LANDSCAPE AND TURF MANAGEMENT
Lesson 18: TURFGRASS

Segment One – Turfgrass Selection

Turf is an important component of most landscapes and the careful selection of turfgrass species and varieties is an important step in developing turf that will serve the purpose for which it is intended. The cost of grass seed or sod is low, considering how long the turf will be in existence and how much time and money will be spent on its maintenance. For prime results, the garden center employee should inform the customer to choose the best grass or grass mixture for the situation and purchase top quality seed.

Kentucky Bluegrass

Kentucky bluegrass is a principal turfgrass used in Minnesota. Adapted to a wide range of environmental conditions, it provides an attractive lawn when maintained under proper cultural conditions. Kentucky bluegrass is winter-hardy and capable of surviving drought. It is a cool season grass and is commonly used in the center and northern U.S.

Many varieties of Kentucky bluegrass are available. They differ widely in characteristics such as the shade of green, texture, density, environmental and cultural adaptation and disease susceptibility. The varieties of Kentucky bluegrass fall into two general groups, those susceptible to helminthosporium leaf spot and those resistant to it.

It is important to remember that Kentucky Bluegrass must be irrigated (1.5 inches/week including natural rainfall) and fertilized in order to do well in Minnesota and all across the country.

Maintaining a dense, healthy lawn is important in preventing erosion and its negative effects on surface water quality (i.e., lakes and streams).

Blends of Varieties

Using a blend of Kentucky bluegrass varieties is generally recommended for establishing turf. A blend is a combination of several varieties within the same species. A combination of three to five varieties is suggested to provide greater genetic variability, which improves disease resistance and the adaptation of turf grasses under different environmental conditions.

The performance of any variety or blend of varieties will depend to a large extent on how it is maintained. Many varieties of Kentucky bluegrass perform well when cultured

at a moderate intensity. As the cultural intensity is increased or decreased, fewer varieties are well-adapted. The quality of turfgrass can also be affected by disease, which is related to the mowing height irrigation practices, and fertilization rate. For example, low nitrogen rate, especially on closely cut turf, increases the tendency for the infestation of dollar spot. High nitrogen rates and close mowing, especially during spring, favor the incidence of fusarium blight and helminthosporium leaf spot on susceptible varieties. A sound understanding of these cultural techniques is essential in making recommendations about varieties of grass and management for your customer's lawn area.

Mixtures of Species

Mixtures are an alternative to single-species blends. Mixtures are combinations of two or more species and are often advantageous because they increase the range of genetic diversity and adaptive potential. Generally, some uniformity and quality is sacrificed by using mixtures. Table 1 summarizes information about some species and varieties that can be used for various lawn situations.

Kentucky bluegrass + fine fescue - Mixtures of Kentucky bluegrass and fine fescue are desirable for shady locations, where there is a wide range in the sunlight, for use on infertile, droughty soils, and for low-maintenance lawns in sunny areas. The fine fescues are not desirable in high traffic areas because of their slow recuperative ability.

Kentucky bluegrass + ryegrass - Ryegrasses are often found in seed mixtures. The rapid rate at which ryegrass seedlings are established makes a mixture of Kentucky bluegrass and ryegrass desirable where quick cover is needed for erosion control or where summer seeding is required. Improved, turf-type perennial ryegrass cultivars are more compatible with Kentucky bluegrass than the older cultivars because of their darker green color, finer texture, better mowing quality and improved winter-hardiness. The wear tolerance of improved perennial ryegrass is good. Mixed with Kentucky bluegrass, these varieties may be satisfactory on sport turfs and other high-traffic areas. The recuperative ability of perennial ryegrass is not as good as that of Kentucky bluegrass. Also, ryegrass does not tolerate extremes of heat or cold like Kentucky bluegrass.

