

Overseeding bermudagrass:

chemical vs. natural transition

By Scott McElroy, Ph.D.

Overseeding bermudagrass with perennial ryegrass is a good idea for many reasons. It provides a year-round green turf surface, increases winter playability, and potentially provides greater attraction of fall, winter, and early spring play.

One of the major problems with bermudagrass overseeded perennial ryegrass is the spring transition. During spring transition from a perennial ryegrass dominated stand to a bermudagrass turf stand, it is very difficult to have a seamless transition where one maintains uniform green turf. This is difficult because, in most situations perennial ryegrass can prevent 100% green-up by the bermudagrass. So, in non-overseeded areas when bermudagrass achieves complete green-up, the bermudagrass underlying an overseeded stand, is still partially dormant. An application of the a herbicide to kill the perennial ryegrass can leave empty brown patches until the turf greens up completely. This mottled green/brown turf would make one think that simply letting the ryegrass die-out on its own would be a better option.

If one chooses to simply let the perennial ryegrass "burn-out," or transition naturally, several new problems arise, one that is potentially worse than the mottled turf-clumpy volunteer ryegrass. You see,

some of the perennial ryegrass never burns out, even in the hottest of summers. This is problematic because the perennial ryegrass that does not burn out often turns into volunteer "clumpy" ryegrass. Clumps of perennial ryegrass are extremely difficult to control. Many herbicides and herbicide rates that are used to control ryegrass in a dense overseeded stand are not as effective controlling volunteer ryegrass. While low and mid rates of foramsulfuron (Revolver) and trifloxysulfuron (Monument) can control ryegrass in an overseeded stand, high rates of either herbicide is needed for 100% control of clumpy volunteer ryegrass. As a side not, in every area I have been in Tennessee where someone says that they completely transition their perennial ryegrass with no herbicide, we have found clumpy ryegrass.

When's it goin' go?

A second problem with letting the perennial ryegrass to burn out naturally is that you never know when it is going to go. If we have a dry spring the perennial ryegrass could die by mid-May, however with a wet, mild summer, most of the perennial ryegrass could stick around all summer, thus making the volunteer ryegrass situation worse. With a natural transition you have no control.



Clumpy volunteer perennial ryegrass that has survived the previous summer and now creates an uneven turf surface.



Rapid death of the ryegrass left open bare ground areas due to suppression of the bermudagrass.

Table 1: Pros and cons of natural versus chemical transition of overseeded ryegrass to bermudagrass turf.

Natural Transition	
Pros	Cons
Cost- Free	Removal is sometimes too fast
	Removal is sometimes too slow, if not at all
	Greater propensity for clumpy ryegrass invasion due to partial stand survival, aka, Clumpy Ryegrass
	Greater survival of perennial ryegrass in the summer can decrease bermuda grass health
Chemical Transition	
Pros	Cons
Potential for slow seamless transition	Cost- Definitely not free.
You control when you want the perennial ryegrass removed.	Seamless transition does not always occur.
Proper timing of ryegrass removal insures an adequate bermudagrass growing season	Repeat applications for a seamless transition is going to be more laborious.
Lower use rates and repeat applications of sulfonylurea herbicides can improve the potential for a seamless transition.	

A third and final problem of letting the perennial ryegrass transition naturally is that allowing perennial ryegrass continue to survive early into the summer is detrimental to the overall bermudagrass stand. Due to the potential for winter-kill or cool springs that delay bermudagrass green up in some areas, bermudagrass needs all the growing time it can get during the late-spring and summer. Experts agree, allowing 90 to 120 days of good growing conditions for bermudagrass during the summer is a good rule to follow when trying to optimize bermudagrass health. This means that bermudagrass needs June, July, August, and part September of growing for optimized stand health. Allowing perennial ryegrass to contaminate the bermudagrass stand will decrease stand health by decreasing the number of uninhibited days of prime growing conditions.

Chemical pros and cons

Let's start with the cons (see Table 1). The main negative is that it is difficult, even when herbicides are used, to remove the perennial ryegrass while maintaining 100% green turf cover throughout the transition. Maintaining 100% green-turf cover would insure a complete seamless transition, as the perennial ryegrass slowly dies, the bermudagrass just takes over.

