SportsTurf MANAGERS ASSOCIATION

Experts on the Field, Partners in the Game.

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SAFE
The Foundation for Safer Athletic Fields

Summer Athletic Field Maintenance Calendar for Warm Season Turfgrasses: June - August

Mowing

Recommended mowing heights:

	June	July	August
Bermudagrass	1-1.5 in (should not exceed 1.5 inches)	1-1.5 in (should not exceed 1.5 inches)	1-1.5 in (should not exceed 1.5 inches)
Hybrid bermudagrass	¾-1 in (should not exceed 1.5 inches)	¾-1 in (should not exceed 1.5 inches)	¾-1 in (should not exceed 1.5 inches)

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 insects, disease, drought and traffic
- Excess clippings

Photo courtesy of James Brosnan, Ph.D. Photo taken by Paul Curtis.

Frequency

Warm season grasses are actively growing throughout the summer months. Mow as often as needed – generally 2-3 times per week.

Lower mowing heights maximize turf density when fertilizer and irrigation needs are met. This density is important for wear tolerance and withstanding weed, disease and insect problems.

Special considerations:

- Weather
  - o Rain – in the event of excessive rain, mowing should be avoided to prevent rutting and compaction.
  - o Extreme temperatures – avoid mowing in the middle of the day when temperatures may exceed 90 degrees Fahrenheit as this may cause damage to the turf.

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.

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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 break down rapidly and do not contribute to thatch as long as no more than 1/3 of the leaf blade is not removed 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. Blade and bedknife sharpness is important.
- Can cause longer grass to lay over
- Safer option in comparison to rotary mowers – blade revolves slower and debris is rarely projected

Rotary Mowers

- Provide the best cut for turf mown over 2 inches
- Cut grass using impact. Speed of blade rotation combined with blade sharpness cut 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.

Irrigation

Recommended amounts per week (minus any rainfall):

June	July	August
1-1.5 inches	1-1.5 inches	1-1.5 inches

Irrigation should occur on an as needed basis. One or two irrigations per week are usually sufficient to maintain bermudagrass fields. This holds true even during extended drought.

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.

Summer Athletic Field Maintenance Calendar for Warm Season Turfgrasses: June - August

Photo courtesy of Jerad Minnick

Frequency

Water should be applied on an as needed basis. The proper amount of water to apply at any one time is dependent on water holding capacity of the soil, grass species, soil texture, climatic condition (rainfall, humidity, temperature, and wind movement), exposure, intensity of use, drainage and amount of moisture present when irrigation is started. Most warm season turfgrasses require between 1-1.5 inches of water per week to remain healthy and resilient. Turfgrasses growing in sandy soils may need to be irrigated more frequently. When natural precipitation is not present, irrigation is essential to maintain the health of turf. Irrigating supports active growth and helps maintain turf's green color. It is necessary for photosynthesis, plant and environmental cooling, and plant rigidity. Properly irrigated turf also helps decrease weed encroachment and tolerates insect and disease pressure.

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.

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, sprigs or sod or forcing growth with nitrogen fertilizer. When establishing turf, because seedlings, sprigs or sod 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.

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

Weather conditions also affect the amount of water needed to sustain a healthy turfgrass area. If the weather is cool and rainy, summer irrigation will not be needed for bermudagrass. In hot, dry, windy, and sunny conditions, more frequent irrigation is needed to make up for water lost to evaporation and transpiration. Turfgrasses vary in total amount of water required for growth, plus the amount of water transpired from the plant and evaporated from both plant and soil surface. Warm season turfgrasses utilize water efficiently and lose about 6-7 mm of water per day. (In comparison, cool season turfgrasses typically lose more than 10 mm of water per day to evapotranspiration.) High air temperature, dry air, wind, growth rate, aerial shoot density, leaf area and leaf position all influence the amount of water lost in a turfgrass plant.

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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
- Reduction in disease potential
- 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 is effective if the goal is to 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 growth and development of disease.

