

HOW MUCH FIELD AREA DOES YOUR CORE CULTIVATION PROGRAM ACTUALLY IMPACT?

<http://turfgrass.hort.iastate.edu/extension/core.pdf>

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Use the following tables to determine how much of the field area is actually being impacted by your coring program. Did you realize that using a 3/4-inch hollow tine more than doubles the area of the field that is impacted compared to a 1/2-inch tine? Let's suppose that your goal is to remove 50% of the field area to a depth of your aerifier tine. The field is predominately clay and you want to begin to remove it from the field and replace it with sand. If you remove cores on 3-inch centers, it will require 22 passes over the field using 1/2-inch hollow tines in order to meet your goal of removing 50% of the clay soil. At two corings per year this would require 11 years and that might be too long to wait. By using 3/4-inch tines you can achieve the same goal in 10 passes over the field. If you increase your aerification and topdressing to three times per year you can achieve your goal of replacing 50% of the surface in nearly three years.

In the case of soil modification, the most effective modification, greatest change in physical properties with the least amount of added sand, has been obtained from sands in the very coarse to coarse size range. Rounded sands that are narrowly graded and have coefficient of uniformity less than 2 are preferred. Select a uniform coarse sand (80% of the particles between 1.0 and 0.5 mm and 90% between 2.0 and 0.5 mm) to maximize large pore space when modifying native soil fields high in silt and clay. Mixtures of predominately coarse and medium sand, with some fine sand, are best for amending native soils. Adding very fine sand or silt and clay does little to improve soils already high in silt, clay, and very fine sand. Golf course topdressing sands containing at least 60% in the medium and fine category are acceptable for topdressing sport fields. Avoid using sands high in the fine and very fine range since they do not contribute to increasing macropore space.

Amount of sand required and area impacted for various coring and topdressing programs.

Core space in.	Holes per sq. ft.	Tine dia. in.	Tine depth in.	sand needed to fill holes + leave some on surface (ton/1000sqft)			% area removed each pass	Number of passes with aerifier to impact a given area of the field		
				+1/8"	+1/4"	+1/2"		50% removed	25% removed	10% removed
2	36	.5	3	1.22	1.78	2.89	5.0	10	5	2
			8	1.76	2.87	4.00				
		.75	3	2.04	2.60	3.72	11	5	2	1
			8	4.51	5.08	6.19				
3	16	.5	3	.85	1.41	2.53	2.2	22	11	5
			8	1.34	1.9	2.93				
		.75	3	1.22	1.78	2.89	5	10	5	2
			8	2.32	2.87	4.00				
4	9	.5	3	.72	1.28	2.40	1.3	40	20	8
			8	.99	1.55	2.68				
		.75	3	.93	1.49	2.61	3	18	9	4
			8	1.55	2.10	3.22				
6	4	.5	3	.63	1.19	2.31	0.5	90	45	18
			8	.75	1.31	2.42				
		.75	3	.72	1.28	2.40	1.3	40	20	8
			8	.99	1.55	2.68				
8	2.25	.5	3	.60	1.16	2.28	.31	161	81	32
			8	.68	1.22	2.35				
		.75	3	.65	1.21	2.33	.69	72	36	15
			8	.81	1.36	2.48				
No coring topdress only				.56	1.12	2.24				

*Assume sand weighs 1.45 ton/cu. yd. and there is 100% efficiency on subsequent passes with aerifier.

Topdressing and amending sands for “native soil” athletic fields.

Size	Sieve Size (mesh)	Particle Diameter (mm)	Ideal % by wt.		Acceptable %by wt.
Gravel	10	2.0 -3.4			20% max, with 3% max from gravel
Very Coarse Sand	18	1.0 -2.0		90% min	
Coarse Sand	35	0.5 –1.0	80%min		
Medium Sand	60	0.25 - 0.50			60% min
Fine Sand	100	0.15 - 0.25	none		20% max
Very Fine Sand	270	0.05 - 0.15	none		5% max
Silt		0.002 - 0.05	none		5% max
Clay		<0.002	none		3% max

CULTIVATION GOALS

There are many cultivation methods available for sports turf management. The best method of cultivation can be selected when specific cultivation goals have been determined.

