

Athletic fields are some of the most difficult turf areas to maintain. Season-long traffic in all types of weather can destroy a field, plus playing schedules rarely allow for aggressive turf management practices that are essential to keep turfgrass stand thriving and safe for athletes. Compounding these are ever-tightening restrictions on expenses and labor. Athletic fields require significant inputs of labor, fertilization, irrigation, aeration, and overseeding in order to maintain safe playable fields and extend the life of the field as long as possible before the inevitable renovation. Athletic fields in Nebraska and north central states are most commonly seeded initially with Kentucky bluegrass and occasionally turf-type tall fescue. Following are descriptions of the management practices required to maintain a dense playable field.

Mowing

Mowing should begin as the turf begins to grow in early spring. Managers should mow frequently enough to avoid removing more than one-third of the existing leaf blade, because removing significant leaf tissue even once in the season causes undue stress and reduces rooting. Though Kentucky bluegrass lawns should be mowed at 3.0 to 3.5 inches, mowing heights on athletic fields range from 1.25 to 2.5 inches. It is preferable to maintain mowing heights as high as feasible given the type of play since lower heights will require more frequent mowing, more irrigation, pest control and fertilizer, and increased labor. Therefore, are more expensive to maintain than when mowed at higher heights. Do not adjust mowing heights up or down during the year, and mow at the same height throughout the year.

Fertilization

Most tend to apply too little nitrogen to athletic fields given the amount of wear and tear incurred on fields. Annual application

amounts should total between 4.0 and 6.0 lbs N/1000 sq ft/year, depending on desired quality and amount and timing of traffic. If a field is damaged from intense traffic or a game played on wet soil, fertilization will have to be increased to help turf recover. About two-thirds of the annual nitrogen should be applied after Labor Day, though spring-use fields require slightly more N during the play period. Fast release sources should be used in fall and/or when the most play is occurring on the field. Slow release sources (Table 1) are normally used in spring and summer to avoid growth flushes. Soil testing should be done every 2 to 3 three years to determine the need for supplemental applications of other nutrients such as phosphorus and potassium (Table 2). More information is available in Soil Testing for Turf Areas listed under Additional Sources at the end of this publication.

Irrigation

Irrigation is essential on sports fields because turf growth must be maintained throughout the year to withstand or recover from traffic. Watering deeply and infrequently upon the first signs of drought stress encourages a deep-rooted turf stand.



Figure 1. Footprinting is good indication that turf requires irrigation to prevent further drought stress. However, even minor drought stress can not be allowed when seedlings are present in the field.

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The first signs of drought stress are a bluish-gray hue to the grass in the heat of the afternoon or footprints that do not recover immediately (Fig. 1). However, overseeding is constantly required on athletic fields and thus, seedlings require frequent and light irrigation. Irrigation is most effective and is less likely to encourage disease when applied in early morning. Avoid heavy irrigation prior to field use to minimize compaction.

Aerification

Aerification is often overlooked in athletic field maintenance, but is critical for a playable, healthy field. Compaction on athletic fields is intense and must be alleviated routinely to ensure safety and aesthetic integrity. Aerification tine diameter should be a minimum of 0.5 inches, penetrate 2 to 4 inches deep, and punch 20-40 holes/sq ft, which affects less than 3% of the surface area (Table 3). Multiple passes from roll-behind type aerifiers are required because these machines usually only punch 6-12 holes/sq ft. Aerification should be done four to eight times during the season, concentrating in the high use areas like soccer goal mouths and between the hashes of football fields. On native soil (soil-based) fields, hollow tines should be used as often as possible, whereas solid tines can be used more often on sand-based fields. Cores can be broken



Figure 2. Annual bluegrass (*Poa annua*) is becoming common in sports turf and is difficult to control.

up with a drag, a piece of chain link fence, or other suitable tool. During the playing season, solid tine aerification can be used to further reduce compaction and improve water and air movement into the soil. Overseeding should be combined with aerification whenever turf density needs improvement.

