Forage Quality Improvement in Reduced-Lignin Alfalfa Monoculture and Alfalfa-Grass Binary Mixtures

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Introduction

Despite its obvious importance to agriculture, alfalfa acres have declined relative to annual corn and soybean crops. Even though prices are relatively high, hay production is down nearly 30% when compared to 10-year historical averages. The dramatic increase in corn and soybean acreage and reduction in diverse rotations including perennials like alfalfa and alfalfa-grass mixtures is likely to have negative impacts on water quality and soil loss.

We now have the opportunity to enhance alfalfa use in livestock rations and to increase its presence on the agricultural landscape. The development of reduced-lignin alfalfa has potential to provide a higher digestibility forage that will increase feeding value and profitability of its use in rations. Transgenic, reduced-lignin alfalfa contains up to 18% less whole plant lignin than standard cultivars.

Increasing diversity in cropping systems helps to balance profitability and environmental concerns. Throughout northern and transition zone regions, alfalfa is frequently grown in binary mixture, and new grasses provide unique opportunities to increase use of alfalfa mixtures. For example, in NY over 85% of alfalfa is sown in mixtures with perennial grasses.

Advantages of alfalfa-grass mixtures compared to alfalfa monocultures:

- Reduced chance of alfalfa heaving and winter kill.
- Less concern over application of animal manures.
- Improved soil and water conservation.
- Maintain a full stand of forage for more years as the alfalfa component declines.
- Increased resistance to alfalfa insect pests.
- Faster drying of mixed alfalfa-grass forage in the field.
- Reduced bloat potential of grazed alfalfa.
- Reduced soil structure damage by grazing animals.
- Provide more balanced nutrition to livestock.

Experimental Design, sown Spring, 2016

Locations:

Ithaca, NY, St. Paul, MN, Lexington, KY

Harvest Management:

Whole plot treatments are two cutting managements, a) maximize yield with harvest at early flower for alfalfa, or b) maximize forage quality based on harvest at bud stage.

Selection of Alfalfa and Grass:

Alfalfa: HarvXtra vs. WL 355 RR.

Grass: *BAR FpF32* Meadow Fescue (*Hidden Va*lley selection), *Fojtan* festulolium, and a very late maturing orchardgrass, *Dividend VL*.

All three sites are successfully established and will be harvested twice in the seeding year (2016).

Recent Alfalfa-Grass References

- Karayilanli et al. 2016. Prediction of botanical composition of alfalfa-grass mixtures using NIRS. Crop Sci. (“First Look”)
- McRoberts et al. 2016. Application of local binary patterns in digital images to estimate botanical composition in mixed alfalfa-grass fields. Computers and Electronics in Agric. 123:95-103.

Acknowledgments

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