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Summer Athletic Field Maintenance Calendar for the Transition Zone: 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)
Kentucky bluegrass	1.5-3 in Should not exceed 3.5 inches	1.5-3 in Should not exceed 3.5 inches	1.5-3 in Should not exceed 3.5 inches
Perennial ryegrass	1.5-3 in	1.5-3 in	1.5-3 in
Tall Fescue	2-3.5 in Should not exceed 5 inches	2-3.5 in Should not exceed 5 inches	2-3.5 in Should not exceed 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.

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Frequency

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

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.
- Decrease in mowing – if the field consists of cool season grasses, turf growth will be slow during hot temperatures and fields may only need to be mowed once per week; if the field is made up of bermudagrass, mowing may continue to be necessary 2-3 times per week

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 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.

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Irrigation

Recommended amounts per week (minus any rainfall):

June	July	August
1-1.5 in/week	1-1.5 in/week	1-1.5 in/week

Irrigation should occur on an as needed basis.

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

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 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 between 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.

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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

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. 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.

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

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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.

Cool season turfgrass fields in the transition zone that do not have access to irrigation or are facing a water ban or restrictions, can be allowed to go dormant. Dormant fields should be watered once every four weeks during a drought. Fields will recover from dormancy as long as traffic is very limited.

Fertilizer

Recommended amount of nitrogen per month:

	June	July	August
Kentucky bluegrass	0-0.7 lb. / 1000 sq ft	0-0.7 lb. / 1000 sq ft	0-1lb. / 1000 sq ft
Perennial ryegrass	0-0.7 lb. / 1000 sq ft	0-0.7 lb. / 1000 sq ft	0-1lb. / 1000 sq ft
Tall Fescue	0-0.7 lb. / 1000 sq ft	0-0.7 lb. / 1000 sq ft	0-1lb. / 1000 sq ft
Unless the athletic field receives intensive use during the summer months, fertilization should be avoided on cool season grasses during extreme weather.			
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
Fertilizer applications are recommended once per month on bermudagrass fields.			

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.

Frequency

Fertilization is dependent on the predominant grass species on the field.

• Bermudagrass

- o **Summer is the best time to promote active growth and warm season grasses will benefit from monthly fertilizer applications.**
- o Quick release nitrogen sources such as urea or ammonium nitrate are commonly used for summer fertilizer applications.
- o Be sure to irrigate after quick release fertilizer applications to minimize the potential for leaf burn.

• Kentucky bluegrass, perennial ryegrass, and/or tall fescue

- o **Fertilization should be avoided during the middle of the summer because turf is not actively growing.** High temperatures, humidity and drought cause stress to the plant, and summer fertilizer applications may cause a flush of growth that is detrimental. Growth occurs mainly in the shoots and depletes necessary carbohydrate reserves in the roots which can lead to a weak plant and shallow roots. The stressed plants have a poor tolerance for traffic and disease, weed and insect infestations. A flush of growth in the summer will also require an increase in mowing and irrigation which can further stress the plants.
- o Fields that are used intensively during June, July and August, may need minimal fertilization and supplemental irrigation to maintain turf vigor and increase recovery from damage. These light fertilizer applications are often referred to as spoon feeding.
- o Mid to late August is a common time to begin fall fertilization applications. Applying nutrients at this time allows for release during fall sports when fields are heavily trafficked.

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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

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.



Photo courtesy of Jerad Minnick

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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.

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.

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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
Bermudagrass	X	X	X
Kentucky bluegrass, perennial ryegrass, tall fescue			X

Timing

Soil cultivation should be done when plants are actively growing.

- Bermudagrass
 - o Bermudagrass requires cultivation once a month.
 - o 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.
 - o If turf is undergoing stress, soil cultivation should be avoided.
- Kentucky bluegrass, perennial ryegrass, and tall fescue
 - o Aerating during hot, dry periods can cause extreme stress to plants and inhibit recovery. Grasses are in a semi dormant state during the summer and do not have the recovery potential of actively growing plants.
 - o Mid to late August is a common time for soil cultivation because summer temperatures are beginning to break and fields need to be prepared for fall sports traffic.

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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 – 3/4 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.



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.

