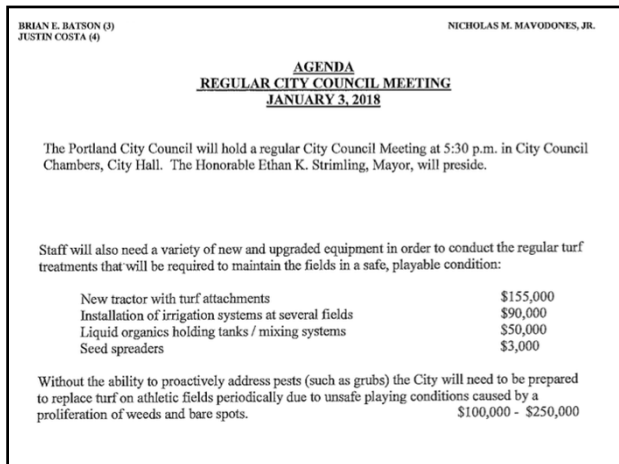




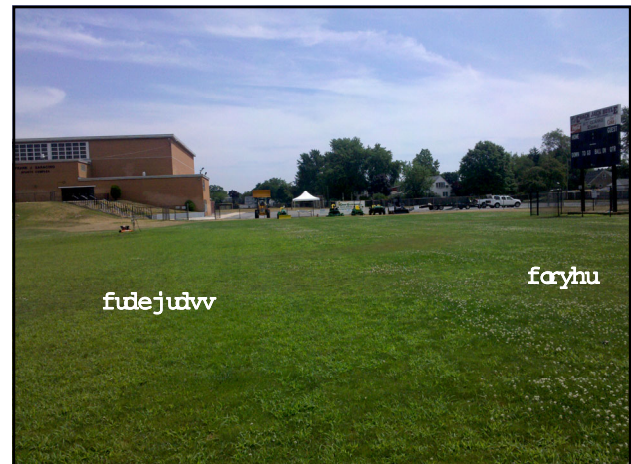
1



2



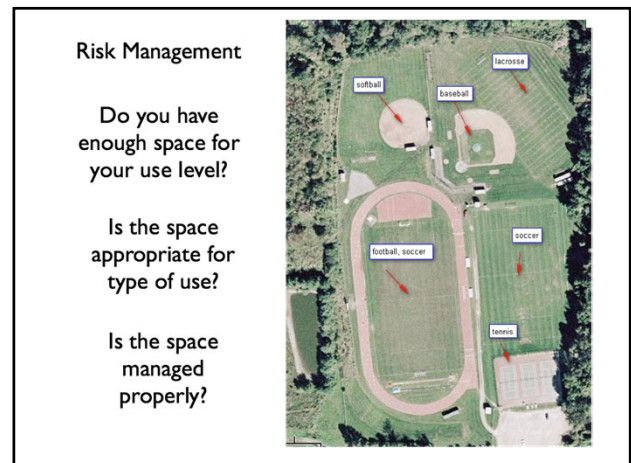
3



4



5



6

Duty of Care

A duty of care is a legal obligation on an individual or organization requiring that they adhere to a standard of reasonable care while performing any acts that could foreseeably harm others. It is the first element that must be established to proceed with an action in negligence.

7



Designation: F 2060 – 00 (Reapproved 2005)

An American National Standard

Standard Guide for Maintaining Cool Season Turfgrasses on Athletic Fields¹

This standard is issued under the fixed designation F 2060; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide covers the minimum requirements for maintaining cool season turfgrasses used for natural surface athletic fields. Practices covered include mowing, fertilization, irrigation, core cultivation, overseeding, and pest management.

1.2 The decisions involved in maintaining a quality natural playing surface should consider soil types, local climate and other factors; therefore, it is recommended that you contact your local cooperative extension service for more specific information on soils, and grass species and cultivars adapted to your area.

1.3 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

providing firm footing for the athletes and by cushioning their impact from falls or tackles. These standards are the minimum inputs required to provide such a surface. Various published guides have been used in the development of this guide (1-3).²

3.2 Field conditions may directly influence the frequency and type of athletic injuries occurring as a result of using the fields. While these standards do not guarantee that such injuries will be prevented, a well-maintained turf on a natural playing surface should minimize field-related injuries.

