

FIELD DAY HIGHLIGHT

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Photo: Peter Purvis, Guelph Turfgrass Institute

Maintaining Turfgrass Coverage Under High Traffic Conditions

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One of the greatest challenges for sports turf managers is to maintain good playing quality throughout the play season. Although there is some question as to how exactly playing quality is defined, Bell and Holmes (1988) found that a player's perception of quality correlates positively with high rates of ground cover regardless of the ground cover population. Bell and Holmes' study indicates that bare ground is the driving factor of the player's perception of reduced quality of the field. If players are just looking for ground cover then why do managers worry about the composition of the field? While some believe the perception of weeds in the sward is purely aesthetic, others argue certain weeds can lead to an increase in injury to players (Larsen and Fischer, 2005a; Sachs, 2004; Raikes et al., 1994). Some weeds of major concern on sports fields are prostrate knotweed, plantain and white clover. White clover in a turf stand can pose a slipping

hazard when the field is wet (Sachs, 2004), while knotweed grows in long stems with no anchoring roots that can lead to tripping hazards for athletes. Preliminary results from research conducted at the Guelph Turfgrass Institute in collaboration with the Orthopaedic Neuromechanics Laboratory at York University have shown that plantain species in a stand reduce stability and may lead to increased risk of knee injuries. These weeds are typically indicator species of other underlying problems of the field. White clover for example, indicates low nitrogen availability, while knotweed and plantain often indicate compacted rootzones. Some factors that contribute to bare ground and weed invasion are the construction of the underlying rootzone, the local climate, the amount of play on the field, and how and when maintenance practices are performed (Larsen and Fischer, 2005a).

With traditional herbicides no longer

being tools in a turf manager's toolbox, emphasis must be placed on cultural practices and their effects on weed control. Larsen and Fischer (2005b) found that verticutting produced a short-term reduction on weed populations on fairway turf when combined with fertilizers. But in general there have been relatively few studies on how to culturally control weeds in turf (Busey, 2003).

One important cultural practice that may help in maintaining turf coverage during the play season is overseeding. Simply put, overseeding refers to the practice of adding desirable turfgrass seed into an existing sward. The purpose of overseeding is to thicken the stand and increase the total turf population thus increasing the ability of the turf to outcompete weeds and decrease the amount of bare ground and weed coverage on the field.

Why Overseed?

Overseeding athletic fields with perennial ryegrass (PR) or annual ryegrass (AR) has been shown to aid in creating a thicker stand of turf while reducing bare patches (Elford, 2008; Minner et al., 2008; Rossi, 2004). The use of an annual turfgrass seed may indeed aid in maintaining turf during the play season; however if time and money are being spent to overseed it may make more sense to choose a perennial species that has greater staying power. The purpose of our study at the Guelph Turfgrass Institute (GTI) has been to evaluate a potential new species of turfgrass for overseeding, while exploring the effects of overseeding frequency and mowing height on turfgrass coverage, weed populations and bare ground coverage.

Perennial ryegrass is a relatively inexpensive turfgrass that has a rapid germination rate (approximately 7 days) making it the number one perennial turfgrass choice for overseeding in Canada's climatic zone. However with the long Canadian winters, the low winter survival rate of PR can lead to increased bare ground coverage in early spring. Adding a slower germinating species into the sward may help ensure long-term turfgrass coverage.

For this study supina bluegrass (*Poa supina*) was chosen as the companion species to overseeding with PR. Supina bluegrass (SB) is native to the European Alps, and has been bred and used as a turfgrass in Germany since the 1930s (Stier, 1998). It has a great ability to thrive under high wear conditions, but its lime green colour and numerous dark seed heads in the spring do not fit with the North American preference for dark green cultivars. However, its stoloniferous growth habit, aggressive growth rate, relatively late fall dormancy and early spring green-up make it an ideal candidate for competing with early germinating spring weeds. Unfortunately the cost of supina bluegrass is high with an average price of \$12-15/kg (\$25-35/lb). Therefore it is practical to look at the minimum amount of SB that is required to be beneficial in a companion PR overseeding regime. Our companion overseeding trial

has been evaluating five seeding rates that include a no overseeding control, an overseeding with perennial ryegrass alone at 6 kg/100 m² and then in combination with supina bluegrass at 0.5 kg/100 m², 1 kg/100 m², 2 kg/100 m², and 4kg/100 m² (Table 1).

