H-1170

Turfgrass

Establishment and **Maintenance** for **Home Lawns** and **Athletic Fields**

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The diversity of turfgrasses available means we have a selection to meet almost any need. They can be used to control erosion and filter out non-source pollution, protect the home from fire hazards, help control vermin problems, provide an aesthetic canvas for other landscape plants, allow a golfer to sink the perfect putt, and help the athlete perform at their best without fear of non-contact injury.

Grasses cover a greater portion of the earth's surface than any other plant material. North America is the natural habitat for approximately 1400 species, with hundreds of them thriving in our Great Plains environment. For turfgrass culture in our region, however, we are working with fewer than a dozen different species for home, recreational, athletic, and roadside use. Our society insists on high-quality environments for work, play, and relaxation, and the right turfgrass, properly maintained, will help meet that expectation.

The grass that is suitable for the home lawn isn't necessarily the best one for use on athletic fields. The grass that thrives on athletic fields may also be a poor choice for roadsides or parks that have dappled shade from mature trees. Generally, for all areas in the northern Great Plains, cool-season grasses predominate for most purposes. The warm-season grasses that are winter-hardy are used in low-maintenance or low-water-requiring sites (generally referred to as "xeric" landscapes).

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Reviewed and Reprinted MAY 2009
May 1999

Home Lawns

Grasses Suitable for Home Lawns

The grass species used for home lawns include many cultivars of Kentucky bluegrass, red fescue, chewings fescue, hard fescue, tall fescue, and perennial ryegrass. These are grasses that are most attractive and grow vigorously during the cooler months of spring and autumn. For the home lawn, mixtures are often the best choice, with the Kentucky bluegrass cultivars making up 55 to 60% of the mixture, followed by a cultivar or two of red fescue (30-35%), with perennial ryegrass (10-15%) making up the smallest portion. Generally, after a year or two, perennial ryegrass is crowded out by the more aggressive Kentucky bluegrass. Avoid the "bargain mixes" that have annual or Italian ryegrass (*Lolium multiflorum*) as a component. The coarse grass blades, rank growth, and yellowish-green color do not make a good mix for even temporary mixing.

Kentucky bluegrass is the most adaptable cold-hardy, cool-season grass species to use for home lawns. It has excellent recuperative and competitive capacity. The rhizomatous nature of Kentucky bluegrass allows it to virtually repair itself, a quality that is lacking in most grasses. Red fescue also produces rhizomes, but it lacks the extensive recuperative potential of Kentucky bluegrass. Red fescue is sometimes referred to as creeping red fescue.

Perennial ryegrass and tall fescue are not as cold hardy as Kentucky bluegrass. Care should be taken in choosing cultivar selections of these two species. Only cultivars that have proven winter hardiness in turfgrass trials should be selected.

Buffalograss (*Buchloe dactyloides*), a warm-season stoloniferous species, is often used in conjunction with blue grama grass (*Bouteloua gracilis*) as a xeric lawn. Seed of buffalograss is expensive and a successful planting is difficult to establish. It stays dormant until the temperatures warm consistently and goes back into dormancy when the temperatures drop to the low 40s. It is the only grass species that is dioecious (male/female plants). It establishes rather quickly from plugs when provided with supplemental irrigation and hand weeding. Blue grama is also a warm-season grass.

Cultivar Selection

The following recommended cultivars have been evaluated in NDSU turfgrass trials at either Fargo, Dickinson, or Carrington. Kentucky bluegrass cultivars are divided into two broad classifications, improved (high-maintenance) or common (low-maintenance). In some instances, the improved cultivars were found to be adaptable to both high-maintenance and low-maintenance inputs. Generally, the cultivars that are classed as high-maintenance need supplemental irrigation and scheduled fertilization (two to three times per growing season) to perform and look their best. The common types receive no supplemental irrigation and are allowed to enter dormancy during the summer and recover when rainfall and cooler temperatures return in late summer or early autumn. For a xeric landscape setting, select the common cultivars of Kentucky bluegrass.