4. Apparatus

4.1 General—Experience and good judgment are important to match the proper type of equipment to the nature of the task to be performed.

4.1.1 Mowing Equipment—Mower types include reel, rotary, and flat; although, the latter type is not recommended for fine playing surfaces. A reel mower should be used for playing

Make your districts aware of this document!

8

SportsTurf
MANAGERS ASSOCIATION

Experts on the Field. Partners in the Game.
www.stma.org

SAFE
The Foundation for Safer Athletic Fields

Natural Grass Athletic Fields

It is becoming more common that high schools and parks and recreation departments are replacing their natural grass playing surfaces with synthetic fields. The reason is often due to the belief that synthetic surfaces are less expensive and easier to maintain than natural surfaces. Synthetic is not an effective replacement if lower maintenance costs are the goal. In addition, it is not a solution to natural grass fields if they are being replaced for aesthetic reasons because they are worn out in the center at the end of the season. The following resource provides a detailed look into the benefits, disadvantages and cost effectiveness of maintaining natural grass fields for recreation.

Natural Grass Benefits

www.stma.org/_files/_items/stma-mr-tab1.../naturalgrassfields.pdf

9

10

Let's have a conversation about the fields

Sports Field Assessment Sheet*												
Location	Light	Water	Fertilizer	Color	Bare Soil	Weeds	Mowing	Feel of Ground	Terrain	Intensity	Expected Quality	Total Score
	% shade	Irrigated or not	Appel/yr	Nutrient or pest issues	% exposed soil	% non-grass	Mowing Height inches	Surface Firmness	Surface Drainage	Events per year	How close to perfect?	
1	full sun	1 yes	1 2 or more	1 green	0-25%	0-25%	2-4.5"	1 firm	1 adequate	2 or less	1 no concern	
2	partial shade	2 no	2 1	2 evenly yellow	25-50%	25-50%	1.5-2"	2 spongy	2 some puddling	3 2-4	2 somewhat	
3	deep shade		3 none	3 patchy yellow	3 >50%	3 >50%	3 >4.5"	3 hard	3 large pools	5 >4	3 perfect	
					5 no turf	5 no turf						
Travis HS Football	1	2	1	1	2	1	1	2	2	1	3	17
Hector Soccer	1	2	3	3	3	3	1	4	3	5	3	31

* Assess each field to determine if adjustments in your management program are necessary.
Rating:
11-20 continue current management, except if color rating 3 or bare soil rating >2
21-35 reassess management program, unless quality expected is <3
>35 consider renovation, change in use intensity or quality expectations

11

z z z ~~rough~~ r p

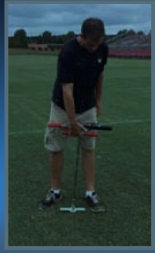
12



13

Performance Testing

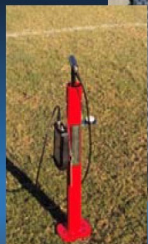
- Used to evaluate field playability
 - Linked to player safety
- Can identify field variability
 - Soil compaction
 - Soil moisture
 - Surface hardness
 - Surface evenness
 - Sod strength
 - Root mass/depth



14

Surface Hardness

- Clegg Impact Tester
- Determines surface hardness in the upper 2 inches of the soil profile
- Recorded in gravities (G-max)




15

Surface Type	Clegg Value (g)
Cement floor	1426
Asphalt road	1442
Tennis court (outdoor composition)	1422
Composition running track	1432
Basketball court (wood)	640
Football stadium - outdoor, 4yo artificial	175
Football stadium - indoor, 1yo artificial	141
Baseball - bare clay infield	504
Baseball - natural turf field (Bermudagrass)	100
Sifers & Beard, 1997	

16

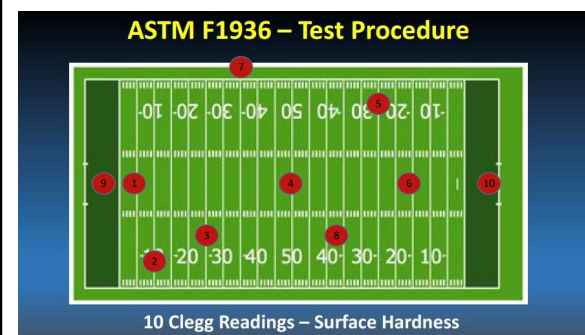
Shear Strength

- Shear Vane
- Measures rotational strength of the turfgrass (Nm)
- Influences the ability of athletes to grip the turf and make cuts

