

# Seedbanking Potential of Kentucky Bluegrass and Perennial Ryegrass

## RFR-A1102

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### Introduction

The ability of the cool season turfgrasses, Kentucky bluegrass (*Poa pratensis* L.), and perennial ryegrass (*Lolium perenne* L.) to form a seedbank under intense traffic scenarios is not well understood. The practice of establishing a seedbank on athletic fields has often been recommended in popular venues, but has received little attention in academic research. Likewise, anecdotal reporting of seed unexpectedly germinating long after planting are common but have not been scientifically tested.

A turfgrass seedbank could potentially benefit athletic field managers by providing viable seed for germination and establishment when traffic begins to wear the existing turf and opens up the canopy for new plants.

This study determines whether continual input of seed during a traffic season will result in a viable, persistent seedbank that will provide enough seedlings to make a significant difference in turf cover. We also tracked the evolution of seed buried one inch deep during an autumn traffic season.

### Materials and Methods

Two different experiments began in fall 2009 and ran through spring 2011 at the ISU Horticulture Research Station, Ames, Iowa.

The experimental design was a randomized complete block with three replications. Seed

rate treatments consisted of three seeding rates. Kentucky bluegrass, 6, 12, and 24 lb ft<sup>-2</sup>, and 30, 60, and 90 lb ft<sup>-2</sup> for perennial ryegrass. Seeding schedules consisted of single and multiple events. The single seeding event occurred all at once on the first day of each year, September 4, 2009 and September 14, 2010. Multiple seeding consisted of five seeding events each applied exactly one week apart, starting on the same day as the single seeding.

Traffic treatments for the single seeding schedule consisted of four passes per week (traffic) and zero passes per week (no traffic). Traffic treatments for the multiple seeding schedule consisted of four passes per week (traffic) and zero passes per week (no traffic). Traffic was applied with a GA-SCW simulator with cleated rollers and a differential slip action during a ten-week period.

One four-inch core sample was taken from each subplot three times during each year of the experiment. Once in December of the planting year, once in April of the year after establishment, and the last in September, one year after initial planting. Samples were analyzed by scalping off any existing vegetation, cutting off the top one inch of the core, broken up by hand and planted in a 7-in. azalea pot. Once per week for five weeks, emerged seedlings were counted to determine viable seedlings in the top one inch of the core.

Nine nylon mesh bags containing 400 seeds each were also buried in a non-trafficked area to determine the fate of those seeds when buried at a one-inch depth. These bags were used to enable seed retrieval for further analysis. At the same three intervals as the

core analysis, the seed packets were exhumed and analyzed. Analysis involved determining if a seed had germinated and if not, whether it was still alive. If the seed was determined alive by forceps testing, it was tetrazolium stained to determine viability.

### **Results and Discussion**

For plots seeded with Kentucky bluegrass, seed rate treatments had an effect on percentage turf cover and cumulative emerged seedlings from cores. In general, an increase in seed rate resulted in an increase in percentage turf cover and number of seedlings emerged. Plots seeded one time in September resulted in greater percentage turf cover compared with multiple seeded plots throughout the traffic season. Plots receiving multiple seedings throughout the traffic season had higher seedling emergence numbers, indicating that no actual seedbank is being formed. Rather, continual input of seed contributes to a very transient seedbank that has few viable seedlings remaining after the traffic season ceases.

For plots seeded with perennial ryegrass, seed rate had an effect on both emerged seedlings from cores and on percentage turf cover. Plots seeded one time in September resulted in greater percentage turf cover compared with multiple seeded plots through the middle of the traffic season and, by the end, attrition caused by intense traffic negated this difference. Conversely, plots seeded multiple times resulted in higher emerged seedlings.

We feel this is due to continued seed input during the first six weeks of the traffic season.

These results indicate that it is possible to form a transient but not persistent seedbank with multiple seed inputs throughout the season. However, our results also indicate that maximizing turf cover throughout the season is done by early, heavy seed rates that ensure a seedling population that can withstand intense traffic. We feel that in order for athletic field managers to benefit from both of these results, they should ensure at least half of available seed resources gets planted early in September, followed by back up seedings throughout the traffic season to provide viable seeds for germination as traffic thins the canopy.

For the buried seed experiment, our results indicate that most seed is germinating at a one-inch depth and of that remaining, very little is viable after being in the soil. With both species, roughly 90 percent of the seed germinated initially and of the remaining seed, there was often one or zero viable seeds. In future trials involving buried seed, we will potentially plant the bags in already present turf to see if that environment has any effect on initial germination rates.

### **Acknowledgements**

Thanks to Rob Eland and CJ Gaston for help in data collection and treatment application for the duration of the study. Also thanks to United Seeds, Inc. for donation of research seed.