Overseeding

Overseeding regularly will improve or maintain stand density when exposed to the rigor of athletic traffic. On fields originally seeded to Kentucky bluegrass, Kentucky bluegrass should be used outside of the playing season or whenever the field will not be used for six or more weeks. On fields originally seeded to turf-type tall fescue, tall fescue should be used outside of the playing season or whenever the field will not be used for six or more weeks. Regardless of the original species, perennial ryegrass should be overseeded during the playing season to achieve quick cover. Kentucky bluegrass and especially tall fescue are not fast maturing as seedlings and thus cannot withstand traffic shortly after germination. Many managers will often seed immediately prior to games or practices so the players will “cleat in” the seed for excellent seed-soil contact. Following seeding, provide adequate irrigation for germination and establishment. A starter fertilizer at 1.0 lb P_2O_5 /1000 sq ft applied at seeding will improve establishment, and avoid any herbicides that will affect seedlings (Table 4).

Weed Control

A vigorous, healthy turf stand will be resilient to weeds, so the aforementioned management practices done properly should reduce the need for weed control. Almost all herbicides will negatively affect turf seedlings (Table 4), so refer to product labels before using herbicides. Avoid using preemergence herbicides to control crabgrass since they will also prevent

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emergence of overseeded grasses. Treat crabgrass postemergence during late spring and summer. Broadleaf weeds like dandelion or clover can be controlled with herbicides applied from September through late October. Annual bluegrass (Fig. 2) is becoming common problem in athletic fields and more information can be found in the publication titled “Annual Bluegrass Control” listed under the additional sources at the end of this publication.

Disease Control

Adequate nitrogen fertilization reduces the presence of most diseases of Kentucky bluegrass. If diseases like dollar spot, rust, or red thread are common on a field, it indicates more annual nitrogen is needed on the field. However, excessive nitrogen on athletic fields may increase brown patch and pythium incidence. Brown patch and pythium should only be treated preventively as weather dictates when they have been identified as recurring problems on the field. Another less common disease is gray leaf spot which affects perennial ryegrass or tall fescue. Common diseases in Kentucky bluegrass in Nebraska and the north central US are summer patch and necrotic ring spot (Figure 3). These are root-infecting diseases that are difficult to control and most common in turf with excess thatch. On



Figure 3. Necrotic ring spot and summer patch are common in Kentucky bluegrass, primarily in areas with 0.5 inches or more of thatch.

fields with a history of infection, preventative fungicide applications in early summer can be effective, but control can be variable. For necrotic ring spot, applications should start in mid- to late April followed by a second application one month later. For summer patch, applications should be made after 2-inch soil temperatures reach 65F in mid afternoon for five consecutive days and repeated 28 days later. Most effective control requires aerification prior to application and heavy irrigation after application. More information on disease control is listed under Additional Sources.

Insect Control

White grubs are the most common insect pest in Nebraska and the north central US. These insects feed on roots primarily of Kentucky bluegrass in August and September, which in turn can create an unplayable or even dangerous field. Though finding about 10 grubs/sq ft is considered the treatment threshold in lawns, almost no grubs can be tolerated in fall-use fields. Therefore, white grubs are best treated preventively on fields where they have been identified as a recurring problem. Insecticides should be applied in late July and watered-in immediately after application. Preventative insecticides for white grubs include imidacloprid, halofenozide, thiamethoxam, clothianidin, or chlorantraniliprole, which are available under a variety of brand names. Curative or rescue treatments may be needed if feeding damage is detected during field use. Trichlorfon is usually the most effective product for white grubs after damage is detected. Check the label of your specific product for re-entry periods to accommodate use of the field after application. More information on white grubs is also listed under Additional Sources.

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Growth regulators

Growth regulators are becoming more common on fall-use athletic fields to slightly reduce mowing needs during the off-season. However, growth regulators should be used only on high-maintenance fields not in need of recovery from the previous season. Products containing trinexapac-ethyl are the only products that should be considered for field use. Time the final application of the year so effects wear off just before play starts, so the last application should be about six weeks prior to the first use. Trinexapac-ethyl can also be combined with field paint to extend the visibility of the paint. Refer to the label instruction for specifics.

Topdressing (Sand-based root zones ONLY)

Topdressing should not be considered unless all other cultural management practices have been maximized. Topdressing will improve seed-to-soil contact and aid in thatch management. Topdress sand-based root zones with the same or similarly sized material as is present in the current root zone. Topdressing is most effective following aeration.