Tall Fescue - Tall fescue is a very coarse-textured grass that is adapted to a wide range of environmental conditions. Its bunch-type growth habit and wide leaf blades are the major objections to its use where a high-quality turf is desired. Tall fescue has good resistance to heat, drought and wear and provides a satisfactory turf on sites that receive little care. Tall fescue is commonly recommended for low-maintenance home lawns, sport fields, playgrounds and other sites such as roadsides, airfields and grassed waterways. For home lawns, tall fescue should be seeded alone at high rates (6 to 8 pounds per 1,000 square feet) to ensure top quality. Be sure to select varieties that are hardy for Minnesota.

Turf type tall fescue - Recently available hybrids offering improved growth characteristics - finer texture and better color - combined with the good traits of tall fescue make these cultivars much more appealing for general use. Turf type tall fescue should not be blended with other species.

Segment Two – Establishing a Lawn

Many problems encountered in caring for a lawn can be avoided by paying close attention to certain procedures when the lawn is established. The following steps are important in developing a new lawn:

- Control weedy perennial grasses like quackgrass.
- Rough-grade the area to be planted so that it has the desired slope.
- Obtain an accurate and complete soil test.
- Apply lime or fertilizer as needed.
- Rototill or work the soil and incorporate organic material to a depth of 6 inches.
- Remove stones and other debris.
- Smooth-grade the area to achieve a uniform surface.
- Apply a starter fertilizer and rake it into the soil surface.
- Plant seed, sod or other vegetative materials.
- Rake the seed lightly, allowing some seed to remain on the surface.
- Mulch the seed with weed-free straw or other acceptable mulch.
- Water the seed and keep it moist until the grass plants are well established.

Preparing the Site

Perennial weedy grasses like quackgrass will reappear and detract from the appearance of the new lawn if they are not controlled prior to establishment. A single application of a suitable herbicide may be adequate to control most perennial grasses. Quackgrass, however, may require several applications of herbicide in conjunction with tilling to kill the subsurface rhizomes.

If the area requires extensive grading, remove the topsoil and store it nearby; the underlying subsoil can then be shaped to the desired contour. Generally, a 2 to 3 percent slope away from buildings is recommended for proper surface drainage. Organic matter can also be added. Steep slopes should be avoided if possible, since it is difficult to establish and maintain lawns on these areas. After rough grading, redistribute the topsoil uniformly over the site and allow some time for settling.

Soils

Poor soil preparation prior to lawn seeding or sodding is one of the major difficulties in establishing a good quality lawn. New housing sites may be compacted by heavy equipment and may be high in clay content. Compacted soils impede root growth, reduce water infiltration and limit air in the soil. Clay and subsoil are poor soils for a lawn. Clay soils usually are unsuitable because of poor aeration and drainage, sandy soils because of poor water and nutrient-retaining capacity. A sandy loam to loam soil is preferred, since turf grass quality is generally better and management requirements are less stringent. For most gardeners the problem will be one of using the existing soil. Most soils can be modified to improve their physical and chemical properties. To improve aeration and drainage and reduce the potential for compaction, soils high in clay should be amended with organic matter (peat, rotted sawdust, compost, etc.). Never add sand to clay; concrete will be the result.

Droughty, sandy soils may also be improved with the addition of organic matter. A 2-inch layer of sphagnum peat or compost, incorporated to a depth of 6 inches, may substantially improve the water-holding capacity of the original soil and also provide for better storage of essential plant nutrients. As an alternative, enough topsoil can be purchased to cover the existing soil by at least 6 inches. This is usually the most expensive method of soil amendment and may not be the best answer; it is generally better to amend the existing soil. Any additional soil purchase should be free of quackgrass rhizomes. If perennial weed grasses develop in the new lawn, they cannot be controlled selectively with the herbicides presently available. If top soil is added, be sure to cultivate to create a transition zone between the new topsoil and the existing soil.

