SportsTurf MANAGERS ASSOCIATION

Experts on the Field, Partners in the Game.

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SAFE
The Foundation for Safer Athletic Fields

Winter Athletic Field Maintenance Calendar for Cool Season Turfgrasses: December – February

Taking appropriate steps to prepare your field for winter will encourage healthy spring green up. Sports turf managers who dedicate their time and care to readying fields for winter most often have healthy, successful fields the following spring.

Mowing

Recommended mowing heights:

	December	January	February
Kentucky bluegrass	1.5-3 in Should not exceed 3.5 inches		
Perennial ryegrass	1.5-3 in		
Annual ryegrass	1-1.5 in Should not exceed 2.5 inches		
Tall Fescue	2-3.5 in Should not exceed 5 inches		

Frequency

In general, fields will not need to be mowed throughout the winter. Slowed growth from colder temperatures and potential snow cover can eliminate the need for mowing during these months. However, if warm temperatures continue into December, fields can be mowed as often as needed.

Special Considerations

Stay alert for frost. Avoid mowing (and turf use in general) when there is early morning frost. Traffic on frosted turf ruptures leaf blades and the damage will likely be visible into the following spring.

If you are using growth blankets on your turf, keep mowing heights under one inch. Warm temperatures and wet conditions during the winter months on turf over one inch can lead to disease problems.

Photo courtesy of Jerad Minnick

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1/3 Rule

A general rule when mowing any stand of turfgrass is to remove no more than 1/3 of the total leaf surface at one time.

Effects of removing more than 1/3 of leaf surface:

- Negatively affect photosynthetic production of food
- Deplete carbohydrate reserves in the plant roots
- Graying or browning of leaf tips
- Root growth restriction
- Weed encroachment
- Increased susceptibility to damage from pests, environmental extremes and traffic
- Excess clippings

Direction

Change direction each time the field is mowed. This promotes upright growth and can reduce wear from equipment continually following the same pattern. Mowing the same direction creates 'grain' and the wavelike ridges affect the speed and direction of ball roll.

Clipping Collection

Clippings typically will not need to be collected if the turf is being mowed on a regular basis using the '1/3rd rule.' However, variables such as weather conditions, season of the year, soil fertility, moisture conditions, growth rate of the turfgrass, and the surface playing characteristics of the sport sometimes require clipping collection. Collect clippings if they are so long and excessive that they negatively impact turf playability and/or turf health (i.e. blocking sunlight, increasing disease activity under the piles, etc.).

Benefits of returning clippings:

- Research at Penn State University shows that over a 3 year period, Kentucky bluegrass clippings returned 46-59% nitrogen to the plant.
- Clippings contain nutrients that act as a fertilizer for the turf. Microbes in the soil hydrolyze the clippings into a solution that plants are capable of using.
- Clippings comprised of leaf blades break down rapidly and do not contribute to thatch when removing no more than 1/3 of the leaf blade and clippings do not clump.

Negative effects of excessive clippings:

- Smother grass
- Provide ideal environment for disease and insects

Equipment

No matter what type of equipment is used to cut the turf, maintaining a sharp blade is the most important element to have a healthy, well groomed, aesthetically pleasing turf.

Reel Mowers

- Provide the best cut for turf mown under 2 inches
- Cut grass with a scissor or shearing action where there actually is slight metal to metal contact. Blade and bedknife sharpness is important.
- Can cause longer grass to lay over
- Safer option to bystanders in comparison to rotary mowers – blade revolves slower and debris is rarely projected
- Require careful maintenance to keep adjusted and sharp

Rotary Mowers

- Provide the best cut for turf mown over 2 inches
- Cut grass using impact. Speed of blade rotation combined with blade sharpness cuts the turf. If blade is not sharp, fraying may occur.
- Blades revolve at high speed and may project objects from beneath the deck.

Flail Mowers

- Typically used on utility turf mown over 2 inches but improved models can be used on athletic fields
- Cuts grass by series of spinning, levered blades in a self-contained deck. Since blades are free-spinning, they 'give' if they strike a solid object and chances of blade breaking and being discharged are negligible.
- Ideal to use in park-like settings where sticks and other debris might exist as bystander safety is enhanced by the blade and deck design.