Kentucky bluegrass (*Poa pratensis*) **cultivars recommended for high- and low-maintenance areas**

High		Low
Glade	Parade	Kenblue
Ram-I	Nassau	S.D. Common
Merit	Harmony	Plush
Bristol	Welcome	Park
Touchdown	Trenton	Ram-I
Victa	Baron	Fylking
Adelphi	Nugget	Victa
		Barblue
		Monopoly
		Parade

Fine fescue species/cultivars that have shown low maintenance tolerance (1- rhizomatous, 2 - tufted or bunch grass)

Botanical Name	Common Name
1 - *Festuca rubra* 'Dawson'	Dawson Red Fescue
1 - *Festuca rubra* 'Pennlawn'	Pennlawn Red Fescue
1 - *Festuca rubra* 'Cindy'	Cindy Red Fescue
1 - *Festuca rubra* 'Ruby'	Ruby Red Fescue
2 - *Festuca rubra* var. *fallax* 'Jamestown Chewings'	Jamestown Chewings Fescue
2 - *Festuca brevipila* 'Scaldis'	Scaldis Hard Fescue
2 - *Festuca brevipila* 'Reliant'	Reliant Hard Fescue
2 - *Festuca ovina* 'MX-86'	MX-86 Sheep Fescue

Perennial ryegrass (*Lolium perenne)* **cultivars recommended that have shown good winter survival in North Dakota trials. All are bunchgrasses.**

Dandy	Goalie
Dimension	PS-8990
Gettysburg	Stallion

Tall fescue (*Festuca arundinacea)* **cultivars recommended that have shown good quality and winter survival in North Dakota trials. All are bunchgrasses.**

Amigo	Rebel Jr.
Arid	Rebel II
Bonanza	Wrangler II

Establishment and Maintenance of Home Lawns

Soil Preparation

Make sure the area is free of rhizomatous weeds like quackgrass (*Elymus repens*) or Canada thistle (*Cirsium arvense*). If such weeds are present, make sure a complete kill is achieved using glyphosate (Roundup) applications prior to seeding or sodding. This may take more than one application to be successful, so allow sufficient time prior to grass establishment.

Whether seeding or sodding, proper soil preparation is necessary to reduce maintenance problems later on. The topsoil should be spread at a constant depth, to match the original contours of the subsoil (or roughgrade). Once the contours of the finished grade are established, do not add additional topsoil, as this would alter the movement of water through the soil profile. Any fertilizer needed, based on soil test results, should be mixed into the topsoil.

Establishment of a lawn by seeding is a task that should not be taken lightly. Purchase only the highest quality seed available on the market with known species and cultivars adapted to this region. Determine the seed quality by noting the germination and purity percentages — the higher the better. For example, if a seed label containing 'Kenblue' Kentucky bluegrass, has a purity of 97% and a germination of 89%, the pure live seed (PLS) percentage would be over 86% (0.97 x 0.89 x 100 = 86.3%). The higher the PLS percentage, the higher the quality of the seed.

Timing is very important when establishing turf by seed. In the Northern Plains the best time is mid-August to mid-September. The warm days and cool nights are ideal for germination and seedling growth, with greatly reduced weed competition when compared to spring seeding. Weed invasion is the major problem when establishing turf by seeding, although annuals will be killed by fall frosts. Control of annual grass-type weeds like crabgrass, foxtails, and barnyard grass can be attained with the preemergence herbicide Siduron (Tupersan) at seeding without any detrimental effects on the desirable grasses.

It is a good idea to have the soil tested prior to either the initial seeding or a renovation seeding. Request a form and soil test bag from the NDSU soil testing lab, and have the pH, N,P,K, organic matter content, and electrical conductivity (EC) tested. This will cost about $20. It provides an excellent snapshot of the fertility status of the soil at the time of sowing, and helps determine whether any additional nutrients are needed.

If no soil test is done it is a good practice to apply a "starter fertilizer" during seedbed preparation. Such a fertilizer will have an analysis similar to 16-25-12 (N,P,K) where the major element is phosphorus, which aids in seedling development, but does not overstimulate foliage growth. Till and rake the area to be seeded to create a gradual slope that will carry surface water slowly to the perimeter of the area, preferably to a grass swale away from the house.

Tilling will leave the topsoil too soft. Once the final grade is established, it is advisable to lightly roll the area with a half-filled ballast roller to firm it up. The surface should leave a footprint, not a hole where one has stepped.

Seeding Correctly

Turfgrass seed mixtures are made up of different species of seed, typically Kentucky bluegrass, red fescue, and perennial ryegrass. Seed blends consist of one grass species but two or more cultivars such as 'Adelphi' and 'Glade' Kentucky bluegrass. Although differences exist among cultivars, on average Kentucky bluegrass has about 2.1 million seeds per pound, while red fescue has 0.546 million, and perennial ryegrass has 0.227 million seeds per pound. Therefore, to have the same number of seeds of each species, a much higher seeding rate of perennial ryegrass is needed.