Cultivation Goal	Hollow tine 4-inch	Solid tine 4-inch	Hydroject	Shatter tine 4-inch (Aera-Vator)	Shatter blade (AerWay)	Vertidrain	Floyd McKay drill & fill	Slicing Koro Topdressing/recycler	Small slicing/spiking	Vertical mower
Cultivation between playing seasons (no activities scheduled on the field)										
Change soil type in top 4 inches by removing soil and back filling with amendment	x							x		
Create large and deep holes or channels that can be back filled with a soil amendment							x	x		
Remove surface soil layer that was attached to sod during sand-based field construction	x							x		
Promote deep rooting, 8 inches or more			x		x	x	x	x		
Maximum removal of water puddles					x	x	x	x		
Aggressive fracturing of hard ground (surface to 6 inches deep)				x	x	x				
Cultivation during playing season										
Increase initial water infiltration rate with minimal disturbance to surface	x	x	x	x	x	x			x	
Plant seed with minimal disturbance to grass and soil stability		x		x						
Encourage lateral growth of sod forming grasses									x	x
Fracture hard skin infield, drag surface, and begin play				x						
Fracture hard grass fields				x	x	x				

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Fast operation over field					x					
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PRE-GERMINATED DIVOT MIX for REPAIRING ATHLETIC FIELDS

<http://turfgrass.hort.iastate.edu/extension/preseed.pdf>

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Most cool-season grasses can be pre-germinated to speed establishment and recovery on athletic fields. Perennial ryegrass, Kentucky bluegrass, and tall fescue have been pregerminated and used in a divot mix to hasten seedling establishment. The following program is used by the Iowa State University turf management team to manage the sand-based fields at Jack Trice Stadium and Johnny Majors practice facility.

Begin the pregermination process 4 or 5 days before the time you will actually apply seed to the field.

Submerge seed for 12 hours. Put a 50 lb bag of seed into a large water tight container. We keep four 50 gallon plastic trash cans on hand and mark them “for pregermination only”. Woven plastic seed bags that seed typically comes in are perfect for pregermination – the water soaks through the bag and the seed remains contained during the draining cycle. Fill the container with water so that the seed is completely immersed. Add 4 oz. Pana-Sea to each container with the seed and water. A heated shop is preferred so that everything equilibrates to about room temperature or 70°F. Do not use chilled water or freezing conditions. Include a fungicide such as Subdue to the soaking mixture during the early football season if seedling damping off by *Pythium* is anticipated.

Drain seed for 12 hours. It is recommended to have a 12 hour soak cycle followed by a 12 hour drain cycle, followed by another 12 hour soak cycle. For convenience we remove the bags each morning and allow them to drain during the 8 hour work day. Before the end of the work day we set up another soak cycle for the night. Even when we have forgotten about the bags and allowed them to soak for 2 or 3 days there has still been good germination.

Pregerminated seed is alive. Even though you may not see root tips the seeds have begun to respire and are alive... there is no turning back now. If the pregerminated seed dries in storage or in the field after planting it will die. You can refrigerate, not freeze, the living seed for about a week to slow down the growth if you want to plant it later.

Make divot mix by combining pregerminated seed, sand, turface, and green dye. Remove the seed bag from the pregermination container and allow a few minutes for drainage. A concrete or smooth blacktop surface works fine for mixing. Dump a 5-gallon bucket of sand on the surface and add some seed, turface, and dye over the pile. Use plastic to avoid staining of the hard surface if desired. Continue adding sand, seed, Turface, and dye until you have a layered pile. Shovel the pile to one side and then back again to mix. The recipe is 15 lbs of perennial rye or 10 lbs of Kentucky bluegrass seed, 40 gallons sand, 50 lbs Turface, and 32 oz Green Lawnger dye.

Remove divot debris before seeding. Load a 5-gallon bucket half full of divot mix and work the field from sideline to sideline five yards at a time. After mechanically sweeping the field there may still be debris in the divot that can be swept out by hand to insure good placement and establishment of the divot mix. Simply work a handful of mix into the divot then firm and level with your foot. Turf that is pushed-up or bubbled is worked back in place and flattened by foot. Divots that are completely dislodged seldom root sufficiently so they are removed and replaced by a 4 or 6-inch plug taken from a nursery or surrounding area of the field. Any remaining divot mix is spread in worn areas of the field.