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Table 1. Fast and slow release nitrogen sources found in fertilizers for athletic fields.

Fast release (water soluble)	Slow release (slowly water soluble or insoluble)
Urea	Coated N (sulfur, plastic, or resin-coated)
Ammonium sulfate	Urea formaldehydes
Any source listed as “ammoniacal”	Methylene ureas
Any source listed as “water soluble”	Organic N (animal byproducts, etc)
	IBDU (isobutylenediurea)
	Any source listed as “slowly water soluble”
	Any source listed as “water insoluble”

Table 2. Recommended total lbs P₂O₅/1000 sq ft applied between soil tests or the total lbs K₂O/1000 sq ft/yr for athletic turf. Phosphorus recommendations are modified from the University of Wisconsin’s “Interim Turf Nutrient Management Guide” at <http://www.turf.wisc.edu/docs/dnr1100-TurfNutrientManagement.pdf>.

ppm P Bray P1	lbs/A P Bray P1	lbs P ₂ O ₅ /1000 sq ft recommended to be applied between soil tests	ppm K	lbs/A K	lbs K ₂ O/1000 sq ft/yr
0-5	0-11	5	0-25	0-50	4-5
6-10	12-21	5	25-50	50-100	3-4
11-15	22-30	3.5	50-75	100-150	2
16-20	31-40	3.5	75-100	150-200	1
21-30	41-60	2	100+	200+	0
31-40	61-80	2			
41-50	81-100	1			
>50	>100	0			

Table 3. Approximate number of holes punched/sq ft and % surface area affected given aeration tine diameter and spacing.

	Tine spacing						
	2 x 2"	2 x 3"	2 x 4"	2 x 6"	3 x 4"	3 x 6"	4 x 6"
	Holes/sq ft						
Tine diameter	36	24	18	12	12	8	6
1/2"	4.9%	3.3%	2.5%	1.6%	1.6%	1.1%	0.8%
3/4"	11.1%	7.4%	5.5%	3.7%	3.7%	2.5%	1.8%
1"	19.6%	13.1%	9.8%	6.5%	6.5%	4.4%	3.3%

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Table 4. Label restrictions for herbicides when applying prior to or after seeding. Refer to label of specific product before use.

Herbicide type	Example brand name	Common name	Label statements for use over newly-seeded turf
Preemergence annual grass	Tupersan	siduron	Can be applied prior to seeding cool-season grasses and anytime after germination
Pre- and postemergence annual grass	Dimension	dithiopyr	Applications to well-established turf with good root system and uniform stand and has received at least two mowings
Postemergence annual grass	Drive	quinclorac	Can be applied 7 days prior to seeding on any cool-season turfgrass. Can be applied anytime after seeding on tall fescue, but must wait 28 days after emergence of creeping bentgrass, perennial ryegrass, or Kentucky bluegrass.
Postemergence annual grass	Acclaim Extra	fenoxaprop	Limited to 9 oz/A on Kentucky bluegrass that has tillered and has emerged for 1 month. Can be applied to tall fescue, fine fescue, and/or perennial ryegrass that is at least four weeks old.
Postemergence crabgrass, creeping bentgrass, etc	Tenacity	mesotrione	Prior to seeding, or 4 weeks after emergence
Postemergence broadleaf	Most products	2,4-D, dicamba, MCPA, MCPP, triclopyr, fluroxpyr	Newly seeded turf should be mowed 2-4 times prior to treatment.
Postemergence broadleaf	Quicksilver	carfentrazone	Can be applied prior to seeding or 7 days after emergence
Postemergence nutsedge	SedgeHammer	halosulfuron	Applications limited to well-established turf with good root system and uniform stand.
Postemergence nutsedge	Basagran Lescogran	bentazon	Do not apply until well established.
Postemergence nutsedge, etc	Certainty	sulfosulfuron	Recommended for use only on established stands
Postemergence nutsedge, etc	Dismiss	sulfentrazone	Established turf areas only
Postemergence annual bluegrass in creeping bentgrass	Velocity	bysribac	Newly seeded turf must have a developed root system and uniform stand and have received at least two mowings before the first application.