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Irrigation

Recommended amounts per week (minus any rainfall):

December	January	February
Weather dependent	Weather dependent	Weather dependent

Amount

Winter is not an active growth period for turfgrasses due to cold temperatures and snow cover. Therefore, irrigation should occur on an as needed basis.

Winterizing the Irrigation System

The irrigation system should be winterized before or during the month of December. Otherwise, water present in the pipes may freeze and lead to many problems the following spring. If irrigation is necessary throughout the winter, the system can be charged with water and irrigation can take place. The system should be winterized again once the needed irrigation is completed.

Fertilizer

Recommended amount of nitrogen per month:

	December	January	February
Kentucky bluegrass	1-2 lb. soluble N /1000 sq ft (dependent on fall sports schedule)		
Perennial and annual ryegrass	1-2 lb. soluble N /1000 sq ft (dependent on fall sports schedule)		
Tall Fescue	1-2 lb. soluble N/1000 sq ft (dependent on fall sports schedule)		

Timing

Winter is not an ideal time to apply fertilizer on cool season turfgrass fields. However, fertilizer may need to be applied this late in the season if the last game on the fall sports schedule occurs in December. Water soluble nitrogen can be applied at 1-2 pounds per 1000 square feet to promote early spring green up. Late season fertilization should occur only when shoot growth stops, grass is still green and before the soil freezes. Application to frozen soils can negatively impact water quality due to runoff.

Applications of potassium at this time are also beneficial to fields. Potassium will help in decreasing potential for winterkill.

Special Considerations

If growth blankets are being used, monitor your turf areas closely when applying nitrogen. If a winter is wet and warm, excessive nitrogen can lead to disease problems.

Photo courtesy of James Brosnan, Ph.D.

Soil Testing

Soil tests should be conducted on a routine basis – every one (sand-based fields) to three (native soil fields) years is recommended. A soil test will analyze nutrient requirements, pH, phosphorus and potassium levels, and will provide the best guide to fertilization to maintain or achieve a healthy field.

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Nutrients

Soils with suitable pH levels and appropriate balances of nutrients promote winter hardiness of cool season grasses. However, when additional nutrients are needed, winter applications are often ineffective due to the low activity of the turfgrass root system. Beneficial responses of the nutrients can occur only if they are absorbed by the plant and not that they simply occur in the soil. Supplemental nutrient applications should be made during the optimal growing conditions of the fall.

The macronutrients required for turfgrass growth include nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), and sulfur (S).

Nutrient effects on turfgrass growth and health:

- Nitrogen – Influences color, shoot growth, shoot density, root growth, rhizome and stolon growth, carbohydrate reserves, high temperature stress, cold tolerance, drought resistance, wear tolerance, thatch accumulation, disease susceptibility and recuperative potential.
- Phosphorus – Involved in transfer and storage of energy for metabolic processes in turf. Affects seedling development, maturation, root growth and seed production. Needed during establishment. Phosphorus has been eliminated in many fertilizers due to potential environmental concerns. Also, soil that already has adequate phosphorus, does not need any additional from a fertilizer application. This is one reason why soil tests are necessary.
- Potassium – Involved in photosynthesis; Important in the regulation of stomates and internal water management; Maintain turgor pressure in plants; Affect root growth, heat, cold and drought tolerance, wear tolerance, disease susceptibility, and environmental stress resistance
- Calcium – Aids in cell wall structure and new cell formation; Stimulates root and leaf development
- Magnesium – Involved in formation of proteins; Found in chlorophyll molecule; Improves P uptake from soil; Aids in plant respiration
- Sulfur - Involved with formation of proteins; Helps with turf growth, green color, shoot growth and density, root growth, carbohydrate reserves, and disease susceptibility

The micronutrients required for turfgrass growth include iron (Fe), manganese (Mn), zinc (Zn), copper (Cu), boron (B), molybdenum (Mb), chlorine (Cl), nickel (Ni). Adequate amounts of micronutrients are usually present in the soil as long as pH is appropriate. Excess amounts of these nutrients are more commonly seen than deficiencies. Deficiencies are much more likely in sand-based soils than heavier textured native soils.