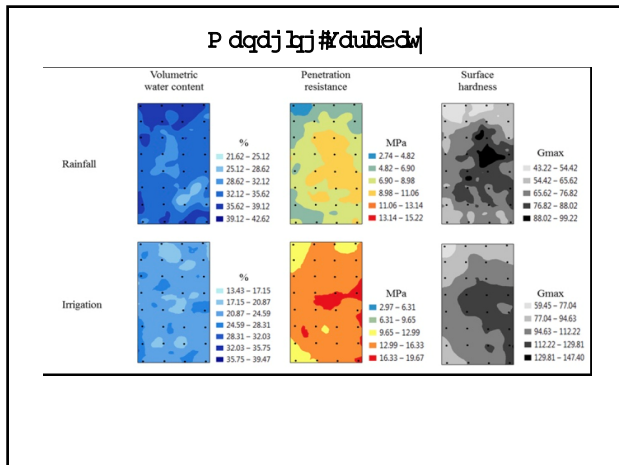




17



18



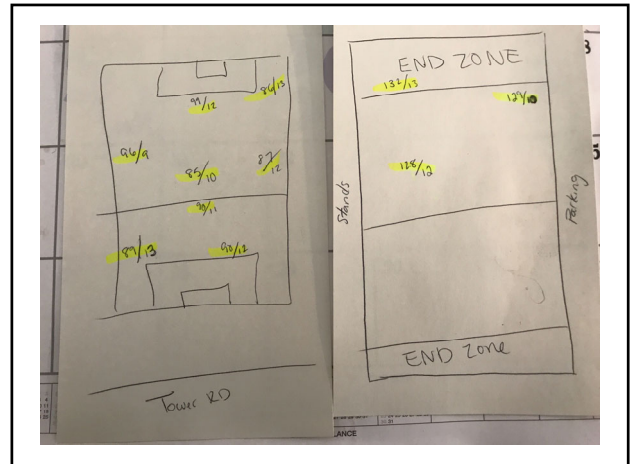
19



20



21



22

Cornell University

Sports Field Management

Maintaining safe sports fields

Home Soils Grasses Routine care Pests **Synthetic turf** Management schedules Resources

Home

Synthetic turf

Is adding a synthetic field the answer?

Many factors impact the capacity of a sports field to handle high usage including: the soil type, grass species, weather conditions, kind of sport, amount of usage, management program, etc.

Most school sports fields are also used for gym class, band practice, community activities as well as practices and games. Native soil fields can take just so much use before the turf thins and compaction becomes severe. Overuse does impact the function and aesthetic expectations of sports fields.

Some managers have considered adding a synthetic turf field which can be played on essentially 24 hours a day, seven days a week. Having and using a synthetic turf field would allow native soil fields to be rested and have time to recuperate. These fields are especially useful in the spring and fall when temperatures are more moderate than in the heat of the summer.

23

Athletes in Division I competitions experienced **199% higher** PCL injury rates on artificial turf than on natural grass.

Athletes in Division II and III competitions experienced **63% higher** ACL injury rates on artificial turf than on natural grass.

Athletes in Division II and III competitions experienced **213% higher** PCL injury rates on artificial turf than on natural grass.