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Table 5. General calendar for maintaining athletic fields in Nebraska and the north central US.

Month	Fertilization	Cultural practices	Pest control	Notes
April	0.50-0.75 lbs N/1000 sq ft			Use on spring-use fields, but may not be needed on fall-use fields. Use fertilizer with 25-50% slow release N*.
		Aerify and overseed		Hollow tines should be used of fall-use fields, solid tines on spring-use fields. Seed Kentucky bluegrass on fall-use Kentucky bluegrass fields and tall fescue on fall-use tall fescue fields, seed perennial ryegrass on spring-use fields.
May	0.50-0.75 lbs N/1000 sq ft			Apply after the spring growth flush. Use fertilizer with 25-50% slow release N.
		Aerify and overseed		Hollow tines should be used of fall-use fields, solid tines on spring-use fields. Seed Kentucky bluegrass on fall-use Kentucky bluegrass fields and tall fescue on fall-use tall fescue fields, seed perennial ryegrass on spring-use fields.
			Crabgrass	Young crabgrass can be controlled POST with mesotrione or quinclorac.
			Broadleaf weeds	Control if a problem, but caution if herbicides used over seedlings.
			Diseases	If a history of summer patch or necrotic ring spot, preventative fungicide should be applied and watered-in.
June	0.50-0.75 lbs N/1000 sq ft			Apply after the spring growth flush. Use fertilizer with 25-50% slow release N.
		Aerify and overseed		Hollow tines should be used on all fields, other than summer-use fields. Seed Kentucky bluegrass on Kentucky bluegrass fields and tall fescue on tall fescue fields.
			Crabgrass	Young crabgrass can be controlled POST with mesotrione or quinclorac.
			Diseases	If a history of summer patch or necrotic ring spot, preventative fungicide should be applied and watered-in.
July	0.50-0.75 lbs N/1000 sq ft			Apply on fall use fields only, use fertilizer with 25-50% slow release N.
		Aerify		Use hollow tines.
			Crabgrass	Young crabgrass can be controlled POST with mesotrione or quinclorac
			White grubs	If a history of white grubs, preventative insecticides should be applied and watered-in.
			Diseases	If a history of brown patch or pythium, preventative fungicide should be applied if weather dictates.

*% slow release N = total % of slow release forms listed on the label ÷ % of total N.



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Table 5 (continued). General calendar for maintaining athletic fields in Nebraska and the north central US.

Month	Fertilization	Cultural practices	Pest control	Notes
Aug	0.75-1.0 lbs N/1000 sq ft			Apply on fall-use fields immediately prior to fall season. Use fertilizer with 25-50% slow release N.
			White grubs	If white grubs are found in the field, curative insecticides should be applied immediately and watered in.
			Diseases	If a history of brown patch, pythium, or gray leaf spot, preventative fungicide should be applied if weather dictates.
September	1.0 lb N/1000 sq ft			Apply on fall- and spring-use fields. Use fertilizer with 0-25% slow release N.
			White grubs	If white grubs are found in the field, curative insecticides should be applied immediately and watered in.
		Aerify and overseed		Solid tines and perennial bluegrass on fall-use fields. Hollow tines and Kentucky bluegrass on Kentucky bluegrass spring-use fields, tall fescue on tall fescue spring-use fields.
			Diseases	If a history of gray leaf spot, preventative fungicide should be applied if weather dictates.
October	1.0 lb N/1000 sq ft			Apply only on fall-use fields use fertilizer with 0-25% slow release N.
		Aerify and overseed		Use solid tines and perennial ryegrass on fall-use fields. Use hollow tines and Kentucky bluegrass on spring-use fields
			Broadleaf weeds	Control if a problem, but caution if herbicides used over seedlings.
November	1.0 lbs N/1000 sq ft			Apply on all fields, use fertilizer with 0-25% slow release N near or preferably prior to the last mowing.
		Aerify and overseed		Use hollow tines and dormant seed Kentucky bluegrass on fall-use Kentucky bluegrass fields, and tall fescue on fall-use tall fescue fields.

*% slow release N = total % of slow release forms listed on the label ÷ % of total N.