SportsTurf MANAGERS ASSOCIATION

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SAFE
The Foundation for Safer Athletic Fields

Winter Athletic Field Maintenance Calendar for Warm Season Turfgrasses: December - February

On non-overseeded bermudagrass fields, bermudagrass typically goes dormant during cooler temperatures. If this is the case, most maintenance practices become unnecessary. On bermudagrass fields overseeded with ryegrass, maintenance practices will need to continue throughout December, January and February.

Mowing

Recommended mowing heights:

	December	January	February
Common or hybrid bermudagrass			
Perennial, annual, or intermediate ryegrass	1-1.5 in	1-1.5 in	1-1.5 in

Frequency

Bermudagrass goes dormant during cool temperatures, eliminating the need for mowing

On fields that are overseeded, perennial, annual, and intermediate ryegrass must all be maintained at the appropriate height.

Photo courtesy of Jerad Minnick

1/3 Rule

A general rule when mowing any stand of turfgrass is not to remove 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

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Special Considerations

In the event of excessive rain, mowing should be avoided to prevent rutting and compaction.

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.

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
Non-overseeded bermudagrass fields			
Overseeded bermudagrass fields	1 in / week	1 in / week	1 in / week

Frequency

Dormant bermudagrass generally does not require irrigation.

Irrigation should occur on an as needed basis with overseeded fields. One or two irrigations per week are usually sufficient to maintain fields.

Always water at the first sign of wilt. Wilt is characterized by folded or curled leaves, blue-green color, and visible footprints left after the walking on the surface. Wilted turf recovers quickly if it is taken care of immediately. Traffic should not be allowed on wilted areas or recently recovered wilted areas.

Rootzone

It is important to know the soil physical properties (water infiltration rate, compaction, soil texture, soil structure, infiltration, water holding capacity, and soil drainage) of your rootzone to establish a successful irrigation program. Native soil rootzones containing high amounts of clays and/or silt typically have high water holding capacity. Sand based rootzones have little water holding capacity and may percolate water very quickly. Soils that have good aggregation permit more rapid infiltration than a soil with poor structural properties. If a soil is compacted, aggregation is reduced or absent. Compaction at or near the soil surface can greatly reduce the rate of water infiltration.

Photo courtesy of Jerad Minnick

Amount

To establish a successful watering program, the depth of the rootzone must be known. Deep, infrequent irrigation that wets the entire rootzone (generally 4 inches in depth) leads to the healthiest turf.

Deep and infrequent

- Leads to the healthiest plants
- Promotes development of deep, strong root systems that can extract water from a large volume of soil

Light and frequent

- Leads to weak, unhealthy plants
- Promotes shallow root systems
- Turf can become susceptible to algae, moss, and disease
- Light and frequent is only acceptable when establishing grass from seed or sod or forcing growth with nitrogen fertilizer. When establishing turf, because seedlings are very susceptible to drying out, the seedbed should not be allowed to dry. These areas require irrigation 2-4 times daily depending on weather conditions. The amount of water applied should only moisten the top 1.5-2 inches of the soil profile. Once germinated seedlings reach 2 inches in height, begin shifting the irrigation strategy to deep and infrequent watering and prepare to mow the turf as the soils are dried.

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Handwatering

- Some areas may be prone to drying out more quickly than other areas and may need to be supplemented by handwatering to extend the interval between watering events.
- Areas that are exposed or excessively fertilized may need up to ¼ inch of water daily.

Timing

Early morning is the best time to water your turf.

Early Morning

- Between 4:00 am and 9:00 am is the best time to water.
- Reduced water loss to evaporation due to lower temperatures, less sunlight, and lower wind velocity.
- Reduced disease potential by minimizing the duration of leaf wetness
- Depending on water source, municipal water demand is lower

Midday

- Not an efficient time to water because water lost to evaporation is at its greatest potential
- Midday watering can be effective if the goal is to temporarily cool plant temperatures and reduce heat stress. Syringing is a very light application of water applied to the turf leaf surface that cools the turf so it can get through the hottest part of the day.

Evening/Night

- Irrigating should be avoided during these hours.
- Excessively wet plants in the evening can remain wet throughout the night and make a favorable environment for fungal diseases.