Consequences of Over Irrigating

Do not irrigate at a rate faster than the soil can absorb. Once the rootzone is wet, additional irrigation is considered excess and will be removed by drainage. 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 health
- Increased weed, disease and insect problems
- Open sparse stand
- Poor appearance
- Runoff and/or leaching of nutrients and pesticides
- Anaerobic soil conditions
- Standing water
- Compaction
- Surface ruts
- Reduced rhizomes
- Increased winter loss in bermudagrass

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

Photo courtesy of Chad Price, CSFM

Consequences of Too Little Irrigation

- Poor health
- Increased weed, disease and insect problems
- A hard playing surface that can impact player safety
- Shallow root system

Drought

Bermudagrass uses water efficiently and thrives in hot temperatures. Even in extended drought, bermudagrass only requires one to two irrigations per week.

Fertilizer

Recommended amount of nitrogen per month:

	June	July	August
Bermudagrass	0.5-1.5 lb. N / 1000 sq ft	0.5-1.5 lb. N / 1000 sq ft	0.5-1.5 lb. N / 1000 sq ft

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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Frequency

Summer is the best time to promote active growth and warm season grasses will benefit from monthly fertilizer applications.

Soil and Tissue 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.

Tissue tests are a great diagnostic tool in that they provide a snapshot of nutrients present in the plant at the time the sample was taken. However, their real value is realized if conducted simultaneously with a soil test since only the soil report can provide clues as to why a nutrient deficiency or toxicity is occurring.

Nutrients

A complete fertilizer may only be necessary once or twice per year. Quick release nitrogen sources such as urea or ammonium nitrate are commonly used for summer fertilizer applications. Be sure to irrigate after quick release fertilizer applications to minimize the potential for leaf burn.

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

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. 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.

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 may require more frequent fertilization. Use tissue and soil tests to determine the amounts and application frequency needed to maintain a healthy turf environment.

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Photo courtesy of Jerad Minnick

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 in 3-10 weeks or more. These products are generally more expensive, but rarely burn leaf blades.

Photo courtesy of James Brosnan, Ph.D.

Equipment

- Rotary spreader
  - o 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 Fertilizer is distributed 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.

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Plant Growth Regulators (PGRs)

Recommended time for application:

June	July	August
X	X (optional depending on weather)	X (optional depending on weather)

For best results with PGRs, be conscious of the grass species it is labeled for, how the product affects the plant, how the product enters the plant, and if water is necessary following application. Never apply PGRs to grass that is under stress.

Benefits

- Seedhead suppression
- Suppression of vertical top growth of desirable turfgrasses. Lateral spread of growth is unaffected.
- Improved recuperative potential
- Management of *Poa annua* growth and development
- Improved color
- Increased density
- Reduction of clippings
- Enhanced establishment
- Deeper roots
- Larger food reserves
- Beneficial for conversion programs when transitioning from one type of grass to another during overseeding programs
- Shift of plant carbohydrates to crowns, stems and roots may increase rooting and tillering
- Rebound – when turf reaches the end of the time period that PGRs are active, there is a surge of growth. Although also considered a disadvantage, if timed appropriately, the rebound can help recovery from late season traffic. Document applications so you can time the rebound effect.

Types (listing of a product by STMA is intended for information purposes only and is not an endorsement of the product)

- Class A – Late Gibberellic Acid Synthesis Blocker
  - o Entry - Foliar
  - o Mode of Action - Prevents cell elongation, promotes lateral growth, provides short periods of growth suppression activity
  - o Products - trinexapac-ethyl

- Class B – Early Gibberellic Acid Synthesis Blocker
  - o Entry - Roots
  - o Mode of Action - Inhibits cell elongation, promotes lateral growth, generally provides longer periods of growth suppression compared to class A
  - o Products – paclobutrazol, flurprimidol

- Class C – Mitotic (Cell Division) Inhibitors
  - o Entry – Foliar or roots
  - o Mode of Action – Inhibits differentiation in meristematic regions, suppresses vegetative growth and seedhead development
  - o Products - mefluidide