Fertilization and Liming

Basic fertilizer materials include phosphorus (P) and potassium (K), which should be incorporated into the seed bed as the soil is being tilled. The garden center employee should advise the customer to take soil samples to determine the specific amount of each nutrient needed. Super phosphate (0-20-0) and muriate of potash (0-0-60) are suitable for correcting deficiencies in these basic nutrients. When soil test information is not available, a general recommendation is 1½ to 2 pounds of phosphorus and the same amount of potassium per 1,000 square feet. There is little value in incorporating soluble nitrogen deeply into the soil, since much of it may be leached out of the root zone before the turfgrass is sufficiently well developed to utilize it. Nitrogen is, however, required and is applied on an annual basis to maintain good quality turf; 1 pound of actual N per 1,000 square feet each year is typical minimum recommendation.

The ideal soil pH for most turf grasses is 6.0 to 7.0. Liming to raise the pH of acid soils should be based on soil test results. Avoid excessive application rates, as too much lime may be more detrimental than too little. If lime is added, incorporate it with the basic fertilizer materials, using a drop-type spreader.

The first step in the actual preparation of the planting bed is to rototill the soil to a depth of at least 6 inches. Next, rough-grade the seedbed to make it as uniform as possible. Unless desired and planned for infiltration of stormwater, low spots or depressions tend to collect water and remain wet longer than the surrounding area. High spots, because they tend to dry out faster, may show symptoms of wilting sooner than adjacent areas. Careful attention to final grading reduces the problems of maintaining lawn areas.

A commercial “starter” fertilizer should be applied using a spreader at this time according to directions on the package. The fertilizer may be raked into the soil surface along or with the grass seed.

Seeding

The best time to seed a lawn in Minnesota is between August 15 and September 15. If seeding cannot be done by October 1, postpone the job until winter (dormant seeding) or spring. The earlier in the spring a seeding can be made, the better the chances for success. Winter seedlings will not germinate until spring.

Sow the seed evenly with a spreader. An even distribution is more likely if half of the seed is applied in an east-west direction and half in a north-south direction. After seeding, rake the area lightly to partially cover the seed and achieve good soil/seed contact. Not more than 1/4 inch of soil should cover turf grass seeds. The seeded area should be rolled lightly to firm the surface and to provide improved contact between the seed and the soil.

Apply mulch to stabilize and reduce drying of the seedbed and to provide a more suitable environment for germination and early seedling development. By stabilizing the soil, mulching also helps reduce erosion due to wind or rain. Straw is more commonly used and should be spread uniformly over the seeded area at the rate of 50 pounds (1 bale) per 1,000 square feet. The straw should be free of weed seeds and weedy perennial grass parts (i.e., rhizomes).

Frequent light watering when necessary will hasten germination and in three to four weeks the frequency of watering should be reduced.

Sodding

An alternative to seeding is the installation of sod. This can be done at any time during the growing season following soil preparation. The sodbed should be prepared in the same manner as a seedbed. Sod pieces should be laid with the edges fitted snuggly together and the ends staggered so that there will be no cracks in the surface. The sod should not be stretched excessively, as this may result in shrinkage and openings in the

surface during drying. Once in place, the sod should be rolled to ensure good contact with the underlying soil. This will remove air pockets, which cause drying of the roots. On steep slopes the sod should be pegged in place so it won't slip. The newly sodded lawn should be watered thoroughly immediately after laying. Water daily thereafter, to maintain adequate surface moisture during the rooting period of two or three weeks. Sod is generally only recommended for sunny location as only grass varieties that require full sun are typically used in sod production. For shady areas, choose a seed mix designed for shade.

Segment Three – Fertilizing a Lawn

A regular lawn fertilization program is necessary if your customers expect to maintain a good-quality lawn. Dollar for dollar, fertilization, primarily nitrogen, will do more to improve poor-quality lawns than any other single management practice.