Lime

Proper liming is as important as fertilization. Properly managed soil pH regulates nutrient availability and creates a soil environment not only desirable for turf, but also for healthy soil microorganisms. Late fall and early winter can be an ideal time to apply lime if it is needed to adjust soil pH. Lime should not be applied to frozen soil and/or turf. The desired soil chemical responses from lime applications often take weeks/months, so soil pH can be adjusted prior to the active growing season of the spring. Lime should only be applied in accordance with what is recommended on soil test results. If recommended amounts exceed 50 pounds per 1000 square feet, apply in split applications.

Products

Nutrients applied at appropriate times late in the growing season will encourage root growth, food storage, and density of turf. Fertilizer should only be applied when shoot growth stops, grass is still green and before the soil freezes. A quick release water soluble fertilizer can be applied to promote spring green up the following year.

Make sure to check with your local and state agencies for any restrictions on applying nutrients. For areas with restrictions on inputs or other management program constraints or objectives, there are organic and microbial products available in the marketplace. STMA encourages you to talk with vendors and practitioners for recommendations to fit your specific needs.

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Equipment

Rotary spreader

- o The most rapid way to apply product as fertilizer is distributed in a wide pattern.
- o Holes in the bottom of the hopper drop granules on to a rotating impeller that slings granules in a pattern wider than the spreader.
- o Distribution is not uniform and is more concentrated in the middle of the pass.
- o To achieve uniformity, on each pass, granules should reach the wheel path of the previous pass. on each pass, granules should reach the wheel path of the previous pass.
- o Splitting the application in half and applying material in two directions can help eliminate striping.

Drop spreader

- o A very precise way to apply product as fertilizer is distributed by only the width of the hopper.
- o A row of holes across the full width of the bottom of the hopper releases granules.
- o Distribution is uniform across the width of the spreader.
- o To achieve uniformity across the entire area, run the tire just inside the track from the previous pass.
- o Splitting the application in half and applying material in two directions can help eliminate striping.

Plant Growth Regulators (PGRs)

Recommended time for application:

December	January	February

Do not apply PGRs at this time. Turf should be actively growing for best results.

Cultivation

Recommended time for soil cultivation:

December	January	February
X (dependent on fall sports schedule)		

Timing

Cultivation on cool season turfgrass fields is most beneficial during periods of active turf growth in order to promote recovery and optimize playability of the field. October and November are the preferred months for cultivation. However, if fall sports schedules prevent the field from being cultivated prior to December, it should be cultivated immediately following the last game. Although recovery from cultivation this late in the season will be slower, it is beneficial to the long term health of the field.

Benefits of Soil Cultivation

- Physical penetration of the soil improves air, water and nutrient movement within the rootzone.
- Corrects or alleviates soil compaction. This is especially important for high traffic areas such as goal mouths. It may be necessary to cultivate these areas 6-8 times per year.
- Improve water infiltration.
- Improve gaseous exchange between the soil and atmosphere.
- Reduces thatch.

Equipment

Hollow tine

- Aerator pulls soil core (3/8 – ¾ inches in diameter) from a 2-6 inch depth.
- Helps minimize thatch and improves water penetration
- This method should be done at least twice a year with high traffic areas receiving it 4-6 times per year. This is an effective practice when done with renovation and reseeding.
- Soil cores can be removed or reincorporated into the rootzone using a dragmat.

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Photo courtesy of Chad Price, CSFM

Seeding

Recommended months to apply seed or sod:

	December	January	February
Kentucky bluegrass	X	X	X
Perennial and annual ryegrass	X	X	X
Tall Fescue	X	X	X

Recommended seeding rates:

Kentucky bluegrass	2-3 lb. / 1000 sq ft
Perennial and annual ryegrass	4-10 lb. / 1000 sq ft
Tall Fescue	5-8 lb. / 1000 sq ft

Timing

Seed can be applied to dormant turf or following late season cultivation. Dormant seeding is when seed is applied to dormant turf or frozen soil and lies dormant until soil temperatures warm in April or May. Dormant seeding can take place beginning in November and continue as late as March. Growth covers can be used to assist in seedling germination and enhance development during the winter. These breathable covers protect seedlings from frost and freeze damage. Turf managers must monitor ground and air temperature, and snow and rain amounts closely for dormant seeding success. Increased temperature and moisture beneath the blankets can lead to growth and pest problems.