- Class D – Herbicides
  - o Entry – Foliar or roots
  - o Mode of Action - Herbicides used at low rates can suppress growth or seedhead development, inhibit growth and development through interruption of amino acid synthesis or fatty acid biosynthesis
  - o Products – glyphosate, ethofumesate

- Class E – Plant Hormone Generator
  - o Entry - Foliar
  - o Mode of Action - Generates ethylene, a hormonal regulator inside the plant which causes seedhead suppression
  - o Products – ethephon

Disadvantages

- Phytotoxicity – most products cause discoloration to the turf. This is not permanent and in some cases may be hidden by nitrogen applications.
- Cost – products are expensive, but the benefits provided by PGRs may outweigh the costs.
- Rebound – when turf reaches the end of the time period that PGRs are active, there is a surge of growth. Document applications so you can time reapplication to avoid the rebound effect.

Cultivation

Recommended time for soil cultivation:

June	July	August
X	X	X

Timing

Soil cultivation should be done once a month when plants are actively growing. If turf is undergoing stress, soil cultivation should be avoided. Soil cultivation is a necessary practice in order to keep bermudagrass fields in acceptable condition. Bermudagrass produces significant amounts of thatch that should not exceed .5 inches throughout the growing season. When cultivating, 2-4 passes in different directions should be made on 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.
- Reduce thatch.

Photo courtesy of Beth Guertal, Ph.D.

Equipment

Hollow tine

- Aerator pulls soil core (3/8 – ¾ inches in diameter) from a 2-6 inch depth.
- Controls thatch and 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.

Solid tine

- Solid tines penetrate through the rootzone with minimal surface disturbance
- Increases initial water infiltration rate
- Effective way to plant seed with minimal disturbance to grass and soil stability
- An ideal tool to utilize during periods of intensive field use, but it does not substitute for overall benefits of core aeration.

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Photo courtesy of Beth Guertal, Ph.D.

Shatter coring

- Solid tines aggressively penetrate the soil and fracture the hard rootzone at a depth up to 6 inches
- Promotes deep rooting, assists in removal of standing water, increases initial water infiltration rate
- Effective for planting seed and improving soil properties with minimal disturbance to the surface and soil stability

Water jet coring

- Streams of pressurized water penetrate thatch and loosen soil to promote root growth
- Effective way to cultivate stressed turf in unfavorable weather conditions
- Promotes deep rooting, increases water infiltration rate
- Minimal disturbance to the surface; does not substitute for overall benefits of core aeration.

Slicing

- V-shaped knives mounted on disks attached to a slowly rotating steel shaft cut into the turf
- Blades sever stems of creeping grasses (i.e. bermudagrass and Kentucky bluegrass) and promote additional lateral growth
- Promotes deep rooting, helps remove standing water
- Effective alternative to aggressive cultivation during extreme temperatures but use does not substitute for overall benefits of core aeration

Vertical mowing

- Knives that cut into the turf are attached to a rapidly spinning horizontal shaft.
- Depending on height adjustment, can be used to relieve grain, dethatch or cultivate.

Spiking

- Similar to a vertical mower, only blades are pointed rather than broad and flat. Blades are attached to a slowly turning horizontal shaft.
- Stimulates shoot and root growth

Deep tine

- Tines penetrate the soil to a depth of 6-18 inches.
- If using hollow tines, holes can be back filled with a soil amendment to improve drainage
- Solid tines are beneficial when cultivating heavily compacted clay or gravelly soil
- Minimal disturbance to the surface with use of solid tines; core aeration results in significant surface disruption and a concentrated effort to manage the cores and/or topdress with new soil material
- Promotes deep rooting, helps remove standing water, aggressively fractures belowground compaction zones at 6-12 inch depths, increases initial water infiltration rate, creates deep aeration channels, and improves air, water, and nutrient movement through layered, poorly drain soils

Deep drill/drill and fill

- Drills penetrate the soil to a depth of 6-18 inches
- Deep channels loosen soil

Summer Athletic Field Maintenance Calendar for Warm Season Turfgrasses: June - August

Photo courtesy of Beth Guertal, Ph.D.