Seed Mixture	lb/1,000 sq.ft.	lb/acre
100% Kentucky bluegrass	1–1½	45–65
20% perennial rye + 80% Kentucky bluegrass	2–2½	85–110
50/50% perennial rye & Kentucky bluegrass	3–3½	130–150
50/50% red fescue & Kentucky bluegrass	2½–3	110–130
100% red fescue	3–4	130–175
100% tall fescue	6–8	260–345

It is a good practice to divide the total amount of seed to be used in half and seed in directions perpendicular to each other.

Once the fertilizer and seed have been spread, lightly rake to slightly cover the seed. Rolling with a light ballast roller will help firm the soil around the seed, facilitating better establishment. Many grass species require light for germination. Do not cover with more than a quarter inch of topsoil.

Keep the soil surface moist (not soaking wet!) to prevent drying out during germination. It is a good practice to mulch the seeded area with either hydro mulch (virgin wood fiber) or clean straw to help conserve moisture and prevent runoff during heavy rains. Perennial ryegrass will germinate in about five to seven days, red fescue in about 12 to 14 days, and bluegrass in about 14 to 22 days.

Maintenance

Begin mowing as soon as the grass has grown to a height of about 3 to 3½ inches. Mow at no lower than 2½ inches. Try to avoid making any sharp turns on the new grass during the first few mowings. Mow as often as necessary to keep from removing any more than one-third of the grass blade length at one time. This will help the grass to tiller and thicken into a healthy, attractive turf.

Broadleaf weeds will appear among the emerging grass seedlings. After three or more mowings, a post-emergence herbicide can be applied that will provide control (see Extension circular H-1009 revised, "Weed Control In North Dakota Lawns").

In subsequent seasons, the turfgrass will respond to the care it receives. Neglect will result in a somewhat thinner, weedier lawn that does not complement the property or landscape. Regular mowing on an as-needed basis is the most important on-going maintenance operation. Select the mower suited to your property size (see Extension circular H-1034 revised, "Looking Over Lawn Mowers"). Be sure the blade is kept sharp!

Fertilization on common, low-maintenance lawns is best done around Labor Day weekend, at a rate of 1.0 pound of nitrogen per 1000 square feet. A 50 pound bag of 28-3-10 would have 14 pounds of actual N and would cover 14,000 square feet at that rate. With high-maintenance lawns that are under irrigation, generally two to three fertilizations are made. In the fall, around Labor Day, in the spring, around Memorial Day, and in the summer around July 4. An alternative date for the third application is around Columbus Day (October 12).

Fertilizers come in two basic forms — water soluble nitrogen (WSN) and water insoluble nitrogen (WIN). The fall and spring forms should have about 30 to 35% of their nitrogen coming from WIN sources, and the July or October application should be essentially 100% organic source.

Sodding

Many new homeowners arrive to a freshly sodded lawn, or they are given the option to have their lawn installed by sodding. There are a number of advantages to sodding. First, the battle with weeds is instantly over (assuming high-quality sod). Next, the total water consumption to get the sod established is much lower than that of a seeded lawn. Mud being dragged into the house is eliminated and the need for pesticides is greatly reduced. If a monetary value is assigned to the effort and time required to establish a seeded lawn, the cost is nearly break-even with having sod professionally installed.

One of the disadvantages of sod is that it is often grown on soil that is different from that found on your property. This creates an interface problem which can inhibit adequate root penetration into the new soil. A remedy for this would be to core aerate after the first year for at least three years in a row, and either pick up the cores, pulverize them with a power rake, or allow them to break down slowly over the next three to five weeks. The effect of this procedure is to stimulate the root system of the sod to "knit" into the soil better and reduce disease problems that are inherent with sodded lawns.

Thatch Control

Power raking the lawn is a time-honored practice that is often unnecessary. The homeowner usually starts too early, tackling the task with a rental unit as soon as the frost is out of the ground and before the grass has a chance to grow. This sets the stage for germination of weed seeds in the lawn. Wait until the grass has begun growth ("greened-up"), then set the tines to just impact the soil surface or thatch. This will clean the lawn of debris and the raking action tends to aerate and dry the soil. The soil then warms more quickly and the grass is stimulated to grow faster.