The herbicide that provides the slowest kill, pronamide (Kerb) often does not achieve 100% control and a seamless transition is not always achieved. A cool period with high cloud cover during the time when the perennial ryegrass is dying can leave the bermudagrass stagnating, struggling to enter a period of vigorous growth. A weather pattern such as this can prevent that seamless period from occurring, leaving mottled green and brown turf.

What about the pros? The biggest pro to me is control. You have control over when you want the ryegrass removed. Newer herbicides in the sulfonylurea family, such as trifloxysulfuron (Monument) and

foramsulfuron (Revolver) for example, can provide a relatively quick, 100% elimination of the perennial ryegrass (Table 2). But then again, if the weather conditions are not optimal, the bermudagrass can still stagnate under cool conditions.

What should I do?

The first thing you should do is remember what your primary concern should be for that turf: bermudagrass health. In an athletic field or golf course situation, if you lose your bermudagrass base you are going to get a decrease in wear tolerance during the overseeded time during the fall, winter, and spring. If you allow the perennial ryegrass to linger longer than it should, you are creating a situation that is potentially decreasing bermudagrass health. A decrease in overall health of the bermudagrass can increase the propensity for secondary problems such as winterkill, or potentially reduced wear tolerance.

Second, remember that perennial ryegrass is primarily for appearance. You are creating a more resilient surface for the fall and early spring football and baseball season or simply trying to improve the

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Table 2. Primary products utilized for overseeded perennial ryegrass in bermudagrass turf.

Product Name	Generic Name	Rate	Speed of Transition
Kerb	pronamide	1.5 - 3.0 lb/a	3-6 weeks
Monument	trifloxysulfuron	0.3 - 0.56 oz/a	2-3 weeks
Revolver	foramsulfuron	17.4 fl oz/a	2-3 weeks
TranXit	rimsulfuron	0.5 - 1.0 oz/a	2-3 weeks

Update on infield skin playability

By Karl Guillard, Seth A. Goodall, William M. Dest, and Kenneth R. Demars

Maintenance budgets for baseball and softball fields are overwhelmingly focused on the infield, due to the laborious nature of maintaining the skinned area. The demand for high quality infields is attributed to the fact that as much as 75% of the game can be played on this portion of the field (Zwaska, 1999). Therefore, the goal of most groundskeepers is to maintain their infield skins in peak playing conditions. This is accomplished in a variety of ways including grooming, watering, and the application of amendments or soil conditioners.

The intensity and frequency of these practices, however, are dependent upon the top mix materials that make up the infield soil. Commonly, the composition of the skinned infield soil varies greatly from one field to another even though guidelines for construction and maintenance have been developed for these purposes (70 to 85% sand and 15 to

35% silt and clay; ASTM, 2005). Recommendations from experienced field managers call for a soil with 50 to 75% sand, 15 to 35% silt, and 15 to 35% clay (Zwaska, 2002), but this advice may not be followed regularly.

Because of the differences in the materials used for construction, soils of varying textural class, particle size distribution, and shapes are installed into skinned infields and topdressed with amendments depending upon cost, level of play, geography, availability, demand for certain visual attributes, and ability of a sales representative to market a product. These variations in the composition of the surface materials influence soil physical properties, which in turn may affect the playability of the skinned infield surface, including hardness, traction, friction, and the movement of balls entering onto and leaving the skin surface.

The lack of research and understanding of these attributes forces the field manager to rely more on trial and error or advice from experienced peers about practices that produce desirable results, instead of recommendations based on scientific measurements and analyses. There is little scientific information on how calcined clays affect physical properties of skinned infields and subsequent ball reaction to the surface. The lack of information on ball response and physical property changes of skinned infields when amended with calcined clay provided the motivation for our research. A full report of the results can be found in Goodall et al. (2005).

Skinned infield plots were constructed at the University of Connecticut's Plant Science Research and Teaching Facility in Storrs, Connecticut. The plots consisted of five different soils of varying textural class and sand fraction distribution amended with four rates (0, 0.5, 1, and 2 tons/1,000 sq. ft.) of calcined clay (Turface Pro League from Profile Products). The added calcined clay represented half, full, and twice the recommended rate by the manufacturer for newly constructed infields with high sand content.

