The Effect of Fine Fescue Species and Seeding Rate in No-Mow Areas

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Introduction

- Reducing the amount of resources used for maintenance of turfgrasses is a theme that is increasing among turfgrass users.
- Consumers are willing to pay a premium for attributes like low irrigation requirements and infrequent mowing (Yue et al., 2012).
- In Northern states, fine fescues species are often used for low-input areas and recommended for “No-Mow” situations.
- Five different fine fescue species are commonly used in low maintenance mixtures: Chewing fescue = CHF (Festuca rubra sp. folia), Hard fescue = HDD (F. brevispina), sheep fescue = SHF (F. ovina), slender creeping red fescue = SCRF (F. rubra sp. litoralis), and strong creeping red fescue = STCRF (F. rubra sp. rubra).
- Previous research has found seed size differences among species and cultivars of the fine fescues (Fairey and Leftkowski, 1996), making comparisons among the fine fescue species and cultivars potentially confounded if seeding is not done based on number of Pure Live Seeds (PLS) for a given area.

Materials & Methods

- **Design**
  - 5 species x 6 seeding rate factorial (Table 1)
  - 2015 Trial planted August 26, 8 replications of 1.5 x 3 m plots
  - 2017 Trial planted August 19, 4 replications of 1.5 x 1.5 m plots

- **Management**
  - **irrigation** - provided for establishment
  - **fertility** - at seeding with 48.8 Kg ha^-1 of P, O^3-
  - **Protection** - Plots covered with Futerra® establishment blankets
  - **Mowing** - 8.9 cm during planting year, annually at 14 cm with biomass removed at the end of July for subsequent years
  - **Herbicides** - Applied to control prohibited noxious weeds: Canada Bluegrass (Cirsium arvense L.) (MDA, 2018)

- **Data**
  - **Turfgrass quality** - (1-9, 9=ideal, S=marginally acceptable)
  - **Seedhead density** - (3 sets of 0.09 m^2 counts per plot)
  - **Lodging** - (1-5, 1=100% lodged)
  - **Establishment** - (1-5, 1 = fully established)
  - **Weed incidence** and Living Turf Cover - Seasonally to assess plot makeup using line intersect (data not shown)

- **Data Analysis**
  - Was analyzed as a factorial with AR (Gyllenring Management Inc.) with main effects separated by means comparison using Fisher’s LSD at α=0.05 when no interaction occurred (Table 2).
  - Fisher’s LSD calculated to make treatment comparisons at α=0.05 (Table 3, Figure 1 & 2).

Results

- Cultivars used in the 2014 NTEP fine fescue trials differed significantly in thousand seed weight, with a difference of over a million seeds kg^-1 between the smallest and largest seeds (Fig. 1).
- Seed lot differences were accounted for with planting year (Table 1).
- There was a significant main effect of species and seeding rate for establishment, weed incidence and seedhead lodging (Table 2).
- Establishment - Slender creeping red fescue established significantly better than all plots except strong creeping red fescue. Increasing seed rate significantly increased establishment.
- Weed Incidence - Sheep and hard fescue had significantly more weeds than the other species. Increasing seed rate significantly decreased the percentage of weeds.
- Lodging - Sheep fescue had significantly less lodging than slender creeping red fescue and Chewing fescue. High seeding rates of 2.0 and 3.0 PLS cm^-2 had significantly less lodging than all lower rates.
- In the first year after seeding, seedling rate had the largest influence on the number of seedheads produced with an inverse relationship between the two. As seeding rate increased, number of seedheads decreased (Fig. 1).
- Chewing fescue produced almost no seedheads at both 2.0 and 3.0 PLS cm^-2.
- Hard fescue and strong creeping red fescue produced the highest density of seedheads at 0.125 PLS cm^-2.
- In the second and third years after seeding, seedhead density decreased across seeding rates and species (Fig. 1).
- Strong creeping red fescue had no seedhead production at 3.0 PLS cm^-2 and minimal seedhead production at all other seeding rates in year three.
- Turfgrass quality varied with species and seeding rate for the August rating date in each reproductive year (Fig. 2).
- Hard fescue maintained acceptable turfgrass quality across all seeding rates and years.
- Hard fescue followed by sheep fescue, had the highest turfgrass quality regardless of seeding rate in the third reproductive year.