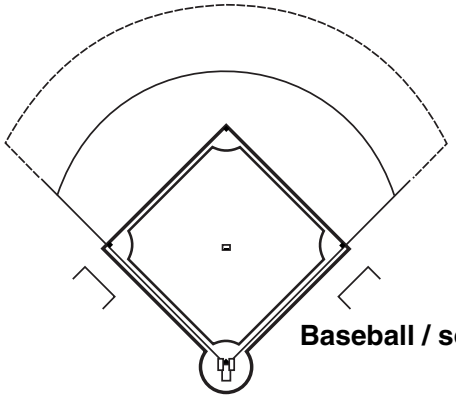
If the lawn has a thatch problem, where thatch is greater than ½ inch thick, set the tines of the power rake deeper, to slice through the thatch. This will pull up mounds of debris which will require ample time to rake up after the raking is completed. If the thatch is extremely thick, the removal will require a reseeding after the raking is done and the debris has been removed. Anytime a dethatching operation removes more than 50% of the desirable grass species, a reseeding is required.

Renovation Procedures

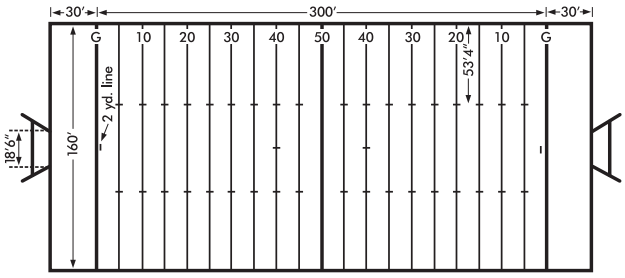
As the landscape matures, trees and shrubs that had little influence on the turfgrass are now shading the grass and causing it to thin out. Also, over the many years of maturation, repetitive traffic patterns may have compacted the soil to the extent that it is impossible to grow grass in such areas. Under these conditions, if more than 50% of the desired grass is gone, a renovation is needed.

First, get rid of the weeds and existing grass with a non-selective herbicide like glyphosate (Roundup). Next, mow the dead vegetation as short as possible and collect the clippings. Then dethatch with a power rake, going in two directions diagonal to each other. Remove all debris, apply a starter fertilizer, and broadcast the appropriate seed. Use a mixture high in red fescue if the area is shady, or use a more wear-tolerant grass like tall fescue where continuous traffic or activity occurs. Then follow the procedure for turfgrass establishment from seed.

Athletic Fields



Baseball / softball field



Football field

Athletic Fields

Athletic Field Establishment

With the exception of highly modified soil systems such as Prescription Athletic Turf (PAT), the basic procedures for athletic field establishment are the same as for those outlined for home lawns. The major difference would be in selection of turfgrass cultivars, as the desire would be to have fast establishment and quick recovery from physical activity. Most athletic fields (football, soccer, baseball, etc.) use a combination of Kentucky bluegrass and perennial ryegrass in a 50/50 mix by weight. As with home lawns, if low maintenance is budgeted, then the use of common cultivars is suggested. Where the system is going to get intensive maintenance, then a combination of three or more elite cultivars of Kentucky bluegrass and two to three cultivars of perennial ryegrass should be used. Seeding rate is carried out at the higher end of the recommendations.

Seed Priming and Pregermination

Athletic field managers and golf course superintendents who are under pressure to get turf established quickly from seed will often resort to one of these two practices. The basic procedures are the same for both processes, except that in seed priming the radical never emerges from the seed coat. The priming process also utilizes various salt concentrations or polyethylene glycol to limit the amount of water that can enter the seed.

Pregermination is the soaking of seed in water that is changed daily until the root radical is just visible. If done properly, both the priming and pregermination techniques stimulate emergence of seedlings in as short as 10 days in slow-to-germinate species like Kentucky bluegrass. It will also cut down on the incidence of pythium in the seedling stand. Seed that has been pregerminated needs to be planted immediately to prevent drying out while primed seed can be dried and sown days later if necessary.

The same process is approximated in nature with a practice known as dormant seeding. Under dormant seeding conditions, the seed is sown late enough in the season so that there is little chance of complete germination taking place. It is done before the ground freezes (keeping track of weather conditions, but around late October or early November). The seed imbibes the moisture from the late autumn rains or early wet snowfalls, but does not germinate due to the low temperatures. By the time spring arrives, the biological clock of the seed for germination has advanced to the point where it will emerge much sooner than spring applied seed and be worthy competitors with emerging weed seedlings.

The success of dormant seeding hinges on correct timing and the weather. If the soil is cool enough so that no germination takes place, and if favorable winter conditions exist giving continuous snow cover and little or no chance for erosion, an acceptable stand of grass can be established the following spring. It is best carried out on sites having poor drainage and where it would be difficult to get equipment on the site early next growing season. It is a common practice to dormant seed football, soccer, and rugby fields after the last game in the fall.