Not all the seed survives but those that do represent mature plants for next years field. Seeds that are visible after placing the divot mix will seldom establish, but those just below the surface will develop if watered. The seeding rates seem very high compared to the normal broadcast seeding rates for grass establishment on bare ground. With divot mix it is important to remember that seed is mixed throughout a volume of sand and then the mixture is placed at various depths into divots. Seed visible on the surface dries out and seldom establishes while seed below a certain depth (1/4-inch for perennial rye and tall fescue, and 1/8-inch for Kentucky bluegrass) is shaded and does not continue to develop. For each home game we mix about eight 5-gallon buckets of sand with 15 pounds of perennial ryegrass or 10 lbs of Kentucky

bluegrass seed. After filling divots we feel that we are getting about 100 seedlings/square inch. At this rate the divots fill quickly without a negative effect from seedling over crowding. Some seedlings get trampled and die but those that survive create biomass and a mature turf for the beginning of next year as opposed to bare spots with exposed and compacted soil.

We start the season in September using Kentucky bluegrass since it establishes well during September but may not fill divots when seeded in October. After the beginning of October we switch to perennial ryegrass because it establishes until the end of October and even into early November. Pregerminated Kentucky bluegrass divot mix seeded in early September will have nearly 90% of the divot covered with “green fuzz” in 7 days. Perennial ryegrass fills the divots about twice as fast as the Kentucky bluegrass. Pregermination fills the divots twice as fast as seeding without pregermination. One advantage of the pregerminated divot mix over non-germinated seed is that the pregerminated seed does not require excessive water to get the seeds started. They are already growing and it only takes a little more frequent watering to make the seedlings develop.

Seed count per square inch and seed weight per 1000 square feet for various divot mix depths

Given: Perennial ryegrass has 225,000 seeds/lb and divot mix uses 15 lbs seed/40 gallons sand
Kentucky bluegrass has 1,500,000 seeds/lb and divot mix uses 10 lbs seed/40 gallons sand

Divot mix depth (inches)	Perennial Ryegrass		Kentucky bluegrass	
	Lbs seed/1000sqft	Seeds/sq.in.	Lbs seed/1000sqft	Seeds/sq.in.
1/16	15	23	10	104
1/8	30	46	20	208
1/4	60	92	40	416
1/2	120	184	80	832
1	240	368	160	1664

■ Indicates amount of seed that forms a seedling for each species.

End of the Season Practices for Athletic Fields

<http://turfgrass.hort.iastate.edu/extension/end.pdf>

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If you are putting your field to bed this fall and tucking it in nicely with some love and care then you can expect it to wake up next spring ready to go and ahead of the game. If you are darn glad the fall season is over and you don't want to see that field until next year, then expect it to look like a pasture because you are treating it like one. If you plan to use the field for early spring soccer or baseball then it will be in the same condition that you left it at the end of the autumn. Spring conditions can often be too wet to core, seed, or topdress before the spring playing season begins. Get a jump on next year by putting your field to bed so it will wake up ready to go.

Here are a few end-of-the-season tips that will help you prepare your football/soccer and baseball/softball fields for next year.

Soccer/Football

- Seed with Kentucky bluegrass and perennial ryegrass during the fall game schedule. Start in September and keep going until the last game. Spread seed over the high traffic areas and allow players to cleat it in or prepare a pregerminated seed mixture with sand and fill divots. Sure, some of the seedlings are injured, but some of them also survive. Solid tine aeration during the playing season, followed by seeding, is another way to get some grass started as the field begins to wear out. Keep in mind your strategy for fall seeding. It not only gives you some fall cover of bare areas with green color, but more importantly any seedling plant that survives the winter will quickly mature in the spring and make a substantial contribution to the biomass cover of the field during the summer. Fall established plants will be much stronger than plants established in the spring. Spring seedings usually succumb to weeds or summer stress and the new turf is too immature for football and soccer that start as early as August 15.
- Hollow core the field and topdress with a medium sand. Drag the cores in if you have a sand field and remove the cores if the field is too hard from a high clay content. Removing cores will help you build up the sand content in the surface faster. If cores cannot be removed then topdress with sand first, then core, then drag the field. Deep tine coring with the vertidrain is also very effective on soil based fields.
- Dormant seeding in combination with coring and topdressing will give the field a quick start in the spring. Be sure to get the seed into the ground. Use a drill seeder or drag the seed into the aerifier holes. Seed that is visibly left on the surface will seldom germinate next spring.
- Breathable covers, such as those made by Covermaster can be used in high traffic areas to help extend the growing season in the fall and speed green-up in the spring. Covers can also allow for seedling development during the winter. Snow mold treatment is recommended on areas that will be covered during the winter.
- Pre-emergent herbicides, such as pendimethalin, can be applied in late fall, following the playing season, to prevent early germinating knotweed that is especially troublesome in high traffic areas. Fall applied pre-emergent herbicides **should not** be used in areas of the field where turfgrass seed is used in the fall or spring.
- Sod is often a better solution to fixing small wear areas instead of trying to nurse the field back by seeding. Sod is an instant solution for worn goal boxes and areas between the hash marks. It may be late in the season, but if a sod producer can cut and deliver sod then you can lay it on your field. Even if the sod doesn't thoroughly root down in the fall it will give you a jump on the spring season and finish rooting in the spring.

