MINNESOTA-Yield & Forage Nutritive Value of Transgenic Reduced Lignin Alfalfa Amanda Grev, M. Scott Wells, Krishona Martinson, Craig Sheaffer, University of Minnesota; Deborah Samac, USDA-ARS

Ifalfa is used as forage to supply energy, protein, fiber, and minerals for livestock diets. However, the digestibility and utilization of alfalfa forage is limited by its lignin content. New alfalfa varieties with reduced lignin concentration and improved forage digestibility have been developed through conventional plant breeding and genetic engineering (see Sheaffer, Undersander, *New Reduced Lignin Alfalfa Varieties – A Potential Forage Quality Breakthrough*, March 2015, *Forage Focus*, on the Members Only page of the MFA website). These new varieties have potential to have improved forage nutritive value at all stages of maturity. In addition, improvements in forage nutritive value may lengthen the time period when alfalfa has a forage nutritive value suitable for high-producing livestock. This could allow for a wider optimal harvest window, making it possible for alfalfa farmers to achieve greater yields by delaying harvest while still maintaining acceptable forage nutritive value.

We evaluated forage yield and nutritive values for transgenic, reduced lignin HarvXtra® alfalfa and three reference (conventionally bred) alfalfa varieties when subject to diverse cutting treatments during the establishment and first production year. Four sites were planted in April 2015; all varieties had good seedling vigor and developed excellent stands. Treatments included four cutting treatments with varying harvest frequencies every 30-45 days. We determined forage quality and forage yield in 2015 and 2016.

Cumulative forage yields were averaged over locations and varieties, and cutting treatments ranged from 2.6-4.3 tons/ac in 2015 (seeding year) and from 6.5-9.8 tons/ac in 2016. Yield differences among varieties were minimal in both years. During the seeding year, yields were improved with the addition of a fall cut. During the first production year, yields were greater with the 40-day cutting treatment compared to the 30-day cutting treatment.

Compared to reference alfalfa varieties, HarvXtra alfalfa had 8% lower acid detergent lignin concentrations, 10% greater neutral detergent fiber digestibility, and similar crude protein and neutral detergent fiber concentrations. Cutting treatments with shorter harvest intervals generally resulted in higher forage nutritive values for all varieties, including increased crude protein concentration, decreased acid detergent lignin concentration, and increased neutral detergent fiber digestibility.

While these results are promising, additional research is needed to compare the forage nutritive value and forage yield of all of the new, elite high forage quality varieties. In addition, to better understand the effect of the reduced lignin trait on whole plant forage nutritive value, we are conducting additional research to further characterize changes in morphological development and the forage nutritive value of stem and leaf fractions of reduced lignin alfalfa varieties.

View project report, including tables & trial details, on the Members Only page of MFA's website at midwestforage.org/ membersOnly.php.