Consequences of Over Irrigating

Do not irrigate at a rate faster than the soil can absorb. Once the rootzone is wet, additional water simply runs off the surface, wasting a valuable resource and potentially moving nutrients and chemicals in the surface flow. What is considered excess water is dependent on soil properties: water infiltration rate, compaction, soil texture, soil structure, infiltration, water holding capacity, and soil drainage.

Over watering can lead to:

- Poor turf health
- Increased weed, disease and insect problems
- Open, sparse stand invaded by moss and algae
- Poor appearance
- Runoff and/or leaching of nutrients and pesticides
- Anaerobic soil conditions
- Standing water
- Compaction
- Surface ruts

Managers should avoid applying water in large volumes all at one time and watch that irrigation patterns are adequately dispersed.

Consequences of Too Little Irrigation

- Poor turf health
- A gradually thinning turf leading to increased pest problems
- Shallow root system
- A hard playing surface that can impact player safety

Fertilizer

Recommended amount of nutrients per month:

	December	January	February
Non-overseeded bermudagrass fields			
Fields overseeded with perennial, annual, or intermediate ryegrass	0.5-1 lb. N / 1000 square feet	0.5-1 lb. N / 1000 square feet	0.5-1 lb. N / 1000 square feet

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Frequency

Fertilizer applications are unnecessary on dormant bermudagrass fields.

Bermudagrass fields overseeded with perennial, annual, and intermediate ryegrass perform best with monthly applications of fertilizer. Small amounts of water soluble N every four weeks can benefit fields. If air temperatures are consistently less than 50 degrees Fahrenheit, turfgrass growth potential is low. Fertilize only when plant response is possible and never apply fertilizer to frozen soils. As temperatures warm in late winter or early spring, appropriate fertilization will encourage growth, color, and recovery of turf.

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.

Nutrients

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.

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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.

Rootzone

Nutrient holding capacity of a rootzone varies depending on soil texture. Heavy, fine textured soils hold more nutrients than light, sandy soils. A rootzone with low nutrient retention is often best managed with light and more frequent fertilization unless water insoluble fertilizers are applied. Use tissue and soil tests to determine the amounts and application frequency needed to maintain a healthy turf environment.

Products

Quick release products are water soluble and cause a turf response in a week or less. These products are generally inexpensive, but have increased leaching and leaf burn potential if used improperly. Application should always either be planned before a rain event or followed with irrigation to prevent turf burn.

Slow release products are water insoluble and provide a gradual, sustained turf response over a period of 3-10 weeks or more. These products are generally more expensive, but rarely burn leaf blades.

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.

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.
- 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

Plant growth regulators are unnecessary at this time of year.

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Cultivation

Recommended time for soil cultivation:

	December	January	February
Overseeded bermudagrass fields			
Non-overseeded bermudagrass fields			

Do not vertical mow, dethatch or aerate bermudagrass fields in the winter.

Seeding

Recommended months to apply seed, sprigs or sod:

	December	January	February
Common bermudagrass and hybrid bermudagrass			
Perennial, annual, and intermediate ryegrass	X	X	X

Recommended seeding rates:

Perennial, annual, and intermediate ryegrass	4-10 lb. / 1000 sq ft

Timing

Non-overseeded bermudagrass fields

Bermudagrass seeding or sprigging is not recommended during the winter because bermudagrass goes dormant. Bermudagrass requires warm temperatures for proper establishment. Sod can be installed essentially any time of the year soil is not frozen. However, if the field is to be played upon the following spring, bermudagrass sod installations should occur by early to mid-fall at the latest, and many times it is desirable to install a ryegrass overseeded sod that will provide the desired stability for spring sports due to ryegrass rooting.

Overseeded bermudagrass fields

Overseeding with perennial, annual, and intermediate ryegrass can continue throughout the winter on dormant bermudagrass fields. This will help maintain turf density, provide winter color, and improve wear recovery. However, germination and establishment during cooler temperatures will be minimal at best and much of the seed will remain 'dormant' until suitable temperatures and moisture are received.

Sod can be installed at anytime as long as the soil is not frozen. However, if the field is to be played upon the following spring, bermudagrass installations should occur by early to mid-fall at the latest, and many times it is desirable to install a ryegrass overseeded sod that will provide the desired stability for spring sports due to ryegrass rooting.