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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



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)		
Kentucky bluegrass			X (Aug 15 at earliest)
Perennial ryegrass			X (Aug 15 at earliest)
Annual ryegrass			X (Aug 15 at earliest)
Tall Fescue			X (Aug 15 at earliest)

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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)
Kentucky bluegrass	2-3 lb. / 1000 sq ft
Perennial ryegrass	4-6 lb. / 1000 sq ft
Annual ryegrass	5-7 lb. / 1000 sq ft
Tall Fescue	5-8 lb. / 1000 sq ft

Timing

- Bermudagrass
 - o 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.
 - o Soil cultivation prior to seeding or sprigging will increase soil contact and benefit establishment.
 - o Once the area has been seeded or sprigged, be sure to irrigate lightly and frequently to encourage growth.
- Kentucky bluegrass, perennial ryegrass, tall fescue
 - o It is important to seed throughout the year to maintain turf density. However, if a field cannot be regularly irrigated during the hot, dry summer months to encourage healthy germination, seeding should be avoided. The best time to seed is in mid August and continuing into the fall. Mid to late August is the ideal time for grass establishment because late summer temperatures are warm enough to encourage quick germination and the cool, moist autumn weather will promote dense growth.
 - o If fall sports conflict with the seeding schedule, managers will seed often and at higher than normal rates to keep a healthy and dense stand actively growing.
 - o University research has also shown that athlete's cleats assist in incorporating the seed into the soil.

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 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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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.

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 and intermediate 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.

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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 in all turfgrasses:

	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, as weeds have already germinated. Herbicides should only be applied when turf is actively growing, temperatures are less than 85 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.

Summer Athletic Field Maintenance Calendar for the Transition Zone: June – August

Common Summer Weeds

Grassy weeds

- Smooth crabgrass
- Large crabgrass
- Foxtail
- Dallisgrass
- Goosegrass
- Bahiagrass
- Sandbur
- Nimblewill
- Orchardgrass
- Crowfoot
- Signalgrass
- Barnyard grass
- Foxtail
- Annual bluegrass
- Creeping bentgrass



Broadleaf weeds

- Black medic
- Prostrate knotweed
- Prostrate spurge
- Purslane
- Chickweed
- Speedwell
- Dog fennel
- Dichondra
- Common lespedeza
- Virginia buttonweed
- Ragweed
- Pigweed
- Lamb's quarter
- Bitterweed
- Spiny amaranth
- Beggar's lice
- Henbit
- Mallow
- Yellow rocket
- Broadleaf plantain
- Buckhorn plantain
- Cinquefoil
- Creeping buttercup
- Dandelion
- Ground ivy
- Heal all
- Wild violet
- Clover
- Yellow woodsorrel
- Hawkweed
- Dock
- Thistle
- Yarrow
- Red sorrel

Sedges

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

Summer Athletic Field Maintenance Calendar for the Transition Zone: June – August

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)
Kentucky bluegrass	Bluegrass billbug, White grub	Bluegrass billbug, Sod webworm, chinch bug, white grub	Billbug, Sod webworm, chinch bug, White grub
Perennial ryegrass	White grub	chinch bug, sod webworm, white grub	chinch bug, sod webworm, White grub
Annual ryegrass	White grub	Sod webworm, white grub, chinch bug	Sod webworm, white grub, chinch bug
Tall Fescue	White grub	Sod webworm, white grub	Sod webworm, White grub



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.

Summer Athletic Field Maintenance Calendar for the Transition Zone: June – August

Diseases

Timing of disease occurrence and grass species affected:

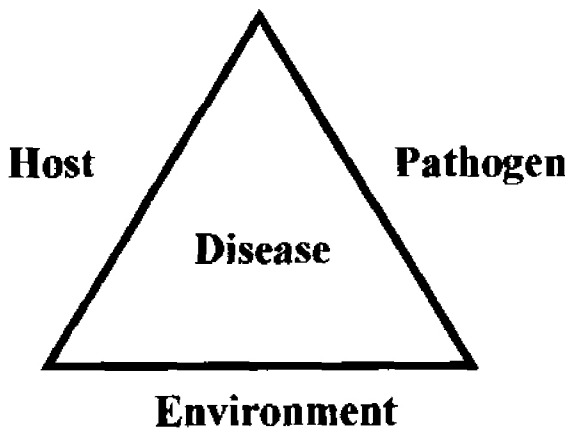
	June	July	August
Kentucky bluegrass	Summer patch, Brown patch, Red thread, leaf spot/ melting out, dollar spot, necrotic ring spot, fairy ring	leaf spot/melting out, brown patch, summer patch, pythium blight, leaf rust, powdery mildew, dollar spot, fairy ring	Red thread, necrotic ring spot, leaf spot/melting out, brown patch, summer patch, pythium blight, leaf rust, powdery mildew, dollar spot, fairy ring
Perennial ryegrass	Brown patch, Red thread, leaf spot/melting out, dollar spot, fairy ring	Red thread, leaf spot/melting out, brown patch, pythium blight, gray leaf spot, leaf rust, dollar spot, fairy ring	Red thread, leaf spot/melting out, brown patch, pythium blight, gray leaf spot, leaf rust, dollar spot, fairy ring
Annual ryegrass	Brown patch, dollar spot, fairy ring, red thread, leaf spot/ melting out	Pythium blight, leaf spot/melting out, brown patch, leaf rust, dollar spot, fairy ring, gray leaf spot	Red thread, leaf spot/melting out, brown patch, pythium blight, leaf rust, dollar spot, fairy ring, gray leaf spot
Tall Fescue	Brown patch, Red thread, leaf spot/melting out, fairy ring	leaf spot/melting out, brown patch, pythium blight, gray leaf spot, powdery mildew, dollar spot, fairy ring	Red thread, leaf spot/melting out, brown patch, pythium blight, gray leaf spot, powdery mildew, dollar spot, fairy ring
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

Summer Athletic Field Maintenance Calendar for the Transition Zone: June – August

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 is often contributes to the appearance of some diseases.



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.

Necrotic ring spot

- Symptoms – Circular patches of reddish brown or bronze leaves. As disease progresses, leaves turn a light straw color. Usually begins as a ring and as turf dies, a depression forms in the center.

Summer Athletic Field Maintenance Calendar for the Transition Zone: June – August

- Prevention – Irrigate during periods of drought stress and increase mowing height. Maintain balanced fertility. Overseed with perennial ryegrass.

Powdery mildew

- Symptoms – White or gray mycelium that appears powdery or dusty appears on the leaves and sheaths. Severe infection leads to yellow, tan, or brown leaves.
- Prevention – Reduce shade and ensure there is air circulation. Maintain balanced fertility program. Avoid drought stress.

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.



Photo from North Carolina State University

Red thread

- Symptoms – Circular or irregularly shaped patches of blighted grass have a reddish or pink color. The patch has a ragged appearance and leaves die from the tip downward. Pink, cottony mycelium is present in wet conditions.
- Prevention – Maintain fertility, but avoid excessive nitrogen. Water deeply and infrequently.

Leaf rust

- Symptoms – Early infection appears as light yellow flecking of the leaves. As the disease progresses, reddish brown, powdery pustules appear.
- Prevention – Maintain balanced fertility and adequate irrigation. Mow regularly and minimize shade.

Summer Patch

- Symptoms – Small circular patches expand into larger patches and may coalesce. Weeds and other types of grass often colonize the center. The patch is initially yellow and turns a tan or brown color. Symptoms appear almost identical to necrotic ring spot
- Prevention – Maintain a high mowing height. Use a slow release nitrogen source and water deeply and infrequently.

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 the Transition Zone: June – August

Calendar

General overview of necessary maintenance practices performed during the summer in the transition zone:

Cool Season Grasses

	June	July	August
Mowing	X	X	X
Irrigation	X	X	X
Fertilizer	X (optional)	X (optional)	X
Plant Growth Regulators	X	X (optional)	X (optional)
Cultivation	X (optional)	X (optional)	X
Seeding			X
Weed Control	X (early June)	X (spot treatments only)	X (late August)
Insect Control	X	X	X
Disease Control	X	X	X

Warm Season Grasses

	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 Control	X	X	X
Insect Control	X	X	X
Disease Control	X	X	X