Nitrogen is the fertilizer nutrient to which turfgrass is most responsive. Nitrogen produces the green color and plant density necessary for good-quality lawns. Nitrogen is available in two basic forms for lawns: water soluble and slow release forms. Water-soluble nitrogen is quickly-available nitrogen that is found in materials like ammonium nitrate, ammonium sulfate and urea. Many of the common lawn fertilizers contain all or a certain percentage of water-soluble urea. These materials provide a quick color and growth response after application and are the least expensive nitrogen fertilizers, but they have a high potential for causing chemical burn of the grass if not applied carefully. Over application of these fertilizers causes excessive growth and can cause serious lawn problems.

Slowly available forms of nitrogen like natural organics (e.g., Milorganite) and synthetic organics (UF, IBDU and sulfur-coated urea) are found in several lawn fertilizers. These materials break down slowly so that nitrogen becomes available to the grass gradually. Although more expensive per pound of nitrogen than the quickly available forms, the slowly available forms provide greater margin of safety because they do not readily cause chemical injury to grass. Care in their application is still, however, required. In addition, the gradual release of nitrogen provides for a uniform turfgrass growth rate and has potential benefits for the environment.

The ideal fertilizer program should provide uniform growth over the entire growing season. The relative amounts of water-soluble nitrogen and water-insoluble nitrogen in a fertilizer are very important in determining how such a program works. The water-soluble fertilizers are immediately available to plants. Plant response is usually a sudden flush of growth and a rapid depletion (4 to 6 weeks) of the available nitrogen. Thus, it will be necessary to make frequent light applications of these materials in order to obtain uniform growth over a long period of time. Water-soluble nitrogen should be applied in moderate amounts during mid-spring, after the grass has resumed growth

and during the late summer to early fall to mid-fall period. Water-insoluble fertilizers release most of their nitrogen over relatively long periods. This permits the user to apply heavy applications of these materials at less frequent intervals. Slowly available fertilizers can be applied at rates of 1-2 pounds of actual nitrogen per 1,000 square feet but no more than 1 pound of actual N should be applied in one application.

Soil Testing

Soil should be tested by a reputable laboratory every three to five years. The results will indicate whether deficiencies of phosphorus or potassium exist in the soil, and if so, how much of these nutrients should be supplied to the soil.

Select a dozen or more small soil samples from various parts of the lawn using a narrow garden tool or soil probe. Do not take all the soil from one spot. In an established lawn, extract samples to a depth of 3-5 inches. Mix all samples, air dry and send approximately half a pint of soil to the testing laboratory. The local county extension service can advise gardeners as to the availability of soil testing labs.

Soil tests also usually determine soil pH. This indicates whether lime or sulfur should be applied to correct for soil acidity or alkalinity - a factor that can influence nutrient uptake and reduce the benefits of fertilization. Do not apply lime or sulfur without a soil test.

Segment Four – Maintaining a Lawn

Lawn Mowing

A quality lawn requires regular mowing at the proper cutting height with suitable equipment. Proper mowing is essential to developing and maintaining a dense, uniform lawn surface and can effectively reduce the number of weeds that may invade a lawn.

GRASS TYPE	CUTTING HEIGHT
Kentucky bluegrass	1 ½ to 3”
Fine Fescue	2 to 2 ½”
Perennial ryegrass	2 to 2 ½”
Tall fescue	2 ½ to 3"
Zoysiagrass	½ to 1"

Turfgrass, like other plants, must manufacture sugars through the process of photosynthesis if it is to survive and grow. This process occurs mainly in the leaves of the plant. Turfgrass cut at low heights cannot sustain the rate of photosynthesis necessary to produce enough food to maintain plant vigor. The short mowing height

weakens the turf and increases susceptibility to weed invasion, insect damage and injury from drought and temperature extremes.

It is advantageous to raise the cutting height slightly in the summer. Higher cutting heights increase the leaf surface area available for food production (photosynthesis) and provide an insulating or shading effect on the basal portion of the plant and soil. Lower cutting heights increase the likelihood of high soil temperatures that can result in leaf browning and death of the root system.