Endophyte-Enhanced Grasses

The athletic field manager, as well as the homeowner, should attempt to incorporate endophyte-enhanced turfgrass cultivars whenever possible. The organism, an internal fungus (*Neotyphodium* previously *Acremonium spp*) lives in a symbiotic relationship of mutual benefit with the turfgrass. Research has shown that grasses enhanced with this endophyte establish quicker, are more disease resistant and more drought tolerant, but most importantly, repel surface feeding insects like chinch bugs and sod webworms.

The endophyte content would be on the seed package, and is commonly found in fescues and perennial ryegrasses. Research carried on by Jacklin Seed Company has shown that endophytes can also live in Kentucky bluegrass and creeping bentgrass. Cultivars of these two species that contain endophytes will be appearing on the market in the near future.

Athletic Field Maintenance and Fertilization

Football and Track Fields

A football field contains 57,600 square feet within the sidelines. The area outside the sidelines and inside the running track that surrounds most football fields, contains a minimum of 30,000 square feet. Together, these two areas comprise at least 88,000 square feet, or 2 acres of turfgrass. For this turf area to look good and provide a safe, effective playing surface, a regular maintenance regime must be followed. This would involve fertilization, pre-emergence weed control, post-emergence weed

control, aerification and/or topdressing, seeding, mowing, and irrigation.

With football and other athletic fields, each one of these basic operations must be timed carefully to maximize the desired impact of safety, playability, and aesthetics.

Fertilization should be carried out three times per year, applying 4 to 6 pounds of actual N per season for maximum results. At least one-half the N should come from controlled release forms. Applying 13 50-pound bags of a fertilizer with an analysis of 21-4-18 will supply about 1.5 pounds N and about 1.3 pounds K per 1000 square feet. As with the N, about one-half of the K should be in the slow-release form. This will provide the turf with 4.5 pounds of N and 3.9 pounds of K per 1000 square feet for the season. This rate can be adjusted higher for extremely high wear and more frequent irrigation.

Soccer Fields

A soccer field has an approximate area of 77,625 square feet of turf, along with approximately 8,000 square feet on the sidelines that is subject to heavy traffic. As a rule, figure about 85,000 square feet of turf to be maintained.

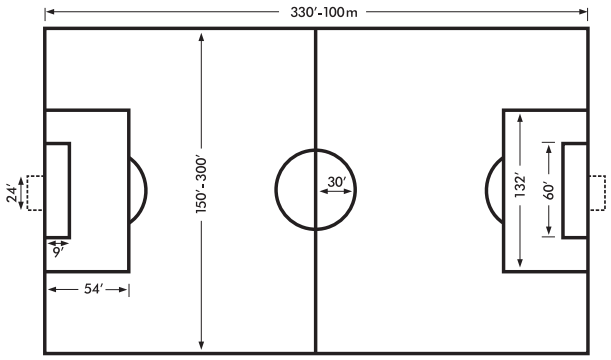
Applying 12 50-pound bags of the same analysis (21-4-18) fertilizer will again provide about 1.5 pounds of N and about 1.3 pounds of K per 1000 square feet with each application, with seasonal results being the same as with football fields.

Baseball Fields

Baseball fields with a measurement of 300 feet down the foul lines will contain approximately 70,000 square feet of turfgrass, depending on the distance to the center field fence line. In addition, there is about 10,000 square feet of turf outside the foul lines that will need regular maintenance, giving a total of about 80,000 square feet that will need fertilization.

Baseball is not as stressful on turfgrass as soccer and football and less replacement or recuperative growth is required. Therefore, a lower application of the fertilizer (21-4-18) will usually provide the needed results. Using 1.0 pound N per 1000 square feet as the guide, eight 50-pound bags would provide this amount with each application. At this rate, 0.9 pounds of K would also be applied.

In some instances, the infield is treated almost like a putting green. In that case, the maintenance in this area (roughly 8,100 square feet) would be more intensive, with the frequency of application being



Soccer field

stepped up to four to six times per year, but still not exceeding the total of 6 pounds of N per 1000 square feet per season.