Baseball/Softball

The fall practice schedule for baseball and softball is usually not as demanding on the field as the spring game schedule. However, it is important to remember that the field condition entering the winter will be the same as the field condition during the start of the baseball/softball season, especially for college fields. College baseball/softball can start as early as February 15 and if the weather is nice they will be on the field. The spring schedule for high school usually starts later in the spring since the high school season continues in the summer after classes have ended.

- Many of the practices described above for football/soccer can also be used to improve the grass areas of baseball/softball.
- Skin areas are often left to fend for themselves during the winter. Strong Iowa winds can blow the infield dirt materials into the adjacent grass areas and cause large lips to build up during the winter. Boards or silt fence have been used to reduce blowing dirt. Another simple method is to lay down 2-by-4 boards along the dirt infield and adjacent to the grass where the lip usually starts to form. Lay the boards flat and stake them if needed. The dirt piles up on the boards and is easily removed in the spring.
- Some high schools disc the skin area and leave it rough all winter. This works fine if you don't need the field until late spring. If you disk the skin area in the fall and need to have the field ready for play in March, you could have a problem. The worked-up infield will hold water and it may be impossible to drag and firm the surface until the surface has dried.
- Mound and batter box areas should be reconditioned in the fall and then covered with a tarp for the winter. Pull the tarp off in the spring and you are ready to go.
- Sod worn areas in front of the mound and at first and third so they will be ready in the spring.
- Avoid using non-selective soil sterilant herbicides on skin areas to prevent weed growth in skin areas. It is likely that these materials will find their way into the surrounding turf areas and cause injury.

The most important part of your fall program is to have a plan. Don't just drop the field after the last fall game and then try to get ready for next year in the middle of the summer. Autumn is the best time to prepare the field for the rest of the year and be sure that you implement your "putting the field to bed program" immediately after your last fall game.

Athletic Field Seeding Schedule

<http://turfgrass.hort.iastate.edu/extension/seed.pdf>

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Cool season grasses adapted to the northern half of the United States are typically seeded from 15 August through 15 October. Late summer temperatures are still warm enough to quickly germinate seed and the ensuing cool and moist autumn will promote dense growth by tillering. Many sporting activities unfortunately conflict with this ideal time for grass establishment. The following seeding scenarios are presented to establish or reestablish grass amidst a continuous field use schedule. The strategy is to seed often and at higher than normal seeding rates in an attempt to overcome the complete removal of grass cover and exposure of bare soil.

Field Use Scenario	Monthly Activity and Seeding Schedule for Intense Traffic Areas							
	March	April	May	June	July	Aug	Sept	
New construction bare soil							* D,B KB 1.5-3#/M once	*
Fall Football		D,B KB Once	D,B KB+PR				* C,B,PD Weekly KB	* C, W KB
Game Field Multiple Use Fall Football + Spring Soccer	* C,B,D KB	* C,B,D,P D Weekly KB	* C,B,D,P D Weekly PR	D once			* C,B,D,PD Weekly KB+PR	* C, W KB
Football Practice Field	* C PR	* C PR	* D PR	D, Sprig Berm		*	* C PR	* C PR

*, Field being used
D, Drill seed
B, Broadcast seed
C, Cleat-in-seed

PD, Pregerminated Divot Mix
Dor, Dormant seeding
KB, Kentucky bluegrass
PR, Perennial ryegrass

TF, Tall Fescue
BR, Bermudagrass

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	March	April	May	June	July	Aug	Sept	
New construction bare soil							*	*
Fall Football							*	*
Game Field Multiple Use Fall Football + Spring Soccer	*	*	*				*	*
Football Practice Field	*	*	*			*	*	*

*, Field being used
D, Drill seed
B, Broadcast seed
C, Cleat-in-seed

PD, Pregerminated Divot Mix
Dor, Dormant seeding
KB, Kentucky bluegrass
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TF, Tall Fescue
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