Cutting height and rate of growth, rather than fixed time intervals, should determine mowing frequency. The landscape professional should recommend to the customer not to remove more than a third of the total foliage at any one mowing. For example, if the selected mowing height is 2 inches, the grass should not grow to more than 3 inches before it is mowed. Removing more than a third of the foliage results in an open, stemmy appearance of the lawn, weakens the plant and may reduce root growth.

Lawn Watering

Adequate water is essential for maintaining optimum growth, density and color. Natural rainfall is generally adequate during the cool spring and fall periods; however, extended drought periods during summer may cause the grass to wilt and turn brown. Although it may look unattractive, a lawn that is brown and dormant in summer will usually recover with the return of colder weather. Irrigation is required during extended dry periods.

If a high-quality appearance is desired throughout, however, the season, the lawn should be watered as soon as the grass shows signs of wilting. Apply enough water to moisten the soil to a depth of at least 6 inches. This is roughly equivalent to applying an inch of water. The amount of water supplied can be measured by placing containers within the area covered by the sprinkler.

Light, frequent watering leads to deterioration of the lawn because of shallow-rooting and increased disease pressure, weed development and insect damage. Once a lawn becomes shallow-rooted, it is even more susceptible to water stress. In addition, under a light, frequent watering program, the grass develops a more lush soft growth that lowers its tolerance to heat and water stress.

Morning or midday watering is preferred for home lawns; every morning is best as evaporative losses are reduced. This minimizes disease activity, since water remains on the leaf surface for only a short period of time. Late-day watering permits free droplets to remain on the leaf surface for an extended period of time. This increases the potential for disease activity. A disease of older or common-type Kentucky bluegrass, called leaf spot or melting-out, is more severe with light, frequent and late day watering. Hand sprinkling of the lawn lightly during the evening hours of the summer is one of the major causes of lawn disease problems.

Shade Management

Portions of most lawns are subjected to partial shading. Shaded turf is usually less dense, shallow-rooted, prone to disease injury and more susceptible to environmental stress. A mixture of shade-tolerant Kentucky bluegrass and fine fescue is recommended for lawns with some shade. The fine fescue mixture should be over seeded where turf in the shade is thin.

Modification of the cultural program may improve turfgrass quality in shaded areas. Suggestions include raising the height of cut, reducing fertilization and irrigation and providing disease control when necessary. In addition, it is very important to prune low tree branches to allow maximum light to reach the turf, but avoid excessive pruning for this purpose. Instead, choose a shade tolerant grass mix or use a shade tolerant ground cover as an alternative to turf in shady spots. Tree leaves should be raked and removed quickly during the fall season to increase light reaching the turf.

Lawn Weed Control

The use of adapted turfgrass species and varieties, adequate fertilization, proper mowing practices, good watering practices and insect and disease control will produce a dense lawn that will seldom be invaded by weeds. Yearly occurrence of weeds in a lawn indicate that one is doing a poor job of lawn maintenance or that the conditions simply aren't conducive to turf (too shady, etc.).

The two major groups of weeds that can be effectively controlled by herbicides are annual grasses (e.g., crabgrass) and broadleaf weeds (e.g., dandelion). These weed groups are controlled by entirely different herbicides. Therefore, the landscape professional must know the weed to be killed; then he can select the correct herbicide. Customers should be encouraged to bring in weed samples for proper identification.

ANNUAL GRASSES - Crabgrass, goosegrass and foxtail are annual grasses commonly found in lawns. They germinate during the spring and early summer and die out with the first frost in the fall. Poorly maintained lawns may appear to be completely taken over by annual grasses by midsummer. The most common annual grass in lawns is crabgrass, and many commercial herbicide products are available for controlling this weed. Pre-emergence herbicides are applied in spring before the appearance of annual grasses in the lawn; these herbicides persist in the soil for several months and control crabgrass and other annual grasses throughout the growing season. Post-emergence herbicides are applied after the weeds germinate. At least two applications about a week apart are generally required for complete control. These herbicides may cause some discoloration of the desirable grass, but the injury is usually short-lived.