24



25



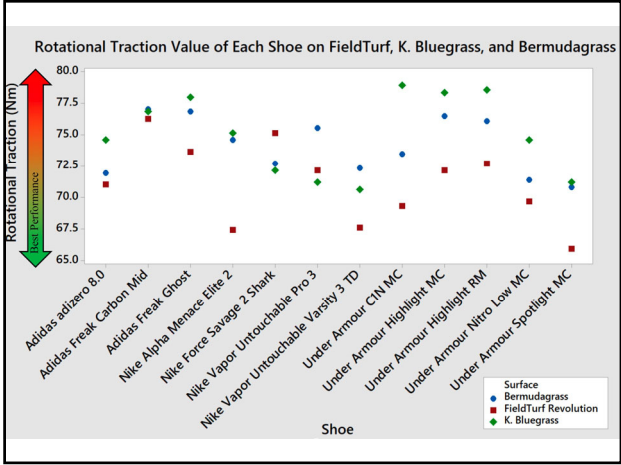
26



27



28



29



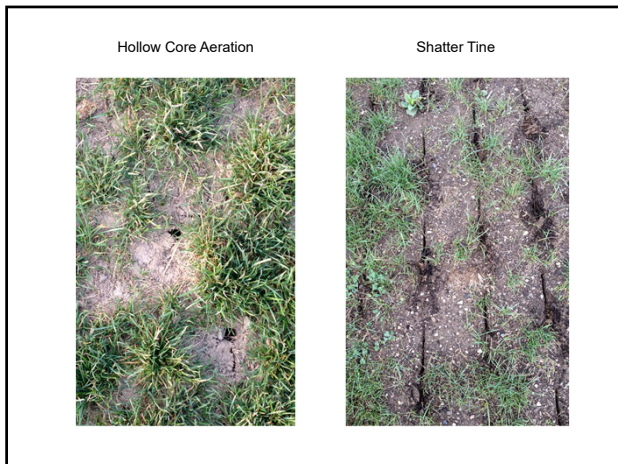
30



31



32



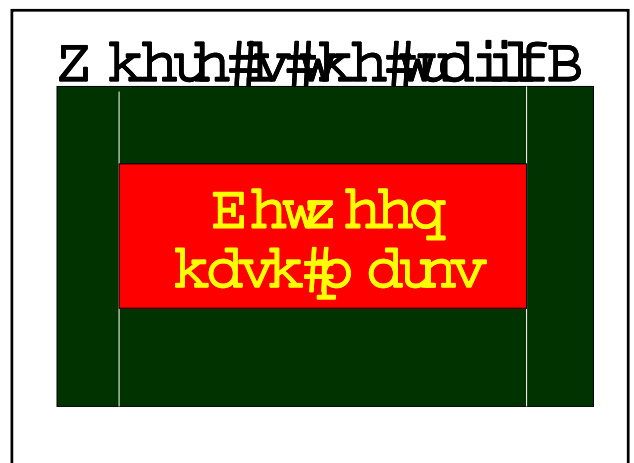
33



34



35



36

Iuhtxhgq#R yhuVhhg bj

✓ P rz hg#z hhnq #dw#”

✓ WdiiFnhg#htxlydhw#r #B #j dp hv#shu#z hhn

✓ Q r#uuj dwrq

✓ Ihw d)hg#P hp ruddG d|Zderu#G d|

✓ Gurs#vsundghuQr#v d#vhhghu

✓ U |hj u dvvE o xhju dvv2w d#hvf xh

37

PR Results

Year 1

Treatment	TD	WD	TQ	Gmax
Control	20	30	3.7	130
2	55	20	4.3	102
4	62	15	4.8	75
8	70	12	5.6	72
10	85	10	6.8	55
lsd (0.05)	15	NS	1.2	21

20% below avg. rainfall

38

PR Results

Years 2/3

Treatment	TD	WD	TQ	Gmax
Control	5	75	1	122
2	85	5	6.6	55
4	90	3	6.9	52
8	95	5	7.2	58
10	100	0	7.5	52
lsd (0.05)	17	11	1.7	18

25-40% above avg. rainfall

39

Z khuh#v#kh#wdiiFB

Ehwz hhq
kdvk#p dunv

40

Economics of Frequent Over-seeding

- Assume seed rate 2 lbs per 1000
- Assume cost \$1.25/ lb.
- Weekly cost \$2.50/1000
- Assume 16,000 sq ft = \$40/week
- Assume 26 weeks = \$1040

41



42

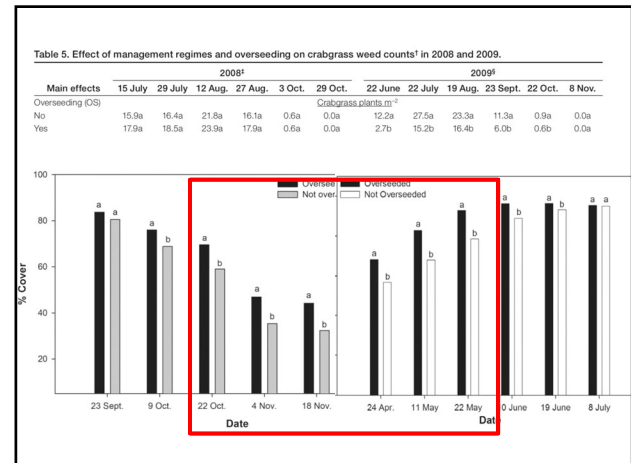
RESEARCH

RESEARCH

Organic Management Practices on Athletic Fields: Part 1. The Effects on Color, Quality, Cover, and Weed Populations