Conclusions

- With the observed variation in seed size among fine fescues, seed recommendations should shift from weight of PLS for a given area to number of PLS cm^-2.
- Hard fescue at the 2.0 and 3.0 PLS cm^-2 shows promise as a turfgrass which can be maintained with a single mowing during reproductive years. The high seeding rate limits weeds, reduces seedhead density and maintains turfgrass quality. Future research needs to answer whether all hard fescue cultivars will behave similarly in Minnesota and other Northern locations.

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Table 1. Thousand Seed Weight (TSW) of species used in the 2014 National Turfgrass Evaluation Program (NTEP) fine fescue trials.

<table>
<thead>
<tr>
<th>NTEP Entry#</th>
<th>Name</th>
<th>Species</th>
<th>TSW (grams)</th>
<th>Seeds per Pound</th>
<th>Seeds per Kilogram</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>FRC/3060</td>
<td>HDD</td>
<td>0.63</td>
<td>1,635,310</td>
<td>738,735</td>
</tr>
<tr>
<td>19</td>
<td>STCRF</td>
<td>SCRF</td>
<td>0.62</td>
<td>1,623,800</td>
<td>717,296</td>
</tr>
<tr>
<td>20</td>
<td>STCRF</td>
<td>STCRF</td>
<td>0.60</td>
<td>1,625,300</td>
<td>738,121</td>
</tr>
<tr>
<td>21</td>
<td>STCRF</td>
<td>STCRF</td>
<td>0.58</td>
<td>1,647,300</td>
<td>760,843</td>
</tr>
<tr>
<td>22</td>
<td>STCRF</td>
<td>STCRF</td>
<td>0.55</td>
<td>1,671,300</td>
<td>792,845</td>
</tr>
</tbody>
</table>

Table 2. Effect of species and Pure Live Seed (PLS) seeding rate on establishment, weed percentage and lodging from 2015 “No-Mow” trial separated by fishers LSD (p=0.05).

<table>
<thead>
<tr>
<th>Species</th>
<th>Cultivar</th>
<th>PLS cm^-2</th>
<th>lbs 1000^-2</th>
<th>kg ha^-1</th>
<th>lbs 1000^-3</th>
<th>kg ha^-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHF</td>
<td>Compass</td>
<td>0.125</td>
<td>0.32 to 7.48</td>
<td>15 to 79.1</td>
<td>0.29 to 7.01</td>
<td>14.3 to 42.3</td>
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<tr>
<td>HDD</td>
<td>Beacon</td>
<td>0.23 to 5.50</td>
<td>11.2 to 58.6</td>
<td>0.29 to 9.13</td>
<td>11.3 to 270.9</td>
<td></td>
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<tr>
<td>SHF</td>
<td>P-Rod</td>
<td>0.23 to 6.80</td>
<td>13.9 to 126.6</td>
<td>0.28 to 7.98</td>
<td>11.7 to 291.4</td>
<td></td>
</tr>
<tr>
<td>SCRF</td>
<td>Seabreeze GT</td>
<td>0.31 to 7.54</td>
<td>14.9 to 358.4</td>
<td>0.26 to 31.5</td>
<td>12.9 to 350.2</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1. Effect of Pure Live Seed (PLS) seeding rate and species on seedhead density (seedheads m^-2). Fisher’s LSD (p=0.05) of 3.12 was calculated for comparing species, years and seeding rates. Error bars = standard error.

Figure 2. Effect of pure live seed (PLS) seeding rate and species on turfgrass quality (1-9, 9=ideal) for August ratings with 5 equal to minimally acceptable. Fisher’s LSD (p=0.05) of 0.04 was calculated for comparing species, years and seeding rates. Error bars = standard error.

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Notes:

- 1 Establishment = 1 to 9 rating with 9 representing a plot that is fully established (30 Sept. 2015)
- 2 LSD (p=0.05) of 3.12 was calculated for comparing species, years and seeding rates. Error bars = standard error.