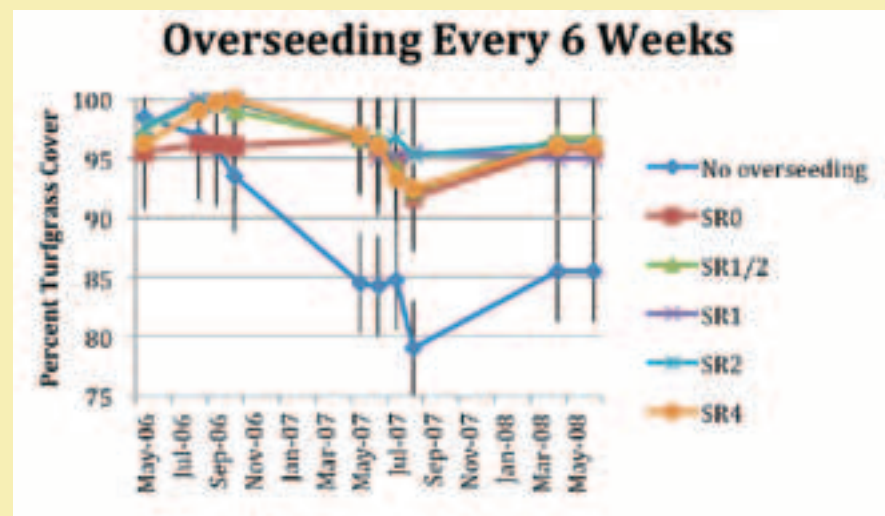
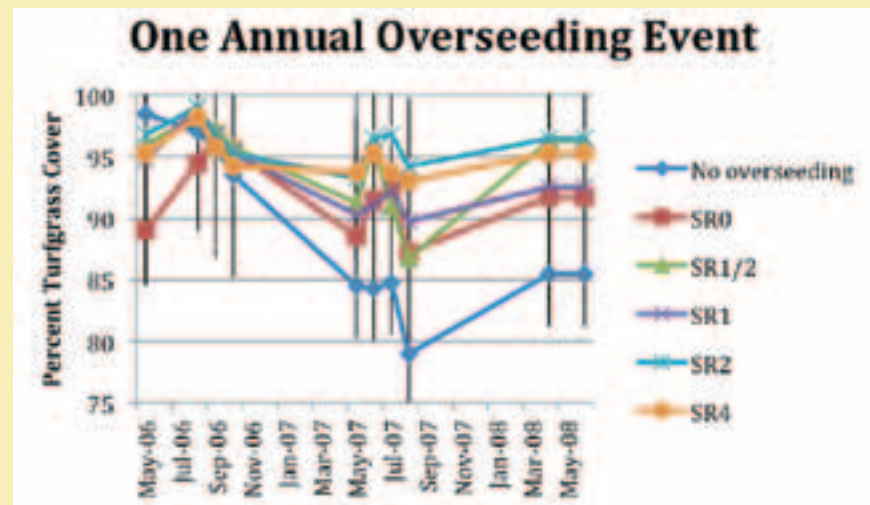
In addition to examining the effects of adding SB into a PR overseeding program

the frequency of overseeding was also explored. We compared applying all the seed in one application versus applying 1/3 of the total seed three times throughout the play season. What we found was that applying smaller amounts of seed every 6 weeks during the growing season resulted in greater turfgrass coverage throughout the play season.

Table 1. Overseeding rates of Perennial ryegrass and Supina bluegrass.

Seeding Rate	Perennial ryegrass	Supina bluegrass
SR0	6 kg/100 m ²	0 kg/100 m ²
SR1/2	6 kg/100 m ²	0.5 kg/100 m ²
SR1	6 kg/100 m ²	1 kg/100 m ²
SR2	6 kg/100 m ²	2 kg/100 m ²
SR4	6 kg/100 m ²	4 kg/100 m ²

Figure 1. Turfgrass coverage over time with 5 different seeding rates (Table 1) and a control (No overseeding). LS means calculated using ANCOVA.



