

Responses of Mixtures of Kentucky Bluegrass, Creeping Red Fescue, and Alkaligrass to Ice Melter

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INTRODUCTION

Ice melters are often applied on sidewalks in cold regions during the winter for safety reasons. Most of the applied ice melting salts eventually are removed to adjacent lawns or storm drains. The objective of this study was to determine salinity tolerance of three-way mixtures of Kentucky bluegrass, creeping red fescue, and alkaligrass in a simplex lattice design. The ultimate goal was to optimize the ratio of the three-way mixture for use in salt prone areas, such as a boulevard, in cold regions.

MATERIALS AND METHODS

- The two repeated experiments were established in August 2009 and 2010, and terminated in October 2011 and 2012, respectively.
- The soil was a Fargo-Ryan silty clay [(fine, montmorillonitic, frigid Vertic Haplaquoll)-(fine, montmorillonitic, Typic Natraquoll)], with a soil particle size composition of 2% sand, 46% silt, and 52% clay.
- A total of 21 mixes were generated from the simplex lattice design with each of the following species in a range of 0, 20, 40, 60, 80, and 100% in the premix.
 - ❖ Kentucky bluegrass (KB) 'Park' and 'Dragon' in 1 to 1 ratio, with pure live seed (PLS) rates of 85% and 80%, respectively. Seeding rate was 150 kg ha⁻¹ PLS adjusted.
 - ❖ Alkaligrass (Alk) 'Salty' with a PLS of 85%. Seeding rate was 150 kg ha⁻¹ PLS adjusted.
 - ❖ Creeping red fescue (RF) 'Smirma' with a PLS of 92%. Seeding rate was 300 kg ha⁻¹ PLS adjusted.

The mixes were tested in a split plot design with ice melter as whole plot arranged in RCBD with three replicates.

- The subplot measured 1.5 by 2.5 m.
- The ice melter (Quad Release, Spring Valley, WI) was applied at 0, 20, and 40 kg ha⁻¹ monthly from April to October.
- The turfgrass received fertilization in 150 kg ha⁻¹ of N and 100 kg ha⁻¹ of K per year, and was mowed at 6.5 cm height and irrigated to prevent wilting.
- The turf visual quality, normalized difference vegetation index (NDVI), and ground cover components were evaluated during the growing season.
- The average data across the growing seasons in each experiment were used in the statistical analysis using the ADX interface for Simplex-Lattice Mixture Design in SAS 9.2.

RESULTS

The optimum ratio from the two experiments was the same. Results of the high ice melter rate from the 2009 study are presented here to illustrate the effects of ice melter on ground cover components over a two-year period and the optimized ratio of three species in the premix.

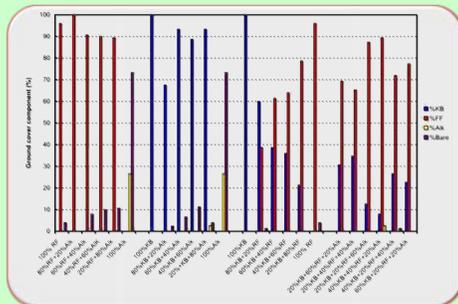


Figure 2. In fall 2011, KB and RF increased, Alk decreased without ice melter treatment.

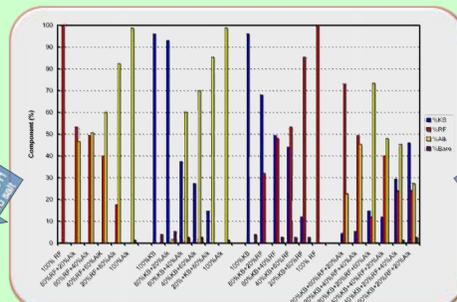


Figure 1. Ground cover in spring 2010 measured with a point intercept method.

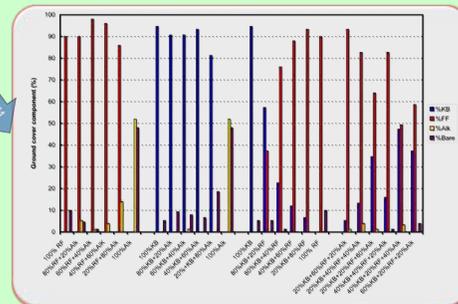


Figure 3. In fall 2011, KB and RF changed, more Alk sustained in the ice melter treatment compared to that without ice melter.

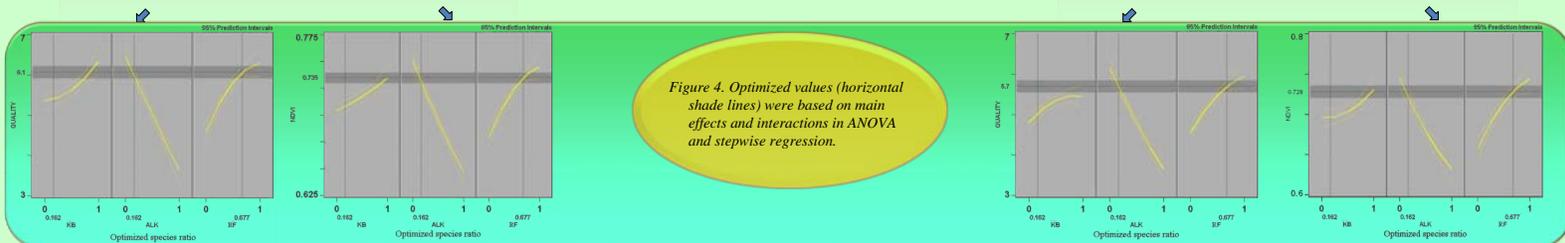


Figure 4. Optimized values (horizontal shade lines) were based on main effects and interactions in ANOVA and stepwise regression.

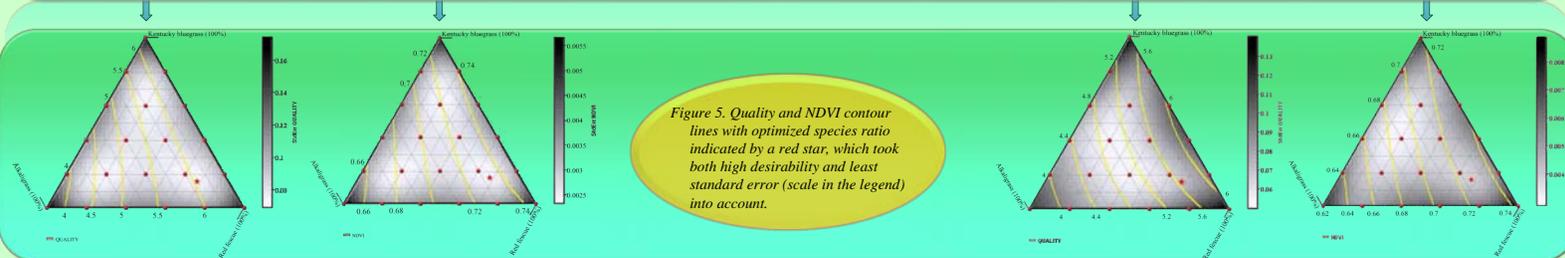


Figure 5. Quality and NDVI contour lines with optimized species ratio indicated by a red star, which took both high desirability and least standard error (scale in the legend) into account.

CONCLUSIONS

- Initial ground cover was in proportion to the ratio of the three species seeded. Overtime, RF and KB increased, Alk decreased as a result of ice melter treatment.
- Both visual quality and NDVI results supported an optimized species ratio in a premix, 68% creeping red fescue, 16% Kentucky bluegrass, and 16% alkaligrass.
- The optimized species ratio was the same regardless of applications of ice melter.