Field Hockey

A field hockey turfgrass measures 300 by 180 feet, for a total of 54,000 square feet, the same size as a football field without the end zones. Count on another 9,000 square feet along the sidelines for maintenance requirements, for a total of 63,000 square feet. This would take nine bags of the fertilizer of choice (21-4-18), totaling 450 pounds per application, or 1,350 pounds for the season. This will provide the field with the requisite 4.5 pounds of N and 3.9 pounds of K per 1000 square feet for the season.

Lacrosse Fields

A lacrosse field measures 110 by 60 yards, for a total of 59,400 square feet of playing turf. Figure 10,600 square feet being added as sideline turf that would need to be part of the maintenance scheduling. To get the rate of 1.5 pounds of N per 1000 square feet per application, would require 10 bags of the fertilizer selection (21-4-18) each time, or a total of 30 bags for the season. This would provide the required 1.5 pounds N and 1.28 pounds of K per 1000 square feet for each application.

Weed Control – Pre- and Post-Emergence

Weed control is extremely important on athletic fields. Pre-emergence herbicides should be applied the latter part of April to early May for grass weed control. Post-emergent herbicides are applied about 10 to 14 days before or after the Memorial Day weekend, depending on the progress of spring weather and field location. Maintaining dense turfgrass through recommended cultural practices (proper mowing, fertilization, overseeding, and irrigation) will greatly reduce the need for chemical weed control.

Aerification

On all sports fields that are regularly used, core aerification should be done at least twice a year; in the spring when the grass is actively growing, and later in the season prior to the start of a game series. In both cases, the cores should either be pulverized with a power rake, dragged back in, or removed, and the field topdressed with the appropriate root-zone mix.

If the field needs aerification during the playing season, coring is often not desirable. Solid-tine slicing would relieve surface compaction without play disruption.

Topdressing

Topdressing, which involves the thin application of soil over the turf surface, is one of the most important cultural practices in the maintenance of high-quality athletic fields. Done properly, it functions to smooth the turf surface and fill in damaged areas. It can be used to reduce thatch and fill in the holes left by core aeration. The use of soil or composts with proper biological components has been shown to reduce diseases. Topdressing with materials like crumb rubber will soften the soil surface and protect the grass crown from abrasive damage in high-traffic areas.

When the fields are not in use for a couple of days, a one-fourth inch layer can be applied, giving the grass time to recover and not hamper the skill of the players. Be sure the soil applied is as close to the underlying soil as possible. This will prevent layering, which could lead to water movement problems. Once a topdressing mix has been established, it should not be changed.

Seeding

Seeding should be an on-going operation. Seed after each aerification or topdressing. Seed during the playing seasons of soccer and football, allowing the activity of the athletes to help incorporate the seed. Use only top-quality seed, with as high a purity and germination percentage that can be found, and selecting aggressive, deep-rhizome cultivars of Kentucky bluegrass like 'Glade', 'Touchdown', and 'Limousine'. Quality cultivars such as these should be mixed with perennial ryegrass cultivars that are winter hardy in a 50/50 (w/w) mix.

Mowing

Mow as needed to keep the grass at proper playing height. This often means mowing on a three-day cycle to keep from removing any more than one-third of the blade at a time. Remove clippings if windrows result from delays in mowing. Keep the blades sharpened! Keep tires properly inflated, and alternate mowing direction each time.

For game show grooming, striped mowing, or following up with a power sweeper provides a polished, professional, TV-camera ready look**.** When the field is out of play for a period of weeks, raise the mowing height to the next nominal level (e.g., 2.5 to 3.0 inches, to build a stronger root, rhizome, and crown system).

Irrigation

Irrigation systems should be activated in May and controlled automatically to provide 1.0 to 1.5 inches of precipitation per week, should deficiency in rainfall occur. Water as needed, but avoid overwatering. Apply water to match the infiltration and percolation rate of the soil or root-zone media. Do not allow the turf to enter dormancy. Keep the system updated as needed to provide head-to-head coverage when operating. Moisture or rain sensors should be installed when possible. Check the irrigation system frequently throughout the season to assure proper functioning of controller, valves, and heads.

Syringing is suggested through the hot, dry periods of the summer. This will lower the turfgrass surface temperature through evaporative cooling and wash off accumulated compounds that are exuded through the pores in the leaves. This serves two purposes. It relieves the grass from heat stress and helps cut down on disease development. Syringing can be done with a hand held hose or an automatic irrigation system, applying just enough water to wet the turf canopy (two to three minutes per station).

Schedule fall blow-out for winterization in early October. Draw up a list of needed replacement parts for next season and include them in the budgeting process.

For more information on this and other topics, see: **www.ag.nodak.edu**

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