The soils were obtained from five Northeast soil distributors, and are used widely in baseball and

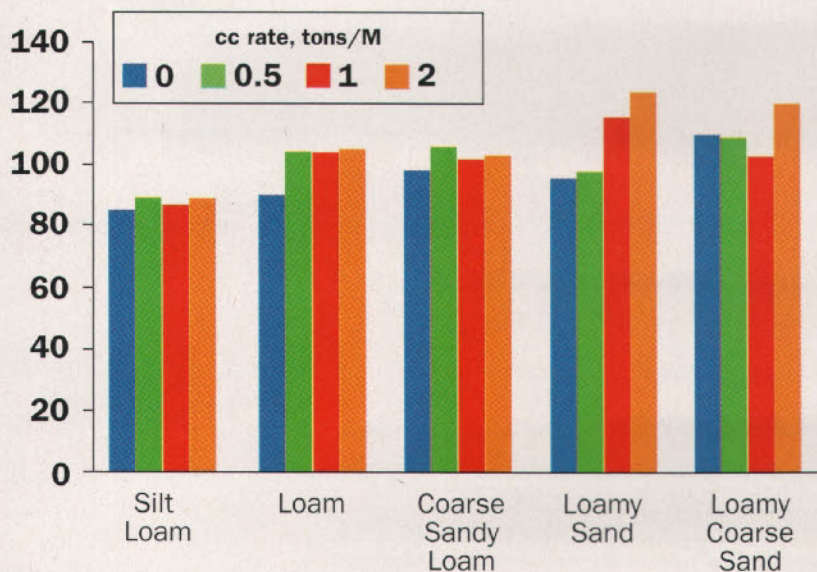


Figure 2: Hardness, Gmax

softball infields in our region on both low- and high-end fields. The soil classified as a loamy coarse sand in Table 1 is actually a crushed rock product manufactured primarily for skinned infields. Even though a clay fraction was determined for this material based on particle size analysis, it does not possess clay mineralogy properties (i.e., cohesive characteristics).

Once the infield plots were established, packed, and groomed to simulate a skinned infield on game day, we took the following measurements on each soil-calcined clay rate combination: surface hardness with a Clegg Soil Impact Tester; surface traction using a friction/traction apparatus modified with steel baseball cleats; static ball-to-surface friction using a disc apparatus with two plates that held four baseballs; and dynamic ball-to-surface friction using a pendulum apparatus. Samples of the soils with and without the calcined clay were analyzed in the laboratory for bulk density, saturated hydraulic conductivity, and shear strength.

Bulk density decreased and saturated hydraulic conductivity (permeability) increased across all soils as the rate of calcined clay increased. In situations where skinned infields would benefit from a decrease in bulk density and an increase in permeability (e.g., compacted conditions), the incorporation of calcined clay would achieve this goal. Improvements to infield materials that have a low permeability by incorporating calcined clay or by selecting materials with a high

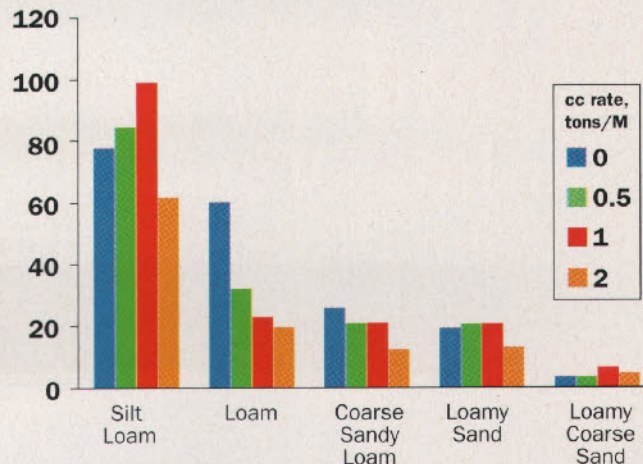


Figure 1: Dry Shear Strength, lbs in⁻²

permeability are important in regions where wet weather prevails or where the infield cannot be covered before rainfall (which is often the case with municipal fields). On the other hand, materials with low permeability having a high moisture holding capacity could be advantageous in drier climates.

Dry vs. wet & strength

Shear strength of a soil gives an indication of the binding capacity of that soil. Soils with greater cohesiveness will require more force to reach shearing; when the binding between soil particles is broken. From a practical standpoint, shear strength is important with skinned infields since it is positively correlated to traction and friction. Players require adequate traction for movement between the bases (running, and stability for fielding and making throws); frictional resistance influences sliding properties and ball reaction to the surface.