Mowing Height

For most people, basic turf care is mowing. As Turgeon (2002) states “mowing is the most basic of all turfgrass cultural practices.” The ability to tolerate regular mowing is a common trait of all turfgrasses, however the ideal height of cut does vary among species (Beard, 1973). The cool season grasses that are commonly planted for athletic fields here in Canada are Kentucky bluegrass (*Poa pratensis*) and perennial ryegrass (*Lolium perenne*), both of which can be mowed at a medium height (40 – 60 mm or ~1.5 – 2.5 inches) (Sheard, 2008). By maintaining an ideal height of cut for each species, you ensure a healthier stand of turf that will resist weed encroachment and other stresses. The appropriate frequency of mowing depends on many factors such as the time of year, moisture availability

and fertility. In general, following the one-third rule will ensure that the plant will be able to recover relatively quickly from the stress of mowing. Therefore when planning a mowing schedule it is important to be flexible and willing to adapt to the conditions that have arisen due to weather, fertility, and use. Mowing typically takes up approximately 30 – 40% of a field’s maintenance budget, so it is important to understand the simple basics of why mowing is important to athletic field sward continuity (Sheard, 2008).

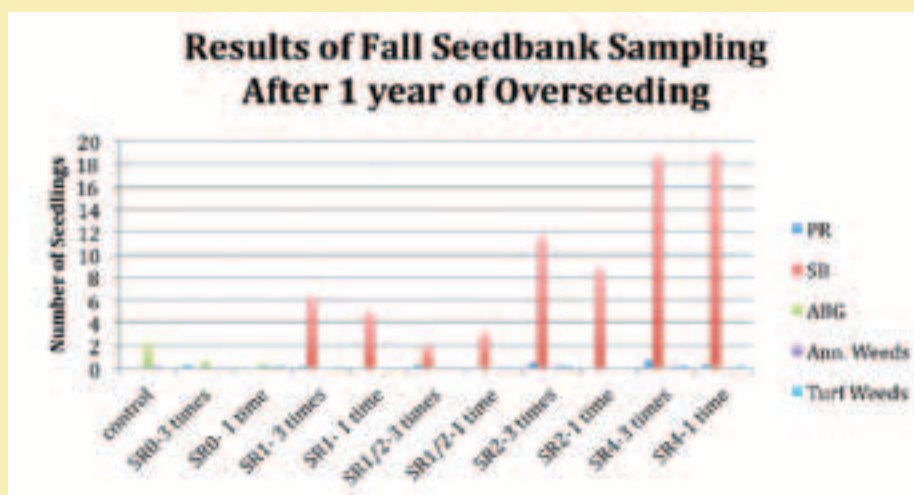
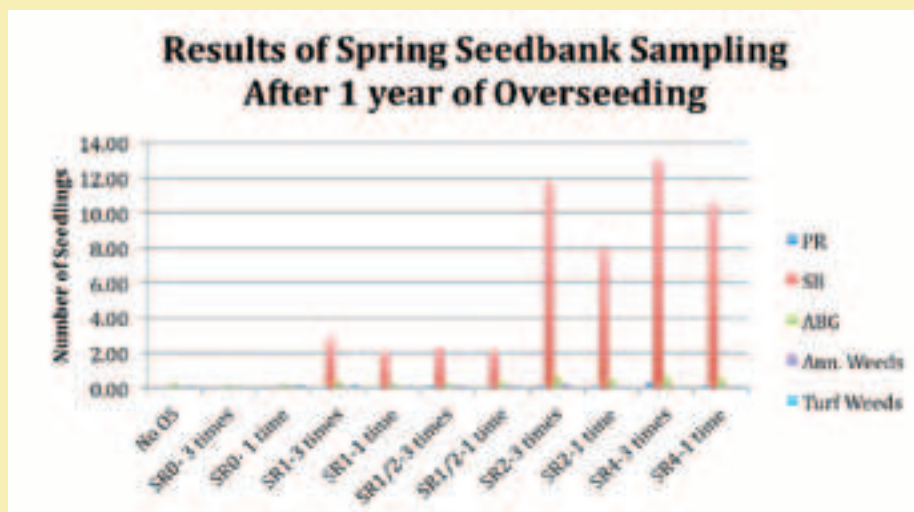
Our research experiment also examined what height of cut would optimize an overseeding program. We compared two mowing heights within our overseeded plot - 3.8 cm (1.5 inches) and 7.5 cm (3 inches). To maintain the lower height of cut the 3.8 cm plots were mown every 4 – 5 days, while the higher