Nathaniel A. Miller and Jason J. Henderson*

43



44

ON THE FIELD

Demonstrating different management options for a municipal sports complex

// BY DR. DOUG SOLDAT, DR. PAUL KOCH, DR. CHRIS WILLIAMSON, KURT HOCKEMEYER & NICK BERG

45

Table 4. The four management programs resulted in different pesticide impact scores.

Field#	Management Program	Environmental Impact Quotient (EIQ)	Hazard Quotient (HQ)
FIELD 1	Organic	0 (55)	0 (5794)
FIELD 2	City of Stoughton 2015 TruPower 3 2017 Millenium Ultra 2 2017 Dimension 2017 Millenium Ultra 2 Total	55 28 8 28 119	5794 2097 280 2097 10268
FIELD 3	Integrated Turfgrass Management 2015 Confront 2017 Confront Total	11 11 22	1344 1344 2688
FIELD 4	Mowing Only	0	0

* applied in 2015 only
** applied in 2017 only

46

Table 5. Estimated costs of the products used in each of the four programs. These costs were estimated from discussions with local turfgrass suppliers and applicators.

Field#	Management Program	Approx. Fertilization Cost per acre, per year	Approx. Herbicide Cost per acre, per year	Total Cost per acre, per year
FIELD 1	Organic	\$250	\$0	\$250
FIELD 2	City of Stoughton	\$70	\$46	\$116
FIELD 3	Integrated Turfgrass Management	\$170	\$22	\$192
FIELD 4	Mowing Only	\$0	\$0	\$0

47

In conclusion, we found that all three fields treated with fertilizer produced acceptable turfgrass quality for the majority of the study period. Weed populations were kept below 20% for the two treatments using herbicides. Weeds were highest in the mowing only program, followed by the organic management program, which saw substantial weed encroachment in 2017. This finding highlighted that weed encroachment cannot be managed by maintaining adequate fertility alone at this site.

48

Cornell University Search Cornell [Contact](#) [About](#)

Sports Field Management

Maintaining safe sports fields

[Home](#) [Soils](#) [Grasses](#) [Routine care](#) [Pests](#) [Synthetic turf](#) [Management schedules](#) [Resources](#)



Watering

Investing in Safe Sports Fields

Children, youth and adults use school grounds and community parks sports for recreation and other health-improving outdoor activities. New York State alone has more 40,000 acres devoted to these uses.

The challenge for sports turf managers is to provide safe, functional and aesthetically pleasing fields.

This website brings you the latest best management practices for managing sports fields and resources for all who care for and use sports fields.

[Learn more.](#)

For Coaches and AEs

To prevent injuries and help your athletes play their best, you need safe, high-quality turf. [Learn more.](#)

For Administrators

Your support of Best Management Practices for turf is essential to foster safe playing fields. [Learn more.](#)

Manage for safety

Explore how you can manage your fields for maximum safety:

- Managing soils
- Choosing grasses
- Routine care
- Managing pests
- Synthetic turf
- Management schedules

Cornell turfgrass

ShurCUTT highlights: Week 20
09-19-2014 09:59
To receive the weekly ShurCUTT newsletter... [Read Post](#)

ShurCUTT highlights: Week 19
09-04-2014 14:01
To receive the weekly ShurCUTT newsletter... [Read Post](#)

Comments, suggestions, feedback?
Use this form to contact us.

49

Cornell University Search Cornell [Contact](#) [About](#)

Sports Field Management

Maintaining safe sports fields

[Home](#) [Soils](#) [Grasses](#) [Routine care](#) [Pests](#) [Synthetic turf](#) [Management schedules](#) [Resources](#)

For Coaches and Athletic Directors

Whose fields are these anyway? Working towards a common goal

Athletic Directors and Coaches can work with and support their Field Manager on providing good quality playing fields by learning:

- How overuse of fields (image) especially under very wet or very dry conditions can injure turf density which is necessary for athlete performance (traction and footing) and safety.
- About Best Management Practices necessary to provide safe, functional fields.
- That field use needs to be based on current field conditions and less on planned schedules.