If a soil relatively high in silt and clay content (as shown in our study) is wetted, packed, then allowed to dry, shear strength is far greater in

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Student researcher Seth Goodall in the test plots at UConn.

the dry condition than in the wetted state. This can happen with infield skins resulting in a soil that is harder to break up and groom once it dries following wetting. Calcined clays are commonly applied to the skins when this occurs. Our results showed that the soils in the study, except for the loamy coarse sand, generally decreased in shear strength when comparing the lower versus highest rates (see Figure 1). As expected, coarser-textured soils exhibited less shear strength than the finer-textured soils. Overall, the silt loam, at dry and moist conditions, exhibited the greatest strength and least amount of weakening with the addition of calcined clay, which is attributed to the silt loam's greater particle cohesiveness. Accordingly, coarse-sandy soils may exhibit greater shear strengths when their clay fraction is significantly greater in proportion to the silt fraction. Because shear strength of an infield soil will affect traction and friction, the field manager should keep this in mind as the long-term application of calcined clays to infield soils may reduce their shear strength over time, particularly with finer-textured soils.

Surface hardness of the soils responded differently across calcined clay rates; the addition of calcined clay significantly increased more so with the coarser-textured soils than with the finer-textured soils (Figure 2). It may seem a bit counter-intuitive that hardness would increase with the addition of a coarse particle sized amendment, but we think this may be a result of the interlocking of the sand-size calcined clay particles when packed. Traction was positively related to shear strength, but we could not find any direct rate effects of the calcined clay additions on traction. Grooming and loosening the infield surfaces before making traction readings with the disc apparatus may have masked any direct calcined clay effects.

Dynamic ball-to-surface friction increased as soils became finer in texture and decreased with increasing calcined clay rates (Figure 3). However, the sandier soils were less affected by the calcined clay additions than the finer-textured soils. The higher frictional resistance of

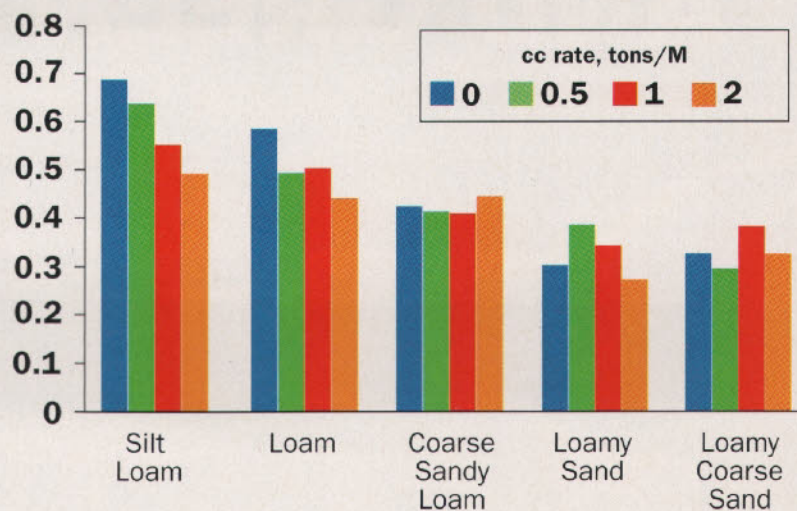


Figure 3: Dynamic Friction, index

the silt loam and loam soils can be attributed to their greater shear strength compared with the other soils in our study. Static ball-to-surface friction results duplicated the same patterns as the dynamic ball-to-surface friction, and so were not shown.

Dynamic ball-to-surface friction has application for skinned infields in situations where ball rebound velocity off the surface is perceived to be a function of an unacceptably hard surface, when, in fact, it may be due to a low frictional coefficient of that surface. We have used the pendulum device to distinguish differences on baseball skinned infields where hardness values were actually lower for surfaces with a higher ball rebound velocity off the surface compared with skinned infields that had a lower ball rebound velocity. This suggested that surface hardness per se, was not resulting in the higher ball velocity off the surface.

The pendulum device, however, was able to show that the dynamic ball-to-surface friction was significantly lower on the skinned infield with the higher ball rebound velocity. Therefore, the reduced friction resulted in less slowing of the ball velocity as it rebounded off the



Devices used for measuring traction, static ball-to-surface friction, and dynamic ball-to-surface friction of skinned infield plots at the University of Connecticut.

surface. This suggests that the frictional properties of certain surfaces should be taken into account along with hardness when determining reasons for unacceptably fast rebound off the surface.

