenhouse plants, get BAYLETON. Powerful protection for fragile beauty. Always read the label before use.

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Box 4913, Kansas City, Mo. 64120

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Circle No. 136 on Reader Inquiry Card
THE PATCH DISEASES
At least 17 exist and the symptoms of some are similar. A positive identification is necessary for control and treatment.

by Dr. Houston Couch, Virginia Polytechnic Institute and State University

Turffgrass "patch" diseases are among the most difficult to diagnose.

The classic patch symptom pattern is characterized by the blighting of the majority of the leaves of the plants in a section of otherwise green turf.

At present, there are 17 known patch diseases of turfgrasses. Various members of this disease group occur throughout the year on both warm- and cool-season grasses (see Table 1). All of the complexities of diagnosis are highlighted within this group of diseases.

For example, some of the more dramatic symptoms associated with certain patch diseases can also be brought on by a variety of causes other than the pathogenic activity of microorganisms.

Plant stress caused by extremes in air temperatures, deficient or excessive soil moisture levels, improper mowing, or improper fertilization practices can also result in a browning of turfgrass in irregularly shaped patches.

In addition, the primary field diagnostic features for many of the patch diseases closely resemble each other. One symptom pattern, the "frog-eye" effect, is common to several of these diseases. It is roughly a circular area of blighted grass with a center of green, apparently healthy plants.

continued on page 90

Corticium red thread of Manhattan ryegrass.

Bentgrass infected with take-all patch.

Necrotic ring spot of Kentucky bluegrass.

Rhizoctonia yellow patch of Kentucky bluegrass.
PENNCROSS, PENNEAGLE AND PENNWAY have stepped up production to meet your demand

Over the years your demand for Penncross, then Penneagle, and now Pennway and PSU 126 creeping bentgrasses has risen with their increased popularity on tees, greens and fairways. We have planted more of the 'Penn Pals' to meet your demands, but like all good things, this production takes time. So, if in the meantime, someone offers to sell you something that's "almost as good," remember ... our production is up and coming!

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Penn Pals blue tags earn cash or prizes. Ask your distributor for details.

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Circle No. 156 on Reader Inquiry Card

APRIL 1986/WEEDS TREES & TURF 87
NOR-AM's TURF PRODUCTS DON'T SIMPLY NOURISH YOUR TURF... THEY PROTECT IT

Now achieve fine turf with fewer problems...thanks to NOR-AM's Total Turf Management Program. This unique program brings you a broad selection of high-performance products that assure healthier turf with better root development, fewer insect problems and less disease destruction.

As a service to the industry, NOR-AM has developed a Total Turf Management Program. This program includes a turf management calendar guide, brochures on turf diseases, insect control and fertilization techniques, in addition to timely turf management reports. To enroll in this helpful program, fill out the coupon below or contact your local NOR-AM sales representative.

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3509 Silverside Road
P.O. Box 7495
Wilmington, DE 19803
Attn: Communications Dept.

YES, I would like to be enrolled in NOR-AM's Total Turf Management Program. Please send me further information.

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Title
Address
City State Zip
Nitroform*  
Slow predictable release by soil bacteria provides constant 38% nitrogen when most needed for even, sustained growth. Nitroform reduces the risk of nitrate contamination, decreases thatch build-up, is nonburning and nonstreaking, resists leaching even in sandy soil, and assures better root development.

Turcam*  
An advanced broad-spectrum carbamate insecticide that controls white grubs, chinch bugs, sod webworms, mole crickets and many other turf and ornamental pests. Turcam is odorless, works well in spray equipment, won’t tie up in thatch, won’t damage turf or ornamentals, and should be your product of choice when long residual control is required.

Proxol*  
Economical Proxol 80SP Insecticide works fast on surface-feeding sod webworms, armyworms and cutworms, and readily penetrates thatch to control grubs. Proxol is easy to apply as a spray, has no unpleasant odor, and no long-term residual build-up in the soil.

Prograss*  
A selective herbicide that effectively controls annual bluegrass, crabgrass and other troublesome weed species.

Acti-dione*  
Broad-spectrum family of turf fungicides that provide four-season disease control. Acti-dione has proven to be effective without creating resistance problems. Acti-dione TGF* can be tank-mixed with Bayleton* or Daconil® to complement or improve disease control with significant cost-per-acre savings.

Banol*  
Specialized fungicide that controls pythium and phytophthora in turf and ornamental plants. Preventative control with Banol stops the spread of pythium by mowers, foot traffic and surface water; it also means fewer applications, lower rates and savings in labor, fuel and equipment.