Field Management Schedules

How to use field management schedules

- Spring only sports
- Fall only sports
- Spring and fall sports
- Year-round schedule

50

Take action

Administrators can improve their own knowledge of sports field management by reviewing the information provided in this website. Start with the [Management Schedules](#) which provide a guide for routine operations. **Keep in mind that the Field Manager must adjust management decisions daily given current field conditions and predicted weather patterns.**

Also take an active role in improving the management of the sports fields by developing and working with a team that includes the Field Manager, Athletic Director, Coaches and other vested partners, to:

- Support the use of Best Management Practices. Improve your relationship with the Field Manager by learning about their knowledge, experience and commitment to providing safe, functional fields. Acknowledge their assessment of field conditions and support their recommendations about field use. Encourage their continuing education.
- Encourage the establishment of a field maintenance record keeping system that will allow Field Managers to assess the impact of their work and allocation of resources. Administrators will learn the cost of keeping safe functional fields.
- Promote the education and understanding of the real cost of overuse and the impact on field quality to all those who use the fields including coaches, Athletic Directors, community members, etc.
- Develop a field use policy for outside groups with realistic expectations, that can be implemented and supported. Consequences for misuse should be spelled out and establish a cost recovery policy for repairs and renovation.
- Build better relationships with all partners by developing a communication system that promotes shared decision-making when it comes to reasonable field use or when closing a field is necessary.

51

Impact of overuse on field quality and safety

Stakeholder	Perspective	High demand or Overused Fields	Results in
Athletic Directors Coaches Players Field users	- Want good quality playing field - Fit in all practices and games	- Keep planned field use schedule - Must fit in games no matter what	- Loss of turf cover - Exposure of soil (slippery when wet) - Increase in compaction (field hardness) - Increase in injury potential - Increase in cost of field repair
Grounds Manager	- Implement BMP that promote dense turf for safety and performance - Meet reasonable expectations given labor, time, budget	- Adjust management program to address demand and predicted rainfall. - Determine if field is safe for use, close if necessary	- Fields need time to recover and should not be used - Extra labor, products, cost to recover from abuse

52

Cornell Turfgrass

Spring and Fall Sports Minimal Management Schedule

Management schedules are approximate "ideal" timing for specific practices. These timings will be adjusted based on weather conditions, soil type, and field use.

Operation	Field in Use			Field Rest and Recover			Field in Use		
	March	April	May	June	July	August	Sept	October	November
Mowing Keep mower blades sharp to reduce turf injury and fuel consumption.	Establish mowing height appropriate for particular sport. Increase mowing frequency to increase turf density.								
Watering Irrigate on 1.5" soil moisture, increasing and decreasing as needed.	Inability to supply water during dry periods increases risk of injury from excessive surface hardness. When possible follow the Medium Management program by borrowing irrigation equipment.								
Fertilizing Amount of Nitrogen per 1,000 sq. ft. Use soil test for precision (N) recommendations.	Follow NPS Use and do not apply fertilizer before April 1. Check your local fertilizer laws.	Apply before season starts, at a 50% water soluble nitrogen source in mid-late May.	Apply 1/4 of a 50% water soluble nitrogen source in mid-August.	Apply 1/4 of a 50% water soluble nitrogen source in mid-September.	Apply 1/4 of a 50% water soluble nitrogen source in mid-October.	Fertilizer applications may be necessary, check local fertilizer laws.			
Cultivating Avoid aerifying when turf is under stress or soil is too dry or too wet.	Inability to cultivate will increase risk of injury from excessive surface hardness and thin turf. When possible follow the Medium Management program by borrowing cultivation equipment.								
Overseeding Focus on high-use areas.	Seed perennial rye at 247,000 sq. ft. weekly in high-use areas.					Seed perennial rye at 247,000 sq. ft. weekly in high-use areas.			
Topdressing For leveling the field, reducing thatch, improving condition.	Inability to topdress will increase risk of injury from irregularities in the surface. When possible follow the Medium Management program by borrowing topdressing equipment.								