Dormant seeding is beneficial because as the soil heaves and cracks during the winter, crevices are created for the seeds. This creates ideal germination conditions as temperatures begin to warm. The seed can also succumb to many fates while it sits on the surface for months waiting to grow. Disadvantages associated with dormant seeding include seed rot, seed desiccation, or runoff due to water.

Sod can be installed at any time as long as the soil is not frozen. Consider that sodding during warmer temperatures will better ensure root development and a stable playing surface.

Species and Mixtures

Always use certified seed when overseeding athletic fields. Certification ensures that the cultivar listed on the label is what is contained in the bag. The label also lists a test date. Seed should not be sold if the test date is more than 15 months past.

The species used for overseeding depends on the current species on the field and the amount of play the field will be receiving within six weeks of seeding.

Kentucky bluegrass

- Fine texture
- Resilient due to rhizomatous growth
- Traffic should not be allowed on the field until it is fully established due to slow germination and establishment rates.
- Once established, produces better wear tolerance and recovery.
- Drought tolerant
- If the field is made up of 100% Kentucky bluegrass, a blend of different cultivars should be used to maximize disease resistance and wear tolerance.
- Most fields are a mixture of Kentucky bluegrass (80-90%) and perennial ryegrass (10- 20%). The germination and recovery rate of perennial ryegrass aid in maintaining turf cover and density on these fields.

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Perennial ryegrass

- Fine texture
- Quick establishment
- Good traffic and wear tolerance when combined with Kentucky bluegrass
- Poor cold tolerance
- Most fields are a mixture of Kentucky bluegrass (80-90%) and perennial ryegrass (10-20%). The germination and recovery rate of perennial ryegrass aid in maintaining turf cover and density on these fields.

Annual ryegrass

- Used primarily for winter overseeding and/or soil stabilization
- Coarse to medium texture
- Quick germination and quick recovery potential
- Provides green color throughout fall, winter and spring
- Poor drought and heat tolerance. Usually dies with hot summer temperatures

Tall Fescue

- Fine to medium texture
- Good pest tolerance
- Most drought and heat tolerant of all the cool season grasses
- Poor tolerance to mowing heights less than 2 inches
- Good wear tolerance
- Good spring greening
- Poor cold tolerance
- Popular choice on low-input athletic fields as a monostand; when used on higher maintenance athletic fields, tall fescue should not be mixed with more than 10% of Kentucky bluegrass. Due to tall fescue's bunch type growth, Kentucky bluegrass is often added to help knit plants together and provide better recuperative potential.

Pest Control

Healthy, dense stands of turf are the best way to prevent disease, weed or insect infestations. Following proper cultural practices throughout the year, including fertilization, irrigation, mowing, seeding, and soil cultivation, can minimize and sometimes eliminate pest problems. The goal of turf management is to produce healthy turf while limiting reliance on pesticides. Many managers follow Integrated Pest Management (IPM) practices. This program does not completely eliminate pests, but maintains the population at a tolerable level. Pesticides are often a part of IPM programs, but they are selected and applied responsibly to avoid health risks to other living organisms than those targeted. It is important to routinely scout the fields and identify the pest problem in the early stages so a decision can be made whether its effects need to be controlled culturally or chemically. University research and efforts by turf managers and communities continue to evolve and support the trend towards sustainable turf management.

Make sure to check with your local and state agencies for any restrictions on applying pesticides. For areas with restrictions on inputs or other management program constraints or objectives, there are organic and microbial products available in the marketplace. STMA encourages you to talk with vendors and practitioners for recommendations to fit your specific needs.

Weeds

	December	January	February
Timing for control			

In order to abide by IPM standards, herbicide applications are uncommon during the winter. Some turf managers may take this opportunity to eliminate winter annuals and perennial broadleaves with a postemergent product.

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Insects

	December	January	February
Kentucky bluegrass			
Perennial ryegrass			
Annual ryegrass			
Tall Fescue			

Insects are rarely a problem during the winter due to decreased insect activity.