BROADLEAF WEEDS - Dandelion, plantain, white clover and ground ivy (Creeping Charlie) are common broadleaf weeds found in lawns. Most broadleaf weeds can be controlled selectively in lawns with post-emergence applications of herbicides. These chemicals are best applied during cool weather in spring or fall when the grass and weeds are actively growing; treatments during hot weather may injure the lawn.

PERENNIAL GRASSES - Other weeds that commonly occur in lawns are the perennial grasses such as tall fescue, quackgrass, timothy, bentgrass, bermudagrass and nimblewill. Currently there are no herbicides that will selectively control perennial grasses without damaging the lawns. Isolated clumps or patches of perennial grasses can be removed with a shovel or pulled by hand. It is important that all plant parts are removed so the weed won't grow back. An alternative method is spot treatment with a non-selective herbicide that will kill all the vegetation that the spray contacts. Glyphosate, (Roundup and other products) is an example and seeding or sodding can be performed within days after application. A minimum of three days should be allowed for adequate translocation of the herbicide within treated areas before tillage or cultivation operations are performed.

Thatch

Thatch is a tightly intermingled layer of living and dead stems, leaves and roots of grasses that develops between the layer of green vegetation and the soil surface. Thatch will develop more rapidly on a vigorous, high-quality lawn than on a low-quality lawn. Thatch accumulation is undesirable because; it increases disease-susceptibility of the grass; reduces tolerance to drought, heat and cold; restricts rooting into the soil below; increases certain insect problems; impairs the movement of some pesticides and reduces the lawn's capacity for vigorous growth.

Thatch on small areas can be controlled by vigorous hand raking with a stiff garden rake or dethatching rake. Various types of machinery for removing thatch are available for larger areas. The machines employ vertical knives or tines mounted on a power-driven reel to cut and physically extract organic debris from the lawn. Dethatching machines can be obtained from local equipment rental stores.

Thatch should be removed when climatic conditions favor rapid grass recovery. In Minnesota the preferred period is late summer. Cool, moist weather that follows will enable the grass to recover quickly. Dethatching can also be done during the early spring just prior to the period of rapid leaf growth. It is best to avoid severe dethatching in late spring, as this opens the lawn to invasion by crabgrass and other annual weeds.

Various products containing enzymes, yeasts, bacteria, etc. have been advertised in recent years for thatch control. They have not significantly reduced thatch problems and are not currently recommended.

Lawn Renovation

The best way to increase turf density is by proper fertilization and maintenance. Seed added to existing lawns is usually wasted unless it is preceded by cultivation. Dethatching machines can be used to cut grooves into the sod so that the seed may be placed in contact with the soil for more favorable growth conditions. Seed-soil contact is critical for successful establishment. Use the following procedure on thin lawns:

- Mow the lawn.
- Selectively cultivate to slice through the sod (e.g., dethatching machine).
- Spread quality seed uniformly.
- Rake or drag to improve seed/soil contact.
- Irrigate regularly until established.

Bare areas of about six inches or more in size may be reseeded by raking, spreading seed, lightly raking again and keeping the area moist. A similar grass mixture to that prevalent in the lawn should be used. Pieces of sod taken from inconspicuous areas and placed in small bare spots may be better than seed.

When problems maintaining good quality turf arise, consider why the turf isn't performing well before taking remedial actions. All turf in Minnesota requires some level of maintenance (irrigation, fertilization, mowing, etc.) but Kentucky Bluegrass has the highest requirement for maintenance and must be irrigated and fertilized to perform well.

Regardless of the type of turf, if the conditioned aren't right for grasses, you can't maintain your way out of the problem; e.g., no amount of water and fertilizer will make up for insufficient light. In such cases, consider alternatives to turf.