7/2014 safesportsfields.cals.cornell.edu

53

Cornell Turfgrass

Year Round Sports High Management Schedule

Management schedules are approximate "ideal" timing for specific practices. These timings will be adjusted based on weather conditions, soil type, and field use.

Operation	Field in Use											
	March	April	May	June	July	August	Sept	October	November			
Mowing Keep mower blades sharp to reduce turf injury and fuel consumption.	Establish mowing height appropriate for particular sport. Increase mowing frequency to increase turf density.											
Watering Irrigate on 1.5" soil moisture, increasing and decreasing as needed.	Monitor rooting depth and moisture level in the root zone. Allow some moisture stress to encourage deep rooting.											
Fertilizing Amount of Nitrogen per 1,000 sq. ft. Use soil test for precision (N) recommendations.	Follow NPS Use and do not apply fertilizer before April 1. Check your local fertilizer laws.	Apply before season starts, at a 50% water soluble nitrogen source or 50% organic nitrogen source in mid-late May.	Apply 1/4 of a 50% water soluble nitrogen source or 50% organic nitrogen source in mid-August.			Apply 1/4 of a 50% water soluble nitrogen source in mid-September.	Apply 1/4 of a 50% water soluble nitrogen source in mid-October.	Fertilizer applications may be necessary, check local fertilizer laws.				
Cultivating Avoid aerifying when turf is under stress or soil is too dry or too wet.	Solid time cultivate in multiple directions to maintain infiltration of air and water. Focus on high-use areas.											
Overseeding Focus on high-use areas.	Seed perennial rye at 247,000 sq. ft. weekly in high-use areas.							Seed perennial rye at 247,000 sq. ft. weekly in high-use areas.				
Topdressing For leveling the field, reducing thatch, improving condition.	Lightly roll high spots to level surface, check field for low spots and fill in.							Lightly roll high spots to level surface, check field for low spots and fill in.				

7/2014 safesportsfields.cals.cornell.edu

54



Fall Sports Minimal Management Schedule

Management schedules are approximate "ideal" timing for specific practices. These timings will be adjusted based on weather conditions, soil type, and field use.

Operation	Field Rest and Recover					Field in Use				
	March	April	May	June	July	August	Sept	October	November	
	Spring					Summer				
Mowing Keep mower blades sharp to reduce turf injury and fuel usage.	Mow at the highest recommended cutting height for the grass species growing that minimizes mowing.					Reduce mowing gradually at "1/2" per week until desired height attained. Increase mowing frequency to increase turf density.				
Watering Base irrigation on ET, soil moisture, surrounding and field use.	Inability to supply water during dry periods increases risk of injury from excessive surface hardness and thin turf. When possible follow the Medium Management program by borrowing irrigation equipment.									
Fertilizing Amount of Nitrogen per 1,000 sq. ft. Use soil test for preference (N recommendations).	Follow NRS law and do not apply fertilizer before April 1. Check local fertilizer laws.					Apply 18 of a 50% water soluble nitrogen source in early April. Apply 18 of a 50% water soluble nitrogen source in mid-August. Fertilizer applications may be restricted, check local fertilizer laws.				
Cultivating Avoid working when turf is under stress or soil is too dry or too wet.	Inability to cultivate will increase injury from excessive surface hardness and thin turf. When possible follow the Medium Management program by borrowing cultivation equipment.									
Overseeding Focus on high-use areas.						Seed perennial ryegrass at 28/1,000 sq. ft. weekly in high-use areas.				
Todpressing Use rolling law spinn, rolling, mats, improving seedbed.	Inability to todpress will increase risk of injury from irregularities in the surface. When possible follow the Medium Management program by borrowing todpressing equipment.									

7/2014

safesportsfields.cals.cornell.edu

55



Fall Sports Medium Management Schedule

Management schedules are approximate "ideal" timing for specific practices. These timings will be adjusted based on weather conditions, soil type, and field use.