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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

Recommended time to apply herbicides:

	December	January	February
Timing for control	X	X	X
Weeds most commonly controlled	Postemergent control of winter annual and perennial broadleaf weeds	Postemergent control of winter annual and perennial broadleaf weeds	Postemergent control of winter annual and perennial broadleaf weeds Preemergent control of summer annual weedy grasses

Non-overseeded bermudagrass fields

Annual bluegrass and winter annual and perennial broadleaf weeds can invade dormant bermudagrass fields. Left uncontrolled, these weeds can compete with bermudagrass for sunlight the following spring. This can delay green-up. Preemergent and postemergent herbicides can be applied to dormant bermudagrass to control weeds. Applying a broad spectrum, non-selective herbicide is a common method for controlling weeds in dormant bermudagrass. **Remember, bermudagrass must be completely dormant when making a broad spectrum, non-selective herbicide application.**

Overseeded bermudagrass fields

Annual bluegrass and winter annual and perennial broadleaf weeds compete with overseeded grasses during the winter. Postemergent herbicides are preferable for overseeded fields. Spot treating weeds may be a desirable method of control as opposed to broadcast applications. Never apply herbicides if the turf is stressed.

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Common Winter Weeds

Grassy weeds

- Annual bluegrass
- Annual ryegrass
- Orchardgrass

Broadleaf weeds

- Common chickweed
- Corn speedwell
- Henbit
- Purple deadnettle
- Shepherd's Purse
- Veronica
- Lawn burweed
- Carolina geranium
- Hop clover
- Parsley-piert
- Mouse-ear chickweed
- Buttercup
- Dandelion
- White clover
- Broadleaf plantain
- Buckhorn plantain
- Ground ivy
- Curly dock
- Broadleaf dock
- Oxalis
- Wild strawberry
- Wild Violet
- Prostrate knotweed

Other weeds

- Wild garlic
- Wild onion

Insects

Timing of insect damage and the grass species affected:

	December	January	February
Common bermudagrass and hybrid bermudagrass			
Perennial, annual, and intermediate ryegrass			

Insects are generally not a problem in bermudagrass fields during cooler temperatures.

Diseases

Timing of disease occurrence:

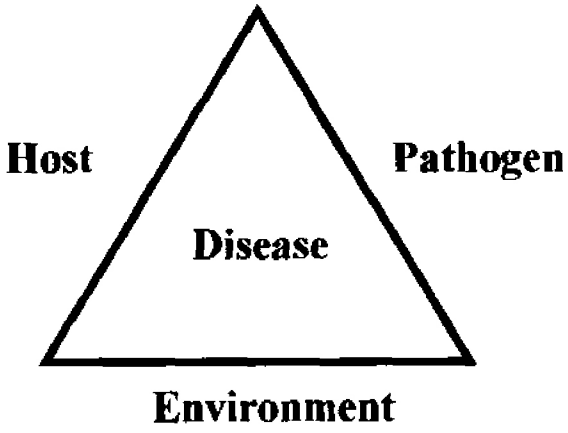
	December	January	February
Common bermudagrass and hybrid bermudagrass			
Perennial, annual, and intermediate ryegrass	Monitor for disease	Monitor for disease	Monitor for disease

On non-overseeded bermudagrass fields, diseases are generally not a problem. Overseeded bermudagrass fields need to be monitored for disease presence.

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.



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 non-overseeded bermudagrass fields:

	December	January	February
Mowing			
Irrigation			
Fertilizer			
Plant Growth Regulators			
Cultivation			
Seeding			
Weed Control	X	X	X
Insect Control			
Disease Control			

General overview of necessary maintenance practices performed during the winter on overseeded bermudagrass fields (maintenance of perennial, annual or intermediate ryegrass)

	December	January	February
Mowing	X	X	X
Irrigation	X	X	X
Fertilizer	X	X	X
Plant Growth Regulators			
Cultivation			
Seeding	X (optional)	X (optional)	X (optional)
Weed Control	X	X	X
Insect Control			
Disease Control	Monitor for disease	Monitor for disease	Monitor for disease