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Project Title: Establishment and Maintenance Practices for No-Mow Fine Fescue Golf Course Roughs

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Objective:

Determine optimum seeding rates and biomass removal strategies for no-mow fine fescue.

Start Date: 2017

Duration: 3 years

Total Funding: $44,272

Golf course superintendents are shifting toward the use of fine fescues in roughs and out-of-play areas to reduce management inputs such as water, fertilizer, pesticides, and time. With continued local restrictions and social pressures of input use on turfgrass, we expect this trend to expand. The utilization of unmown fine fescues can result in decreased maintenance costs and display aesthetically pleasing areas throughout a golf course. Since these stands are managed differently than in-play areas, superintendents may be faced with management of different weed species. Slow establishment of fine fescues can also induce weed competition challenges. The density and height of the stands may alter golf ball visibility and ultimately the pace of play (Figure 1). Research that guides superintendents of proper establishment and management of unmown fine fescues is lacking. In this project, we are investigating seeding rates and mowing regimes for optimal weed suppression, golf ball visibility, and aesthetics to reduce management uncertainty.

Establishment of the project began in July of 2017 at the University of Minnesota Turfgrass Research Outreach and Education Center in St. Paul and at Rush Creek Golf Club in Maple Grove, MN. Each location was seeded with 'Beacon' hard fescue in a 3 x 4 factorial design with four replications. The two factors include seeding rate based on pure live seed (PLS) (3 levels: 1, 2, and 3 PLS per cm^2) and mowing regime (four levels: spring, fall, spring and fall, and no mowing). At planting, starter fertilizer impregnated with mesotrione was applied at 3.6 x 10^{-3} lb. active ingredient per 1000 ft^2 to reduce weed pressure. Bleaching of fine fescue seedlings was observed but was temporary. Each location was supplied a total of 1.95 lbs. N and 2 lbs. K$_2$O per 1000 ft^2 during the first two weeks of establishment with split applications, and an additional 0.71 lb. N per 1000 ft^2 was applied at the Rush Creek Golf Club trial in September. The trial areas were mowed at 4 inches in the fall with clippings removed for preparation of data collection and mowing treatments in spring 2018.

During establishment, weed emergence was observed and fine fescue coverage was estimated using grid counts at four time points prior to fall mowing. Plots in St. Paul had significantly more grassy weed coverage and less bare soil than plots in Maple Grove. Prominent

weeds at each location also differed (Figure 2). Within each location and coverage category (i.e. broadleaf weed), there were no statistical differences across seeding rates (Figure 3). We expect fine fescue coverage to increase by spring 2018 following the fall mowing and loss of annual weeds. Grid counts and species identification will continue during the following two years.

In 2018-19, we will collect the following data: living fine fescue coverage and weed pressure (grid counts three times each year); seed head density (culm counts in a 1 ft^2 subsample per plot); overall quality; total biomass at each mowing (dry biomass weights of 1 ft^2 subsample per plot); maturity (days after April 1 until seed head is fully emerged); lodging (visual assessment as needed); golf ball lie.

Playability in unmown fine fescues is difficult as it serves as a penalty for unfortunate golf shots. Struggles with locating golf balls may decrease the pace of play and player satisfaction, so an assessment of golf ball visibility in each plot will be performed in the spring, summer, and fall of 2018-19. Digital image analysis will be used to estimate golf ball exposure in each plot. We will drop a red golf ball from a set height into each plot and take a digital image from the top-down. Image analysis will determine the percentage of red pixels in each image to estimate golf ball visibility.

Summary Points

- No-mow fine fescues can serve as a low-input vegetation option in golf course roughs.
- We are determining optimum seeding rates and mowing regimes for maximum quality, weed suppression, and golf ball visibility.
- Estimated fine fescue coverage was similar during establishment for each seeding rate.
- The results from this project will clarify fine fescue rough establishment and management strategies.

Figure 1. Fine fescue no-mow research plots from a previous trial in St. Paul, MN (photo credit: Andrew Hollman).