Seeding

Recommended months to apply seed, sprigs or sod:

	June	July	August
Common bermudagrass	X (early June)		
Hybrid bermudagrass	X (early June)		

Recommended seeding or sprigging rates:

Common bermudagrass seed	1 lb. / 1000 sq ft
Hybrid bermudagrass sprigs	5-15 bushels / 1000 sq ft (higher planting rates may require 25+ bushels / 1000 sq ft)

Timing

Early June is the latest preferred date for seeding or sprigging. Seed and sprigs need 2-3 months of good growing weather before heavy use can be allowed and to survive cooler temperatures in the winter. Ideal temperatures for establishment are between 68-75 degrees Fahrenheit. Soil cultivation prior to seeding or sprigging will increase soil contact and benefit establishment. Once the area has been seeded or sprigged, be sure to irrigate lightly and frequently to encourage growth.

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Species

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 or sprigging depends on the current species on the field.

Common bermudagrass

- Fine textured, dense, vigorously growing turf
- Disease resistant
- Performs well on a limited budget
- Can be seeded and has quick establishment
- Poor shade tolerance
- High wear, drought and salt tolerance
- In warm, frost free climates, bermudagrass stays green all year. Optimum air temperatures for growth are between 75-100 degrees Fahrenheit. Optimum soil temperatures for growth are between 65-80 degrees Fahrenheit.
- Poor cold tolerance. Bermudagrass goes dormant after the first frost, or if temperatures are consistently below 50 degrees Fahrenheit.

Hybrid bermudagrass

- Fine textured, dense, vigorously growing turf
- Higher density and disease resistance than common bermudagrass.
- Hybrid bermudagrass is sterile and can only be sodded or sprigged. Both methods have quick establishment.
- Poor shade tolerance
- High wear, drought and salt tolerance
- In warm, frost free climates, bermudagrass stays green all year. Optimum air temperatures for growth are between 75-100 degrees Fahrenheit. Optimum soil temperatures for growth are between 65-80 degrees Fahrenheit.
- Poor cold tolerance. Bermudagrass goes dormant after the first frost, or if temperatures are consistently below 50 degrees Fahrenheit.

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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:

	June	July	August
Timing for control	X	X	X
Weeds most commonly controlled	Post emergent control of all summer weedy grasses, broadleaf weeds and sedges	Post emergent control of all summer weedy grasses, broadleaf weeds and sedges	Post emergent control of all summer weedy grasses, broadleaf weeds and sedges Preemergent control of annual bluegrass and other winter weeds

The best defense against weeds is by increasing density and vigor of turfgrass to discourage weed competition. Weeds fill in voids in the turf. These voids can be avoided with proper selection and establishment of turf, adequate liming and fertilization per recommendations from soil tests, proper mowing heights and watering deeply and infrequently. If herbicides are necessary to control weeds, a product that provides postemergent control will be the most effective, if weeds have already germinated. Herbicides should only be applied when turf is actively growing, temperatures are less than 90 degrees Fahrenheit, and soil moisture is adequate. Spot treating weeds may be a desirable method of control as opposed to broadcast applications. Temporary discoloration can be expected in hot weather and dry soils. Treatment in July and August should be avoided if turf is drought or heat stressed.

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Common Summer Weeds

Grassy weeds

- Smooth crabgrass
- Large crabgrass
- Foxtail
- Dallisgrass
- Goosegrass
- Bahiagrass
- Sandbur
- Nimblewill
- Orchardgrass
- Annual bluegrass
- Crowfoot
- Signalgrass
- Barnyardgrass

Broadleaf weeds

- Clover
- Chickweed
- Dandelion
- Henbit
- Dichondra
- Knotweed
- Spotted spurge
- Common lespedeza
- Broadleaf plantain
- Buckhorn plantain
- Virginia buttonweed
- Ground ivy
- Curly dock
- Black medic
- Yellow woodsorrel
- Ragweed
- Pigweed
- Lamb's quarter
- Bitterweed
- Spiney amaranth
- Beggar's lice

Sedges

- Yellow nutsedge
- Annual sedge
- Green kyllinga
- Purple nutsedge

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Insects

Timing of insect damage and the grass species affected:

	June	July	August
Bermudagrass	Mole crickets, armyworm, cutworm, chinch bug, sod webworm, Rhodegrass scale (mealybug)	Armyworm, cutworm, chinch bug, sod webworm, Rhodegrass scale (mealybug)	White grubs, armyworm, cutworm, chinch bug, sod webworm, mole crickets, Rhodegrass scale (mealybug)

Thin, weak turf is more susceptible to insect infestations. Insect damage can be minimized with proper selection and establishment of turf, adequate liming and fertilization per recommendations from soil tests, proper mowing heights and watering deeply and infrequently.

Diseases

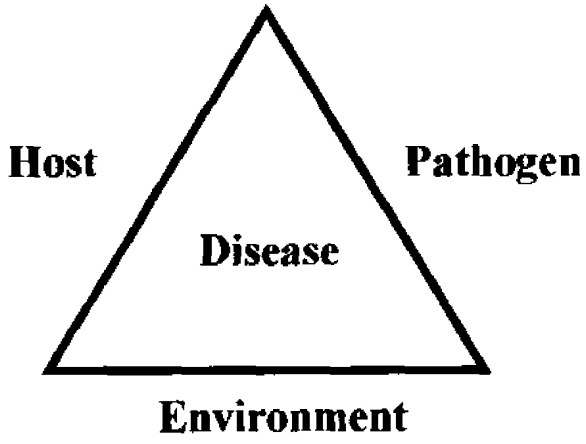
Timing of disease occurrence:

	June	July	August
Bermudagrass	Brown patch, dollar spot, fairy ring, leaf spot/melting out, pythium blight	Brown patch, dollar spot, fairy ring, leaf spot/melting out, pythium blight	Brown patch, dollar spot, fairy ring, leaf spot/melting out, pythium blight

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 Preventative Measures

Brown patch

- Symptoms – Leaves have a dark margin with light brown in the center. Forms a circular patch that is surrounded by a dark purplish ring (known as a smoke ring) that is visible in the morning. White mycelium can be seen on affected areas.
- Prevention – Maintain adequate fertility and drainage. Remove dew in the morning and minimize thatch.

Dollar spot

- Symptoms – Spots appear small, circular, and sunken and can coalesce as disease progresses. Lesions on the leaves have an hourglass appearance with a bleached center with brown margins. In wet conditions, white, cottony mycelium can be present.
- Prevention – Maintain adequate nitrogen fertility. Water deeply and infrequently during morning hours. Promote air circulation.

Photo from Penn State University

Fairy ring

- Symptoms – Darker green or faster growing grass appears in a circular or arc shape. There can sometimes be a circular area of dead grass within or outside the ring of lush growth. Mushrooms can also develop.
- Prevention – Control is very difficult. Maintaining core cultivation, irrigation and fertilization can help suppress the disease.

Leaf spot/melting out

- Symptoms – Small brown spots surrounded by a dark, purplish red border appear on the turf leaves. Spots enlarge until the entire width of the blade is blighted. When the crown becomes infected, entire tillers die and turf loses density.
- Prevention – Avoid excessive nitrogen in early spring. Use resistant turf cultivars. Water deeply and infrequently.

Pythium blight

- Symptoms – Wet leaves appear dark and water soaked and feel oily. As the leaves dry, areas are light brown or tan and are shriveled and matted. Affected areas are covered with fluffy white mass of mycelium. Disease tends to spread in patterns that follow water drainage.
- Prevention – Provide good drainage and avoid overwatering. Use slow release nitrogen products.

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.

Summer Athletic Field Maintenance Calendar for Warm Season Turfgrasses: June - August

Calendar

General overview of necessary maintenance practices performed during the summer on warm season turfgrasses:

	June	July	August
Mowing	X	X	X
Irrigation	X	X	X
Fertilizer	X	X	X
Plant Growth Regulators	X	X (optional)	X (optional)
Cultivation	X	X	X
Seeding	X		
Weed Contol	X	X	X
Insect Control	X	X	X
Disease Control	X	X	X