The decision to add calcined clay to fine-textured soils should be made with consideration of the potential changes in surface friction. If the objective were to slow the velocity of the ball off the surface, then calcined clay application rates should be limited on fine-textured soils. Addition of calcined clay would only serve to reduce surface friction and may not achieve the goal. On the other hand, if ball velocity off the surface of fine-textured soils is deemed unacceptably slow, then additions of calcined clay may help to reduce the surface friction, leading to faster ball rebound from the surface.

The results of this study suggest that the playability of skinned infields can be affected by soil composition and the calcined clay rate. In general, the fine-textured soils responded differently than the coarse-textured soils for most measurements. The effects of calcined clay are probably attributable to the potential modification of the textural class of a finer-textured infield skinned soil to one of a coarser-textural class. Therefore, addition of calcined clay to fine-textured soils may cause them to react similarly to coarser-textured soils.

Although our study was not long-term, the results suggest that repeated surface incorporation of a calcined clay into a skinned infield with a finer-textured soil could lead to changes in playability by changing the physical properties. On the other hand, coarser-textured infield soils would be more resilient to changes in physical properties under repeated calcined clay additions because of more similar particle sizes between the soil and the amendment.

We know from experience and from player and coach comments that different infields play differently. Determining those differences and relating them to playability will be an important advancement in successful skinned infield management. Objective measurements similar to the ones used in our study will allow for a more scientific approach to skinned infield management and less reliance on trial and error. This raises the possibility that playing surface standards might be developed for skinned infields using the techniques employed in our study.

The next step in this line of research is to ascertain the relationship between objective measurements and playability. Our preliminary results do not allow us to make specific recommendations at this point because we are not sure what the numbers mean with respect to actual playability of the infield. More research is needed before reaching that endpoint. This would include quantifying infield skins for their hard-

ness, traction, frictional coefficients, shear strength, etc., then matching those values to player preferences and acceptability. Moreover, developing meaningful values from objective scientific measurements will take the guesswork out of how much of a particular amendment should be applied to a specific soil to reach a desired goal for playability. ■

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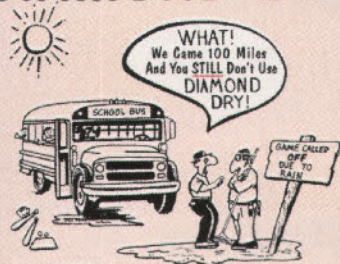
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aesthetic appearance of dormant bermudagrass. The additional wear tolerance that a perennial ryegrass overseeding provides is minimal at best and can often decrease the health of the bermudagrass during spring green-up. Let's face facts, the primary reason for overseeding is aesthetics, period.

So here is what you do. First, plan your spring transition somewhere between May 1 and June 15 (more southern areas such as Florida and Texas can go earlier). Any earlier than May 1 and the bermudagrass can stagnate and not fill in fast enough. Any later than June 15 and you are encroaching too far into the optimum bermudagrass-growing season.

Next, determine why you need the overseeding in the spring. Do you have a late spring/early summer tournament, spring baseball/softball season, or spring training for football? After your main event is completed, chemically remove your overseeded grass and get the bermudagrass going. And as much as I hate to say it, you have to teach management about the problems of transition. It is just part of overseeding and the fields may not look their best for a couple of weeks.

Third, face facts: If you've got the money to buy the seed, you've got the money to chemically remove it. So take control of the situation, remove the ryegrass on your time

schedule, and optimize the growing potential of your bermudagrass.

Figure 3 provides a flow chart of some basic questions you can answer to determine what is the best method, natural or chemical transition, is the best for you. Because in the end, you have to do what is best for your facility taking into account, environmental, usability, aesthetic, time, and budgetary constraints.

It is my opinion that some of us should take a step back and consider why we are overseeding in the first place. If you are thinking that you don't have the budget to chemically remove the ryegrass, then you don't have the budget to overseed, plain and simple. For most, chemical removal is part of overseeding. It is not an option.

Finally, some of us need to remember that we are in the business of growing bermudagrass. If you lose your bermudagrass base you will have nothing to hold you overseeded. And a young seedling stand of ryegrass unprotected by the stolons of bermudagrass does not last long at all. In all cases, do whatever is necessary to maximize the growth of the bermudagrass. ■

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