Common weeds during establishment			
Grassy weeds		**Broadleaf weeds**	
St. Paul	**Maple Grove**	**St. Paul**	**Maple Grove**
Annual bluegrass	Creeping bentgrass	Prostrate knotweed	Pennycress
Fall panicum	Perennial ryegrass	Purslane	Canada thistle
Perennial ryegrass	Fall panicum	Redroot pigweed	Common milkweed

Figure 2: Weed species identified in fall 2017 on plots in St. Paul and Maple Grove.
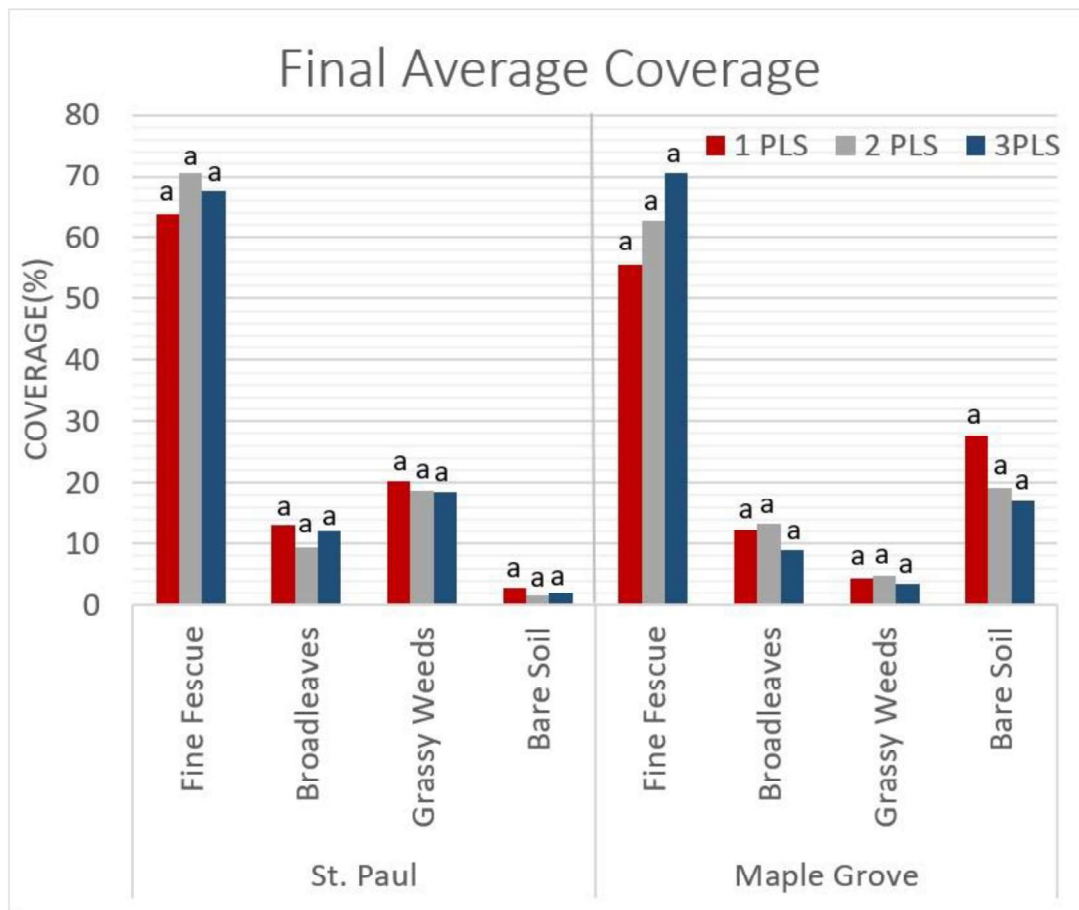

Figure 3: Fine fescue, weed, and bare soil coverage in plots at St. Paul and Maple Grove during fall 2017. Coverage was assessed using the grid-intersect method.