Operation	Field Rest and Recover					Field in Use				
	March	April	May	June	July	August	Sept	October	November	
	Spring					Summer				
Mowing Keep mower blades sharp to reduce turf injury and fuel usage.	Mow at the highest recommended cutting height for the grass species growing that minimizes mowing.					Reduce mowing gradually at "1/2" per week until desired height attained. Increase mowing frequency to increase turf density.				
Watering Base irrigation on ET, soil moisture, surrounding and field use.	Monitor rooting depth and moisture level in the root zone. Allow some moisture stress to encourage deep rooting.					Apply at least 3" to 5" every 4 weeks to avoid dormancy. Limit traffic.				
Fertilizing Amount of Nitrogen per 1,000 sq. ft. Use soil test for preference (N recommendations).	Follow NRS law and do not apply fertilizer before April 1. Check your local fertilizer laws.					Apply 18 of a 50% water soluble nitrogen source in mid-late May. Apply 18 of a 50% water soluble nitrogen source in mid-August. Fertilizer applications may be restricted, check local fertilizer laws.				
Cultivating Avoid working when turf is under stress or soil is too dry or too wet.						Solid tine cultivate in multiple directions when fields are in use to maintain infiltration of air and water. Focus on high-use areas.				
Overseeding Focus on high-use areas.						Seed perennial ryegrass at 28/1,000 sq. ft. weekly in high-use areas.				
Todpressing Use rolling law spinn, rolling, mats, improving seedbed.						Lightly roll high spots to level surfaces, check field for low spots and fill in. Hollow tine cultivate, break up cores to use in todpressing.				

7/2014

safesportsfields.cals.cornell.edu

56



Fall Sports High Management Schedule

Management schedules are approximate "ideal" timing for specific practices. These timings will be adjusted based on weather conditions, soil type, and field use.

Operation	Field Rest and Recover					Field in Use				
	March	April	May	June	July	August	Sept	October	November	
	Spring					Summer				
Mowing Keep mower blades sharp to reduce turf injury and fuel usage.	Mow at the highest recommended cutting height for the grass species growing that minimizes mowing.					Reduce mowing gradually at "1/2" per week until desired height attained. Increase mowing frequency to increase turf density.				
Watering Base irrigation on ET, soil moisture, surrounding and field use.	Monitor rooting depth and moisture level in the root zone. Allow some moisture stress to encourage deep rooting.					Apply at least 3" to 5" every 4 weeks to avoid dormancy. Limit traffic.				
Fertilizing Amount of Nitrogen per 1,000 sq. ft. Use soil test for preference (N recommendations).	Follow NRS law and do not apply fertilizer before April 1. Check local fertilizer laws.					Apply 18 of a 50% water soluble nitrogen source in mid-late May. Apply 18 of a 50% water soluble nitrogen source in mid-August. Fertilizer applications may be restricted, check local fertilizer laws.				
Cultivating Avoid working when turf is under stress or soil is too dry or too wet.						Solid tine cultivate in multiple directions when fields are in use to maintain infiltration of air and water. Focus on high-use areas.				
Overseeding Focus on high-use areas.						Seed perennial ryegrass at 28/1,000 sq. ft. weekly in high-use areas.				
Todpressing Use rolling law spinn, rolling, mats, improving seedbed.						Lightly roll high spots to level surfaces, check field for low spots and fill in. Hollow tine cultivate, break up cores to use in todpressing.				

7/2014

safesportsfields.cals.cornell.edu

57

www.Safesportsfields.cals.cornell.edu

Cornell University

Sports Field Management

Managing safe sports fields

Home Soils Grasses Routine care Pests Synthetic turf Management schedules Resources

Investing in Safe Sports Fields

Children, youth and adults use school grounds and community parks sports for recreation and other health-improving outdoor activities. New York State alone has more 40,000 acres devoted to these uses.

The challenge for sports turf managers is to provide safe, functional and aesthetically pleasing fields.

This website brings you the latest best management practices for managing sports fields and resources for all who care for and use sports fields.

Learn more.

Manage for safety

Explore how you can manage your fields for maximum safety:

- Managing soils
- Choosing grasses
- Routine care
- Managing pests
- Synthetic turf
- Management schedules

Cornell turfgrass

ShortCUT highlights: Week 20
09-19-2014 09:59
To receive the weekly ShortCUT newsletter... [Read Post](#)

ShortCUT highlights: Week 19
09-04-2014 14:01
To receive the weekly ShortCUT newsletter... [Read Post](#)

Comments, suggestions, feedback?

[Use this form to contact us.](#)

58