IMPORTANT: Please remember always to read and follow carefully all label directions when applying any chemical.
At present, nine patch diseases are known to be capable of producing this type of symptom: spring dead spot of bermudagrass; fusarium patch; rhizoctonia yellow patch; necrotic ring spot; take all patch; pythium blight; fusarium blight; rhizoctonia blight, and sclerotium blight.

At times, a positive diagnosis of a patch disease can only be made after there has been a thorough review of the environmental conditions preceding problem development, an evaluation of the current management program for the grass (including mowing practices, fertilization rates and dates, watering practices, and the record of pesticide application), and a series of laboratory-based tests on diseased plant tissue and soil samples collected from the affected area.

In order to be successful in on-site identification of patch diseases, the identifier must:

1. Know what diseases could be occurring in the stand of grass at the time in question;
2. Be familiar with all of the primary and secondary field symptoms of each of these diseases;
3. Be able to recognize the particular field symptom patterns unique to each disease.

In this article we will review the key diagnostic features of the spring patch diseases of turfgrasses, highlight the weather and management conditions that favor their development, and give the control practices for each.

**Necrotic ring spot**

Necrotic ring spot is a newly recognized disease of turfgrass in North America, reported from the Pacific northwest, northeast, and north central sections of the U.S.

This disease is particularly destructive to Kentucky bluegrass and bentgrass, but also affects ryegrass, red fescue, tall fescue, and chewings fescue.

In the early stages of disease development, necrotic ring spot is seen as irregular patches of grass that have a general appearance of drought injury. The plants are often stunted or discolored, turning various shades of red, yellow or tan. These areas become dull tan to brown as the disease progresses.

The individual areas of dead grass are usually more or less circular in outline, and may range from a few inches to several feet in diameter.

When these patches first develop, the extent of leaf blighting within them is usually universal. However, many of the affected areas soon assume a distinctive "frog-eye" appearance.

At times, the initial sites of disease may coalesce to form large, irregularly-shaped zones of blighted grass.

Under weather conditions favorable for necrotic ring spot, reddish-brown borders may develop between the patches of dead plants and the adjacent healthy grass.

Also, the thatch may decompose rapidly in the patch areas, leaving depressions that give a "sunken pocket" appearance to the turf.

Necrotic ring spot is incited by *Lep-tosphaeria korrae*. Laboratory examination of the diseased plants reveal the dark brown strands (mycelium) of the fungus growing over the surface of the crowns and roots.

This can be a valuable aid to diagnosis, but must be used with some caution, for the fungus that incites take-all patch also produces similar structures on the root and crown surfaces.

Development of necrotic ring spot generally occurs during the cool, wet weather of spring and fall. During April and May, heavy outbreaks of the disease have been noted after prolonged periods of rainfall.

Field research reports from Washington and Wisconsin indicate that Chipco 26019 and Banner provide good control of necrotic ring spot, while Bayleton has been found to be ineffective in controlling the disease.

**Take-all patch**

Take-all patch (ophiobolous patch) affects Kentucky bluegrass, ryegrass, red fescue, tall fescue, and bentgrass. It is generally considered to be only a serious problem in bentgrasses.

New outbreaks, usually appearing in late spring, are characterized by dead spots of grass a few inches in diameter. Initially, under stress conditions, the leaves of affected plants may range in color from bronze to a bright reddish brown. Eventually, they fade to a light tan.

In time, these areas may increase to two feet or more in width, and develop "frog-eye" patterns as the centers are invaded by the more resistant grass species.

Ultimately, the roots of affected plants will rot. Therefore, during the final stage of disease development, the plants are easily pulled loose from the soil.

Outbreaks of take-all patch are most severe during periods of prolonged rainfall. The disease will usually first appear along drainage slopes, in low areas, or in locations where there has been excessive irrigation.

Although initial outbreaks usually occur during cool, moist growing conditions, often times the overall symptoms will continue to increase in severity during periods of stress from hot, dry weather.

Take-all patch is more severe when the soil is alkaline. The disease will be more prevalent on grass growing in soils that are light-textured, low in organic matter, or low or unbalanced with respect to nitrogen, phosphorus, and potassium.

Take-all patch is most severe on bentgrass that has been seeded on recently-fumigated soil.

Take-all patch is incited by *Gaeumannomyces graminis* var. *avenae*. This fungus produces dark brown thread-like strands (mycelium) on the surface of the diseased roots and lower leaf sheaths, serving as an aid in laboratory diagnosis. One must distinguish it from similar structures produced by the fungus that continued on page 96