height of cut plots were mown only once a week. While there were no statistical differences between the two heights of cut for turfgrass coverage, there was a difference in smoothness of the plots. The plots that were maintained at the shorter mowing height had a higher quality playing surface when compared with the higher mowing height. Our rating of quality was based on a visual rating that reflected both functional and aesthetic attributes like density, uniformity, smoothness, growth habit and colour (Morris and Shearman, 1998). Whether the observed higher quality is directly linked to mowing height or to frequency and quality of cut is not known from this study, however it does imply that mowing more frequently has a positive effect on turfgrass quality.

What Happens to the Seed?

One question that is often posed to researchers is, what is happening to the seed that is being applied through overseeding? Does it all germinate? If it doesn’t all germinate does that mean it dies? Many of us know about the ubiquitous nature of annual bluegrass and the ability of its seed to maintain viability in the seedbank for more than 6 years (Turgeon et al., 2009); however, very little is known about the survivability of our turf-type turfgrasses in seedbanks. We evaluated the soil seedbank to determine the fate of the seed that we added each season. Soil samples were collected from the research plots using a soil probe both in the fall of 2010, in the spring and fall of 2011 and in the spring of 2012. Plots that received the higher amounts of total seed had more seed surviving in the seedbank. However, in the treatments where both species were overseeded, the dominant species in the seedbank was supina bluegrass. Interestingly the amount of PR that was able to survive in the seedbank increased with increasing amounts of SB overseed (Figure 2). Spring sampling had lower amounts of PR seedlings than the fall sampling, suggesting that in order to get an accurate prediction of what seed in the seedbank may be affecting your field for the upcoming playing season it is better to sample in the spring than the fall.

Figure 2. Seedbank analysis results after 1 year of companion overseeding with 6 kg/100 m² of PR, and 4 rates of SB (Table 1). LS means calculated using ANOVA.



Wrapping It All Up

When deciding on when and how to overseed, frequency appears to play a more important role than total amount. Figure 1 exemplifies the importance of adding small amounts of seed more frequently. Looking at the perennial ryegrass overseeding example (SR0) shows that with the frequent overseeding there was a greater than 95% turfgrass coverage, while the one time SR0 seeding was at 91% turfgrass coverage. The addition of SB as an overseeding companion did not affect overall effectiveness of overseeding, but appears to play a dominant role in the soil seedbank. That said, it is important on non-irrigated fields to time your overseeding applications so there is enough precipitation to aid in germination if you are overseeding with PR alone. In general, overseeding appears to help in maintaining turfgrass coverage (Figure 3). Also in a non-irrigated environment adding SB into the overseeding mix results in a faster recovery time after periods of long drought. The non-irrigated field at the GTI (Figure 3) recovered faster on the half with SB when compared to the half of the field that had PR alone. Mowing height plays an important role in maintaining turfgrass quality as well, but whether this is due to mowing frequency or height of cut or a combination of both factors is not determinable from the presented data. Seedbank data suggest that overseeding with perennial ryegrass alone does not feed the seedbank; therefore timing of overseeding should occur when environmental conditions are favorable for seed germination.



Figure 3. Non-irrigated field at the Guelph Turfgrass Institute. Left side has been overseeded 3 times with either 0.5kg/100m² SB (back half, lime green colour) or 3kg/100m² perennial ryegrass (front half), while the right side of the field had no overseeding.

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