Diseases

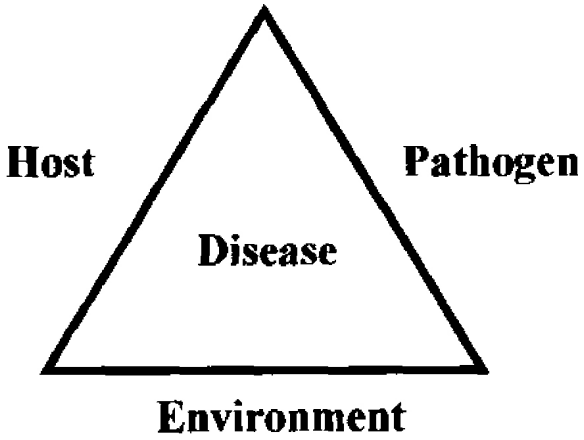
Timing of disease occurrence and grass species affected:

	December	January	February
Kentucky bluegrass	Gray snow mold, pink snow mold	Gray snow mold, pink snow mold	Gray snow mold, pink snow mold
Perennial ryegrass	Gray snow mold, pink snow mold	Gray snow mold, pink snow mold	Gray snow mold, pink snow mold
Annual ryegrass	Gray snow mold, pink snow mold	Gray snow mold, pink snow mold	Gray snow mold, pink snow mold
Tall Fescue	Gray snow mold, pink snow mold	Gray snow mold, pink snow mold	Gray snow mold, pink snow mold

Disease Triangle

Diseases occur when three factors are present and meet the correct conditions:

1) A susceptible host – The grass plants are the hosts; choose resistant and/or tolerant varieties whenever possible.
2) A virulent pathogen – The disease-inciting organism is almost always present in the soil and not causing problems. However, conditions sometimes change and it can attack the turf.
3) A suitable environment – When certain environmental conditions are present, disease may occur. For example, hot, humid weather often contributes to the appearance of some diseases.



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Symptoms and Prevention

Gray snow mold

- Symptoms – Circular areas of turf turn yellow or gray/brown. Wet leaves become matted together and are covered with gray or white mycelium. Dry leaves are gray and brittle with no mycelium. A defining characteristic is the small, hard, round sclerotia on infected leaves. They can be white, pink, brown or black. Gray snow mold requires snow for development.
- Prevention – Avoid heavy applications of quick release nitrogen in late fall. Avoid excessive thatch and prevent compaction. Keep turf height low to prevent leaves from matting. Promote air circulation in early spring by removing snow and ensuring proper drainage.

Pink snow mold

- Symptoms – Circular areas of turf turn tan, light gray, or orange-brown. Fluffy mycelium may be present that appears pink in sunlight. Snow does not need to be present for development..
- Prevention – Avoid heavy applications of quick release nitrogen in late fall. Keep turf height low to prevent leaves from matting. If the field has a history of snow mold, a preventative fungicide application can be applied just before the first significant snowfall.

Chemical Control

Proper mowing, irrigation, fertilization, and cultivation can all lead to a healthy, dense field that is able to withstand moderate disease infestations. Unless fields have a history of poor disease tolerance, in order to abide by IPM standards, preventative fungicide applications are often not necessary. If the field is affected by a disease, a curative application should be sufficient.

If turf blankets are being used, carefully monitor the area for disease. Warm, wet weather during the winter can increase the likelihood for disease appearance. Fungicide applications may be necessary depending on winter weather.

Off Season Maintenance

Winter is also a great time to devote to equipment maintenance and repair. Maintenance to prepare for the upcoming spring season can include, sharpening mower blades, oil changes, routine inspection and safety checks, cleaning, and other major repairs. Proper equipment maintenance and care prolongs the life of equipment and saves money in the long run. If equipment is not functioning properly, winter may be a good time to replace and upgrade your inventory.

Conducting routine field and facility safety checks are important throughout the year. However, busy sports and maintenance schedules can sometimes compete with tasks on the priority list. Take this opportunity to check your fields and surrounding facility for any necessary maintenance to prepare for the upcoming season.

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Calendar

General overview of necessary maintenance practices performed during the winter on cool season turfgrasses:

	December	January	February
Mowing	X (weather dependent)		
Irrigation	X (weather dependent)	X (weather dependent)	X (weather dependent)
Fertilizer	X (dependent on fall sports schedules)		
Plant Growth Regulators			
Cultivation	X (dependent on fall sports schedules)		
Seeding	X	X	X
Weed Control			
Insect Control			
Disease Control	X	X	X