



Northern NY Agricultural Development Program 2021 Project Report

Maximizing Both Alfalfa and Grass Quality of Mixtures

Project Leader:

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Cooperating Producers:

- Jefferson County: Mike Kiechle, Philadelphia, NY
- Lewis County: Tony Paluck, Constableville, NY

Background:

Mostly through the efforts of European grass breeders, there are new varieties of perennial grasses that have the potential to greatly improve the quality of alfalfa-grass mixtures. There is a relatively large acreage of meadow fescue (MF) in Europe and Canada, but MF is just beginning to come back into use in the USA. Using meadow fescue in mixture with alfalfa will significantly increase fiber digestibility of the mixture, and increase milk production. Not only are meadow fescues typically higher in fiber digestibility than other grasses, but there are significant differences in NDFD among meadow fescue varieties. There are over 100 meadow fescue varieties certified in Europe and most of them have not been evaluated for yield or quality in North America.

Almost all alfalfa in northern NY is seeded with a companion cool-season grass, due to less than ideal alfalfa growing conditions. While alfalfa quality is relatively consistent among varieties over regions, grass quality and yield are significantly impacted by region. Fiber digestibility (NDFD: neutral detergent fiber digestibility) declines over one percentage unit per day in spring growth, and spring harvest may account for up to half of

the total forage yield used as forage for lactating cows. As low as 5% grass in an alfalfa-grass mixture will significantly increase the fiber digestibility of a mixture, compared to pure alfalfa.

For growers in northern climates, meadow fescue has the added advantage of being more winter hardy than most cool-season grasses, including tall fescue. Almost all of the meadow fescue varieties in Europe were selected in northern environments, many with more severe winters than northern NY. This research evaluates several variety options for their potential to enhance alfalfa-grass production by Northern New York growers.

Methods:

The two primary concerns with alfalfa-grass mixtures are 1) achieving a 20-30% grass mixture, and 2) achieving the highest quality possible for the grass. The NNYADP field experiments were established to evaluate both of these issues.

Meadow fescue seed was collected from a number of European sources for evaluation in mixture with alfalfa. There was a 3-fold range in weight per seed, but the same number of pure live seeds/acre were planted for all meadow fescue varieties.

Nine meadow fescue varieties were selected, along with Bariane tall fescue, for differences in NDFD and grass percentage in mixtures. This included two new tetraploid varieties, Tetralonia and Schwetra.

In the spring of 2020, we established two meadow fescue-alfalfa studies in Northern NY. We seeded at the Mike Kiechle farm in Philadelphia, Jefferson County, on April 25, 2020, and at the Tony Paluck farm in Constableville, Lewis County on May 5, 2020.

All grasses were seeded at approximately 1, 2, and 3 lbs/acre with Ameristand 427TQ alfalfa at 15 lbs/a. SW Minto was seeded at exactly 1, 2, and 3 lbs/a, and all other grasses were seeded at the same number of pure live seeds per sq. ft. as Minto. Tetraploid seeds are as much as three times the weight per seed of diploid varieties.

Each study has four field replicates. We also provided seed to Heather Darby at the University of Vermont, and Heather seeded the same study in northern VT for evaluation in 2021 as a comparison study with the Northern New York field plots.

Alfalfa and grass were analyzed separately for crude protein (CP), neutral detergent fiber (NDF), in vitro true digestibility (IVTD), neutral detergent fiber digestibility (NDFD), Acid Detergent Fiber (ADF), and lignin.

Results:

Tony Paluck Farm

The Paluck farm site in Constableville was very weedy in 2020, making it difficult to assess the grass trial for seeding success through 2020. We assessed the experiment in the spring of 2021 and concluded that we failed to establish any grass at that site, and discontinued the experiment there. The site planted in northern VT also failed to establish

any grass. A combination of unfavorable weather and less than optimal forage seeding sites resulted in the grass establishment failures.

We planted meadow fescue-alfalfa at six sites in NY in 2020, and only three of the sites had successful grass establishment. We also attempted to interseed grass in a HarvXtra alfalfa stand in western NY and failed to get any grass establishment. Dry weather after planting in 2020 made grass establishment difficult. However, almost all sites had reasonably good alfalfa establishment.

Mike Kiechle Garden of Eden Farm

The Kiechle farm site in Philadelphia resulted in a very successful grass establishment in 2020.

Spring Growth. Alfalfa and grass growth was lush in the spring of 2021. We sampled plots on May 21 prior to spring harvest of the field. Although there was a relatively small proportion of grass in the plots in the fall of 2020, the grass proportion was relatively high the following spring. Visual evaluation of plots in the spring showed that the grass% in mixtures ranged from about 30% to 45%. Grass percentage increased linearly with the grass seeding rate (Figure 1). A seeding rate of only 1 lb grass/acre resulted in over 30% grass in mixtures the year after seeding. SW Minto and Tored had the highest grass%, with Hidden Valley having the lowest (Figure. 2). Bariane tall fescue is typically intermediate in grass% in mixtures compared to MF varieties.

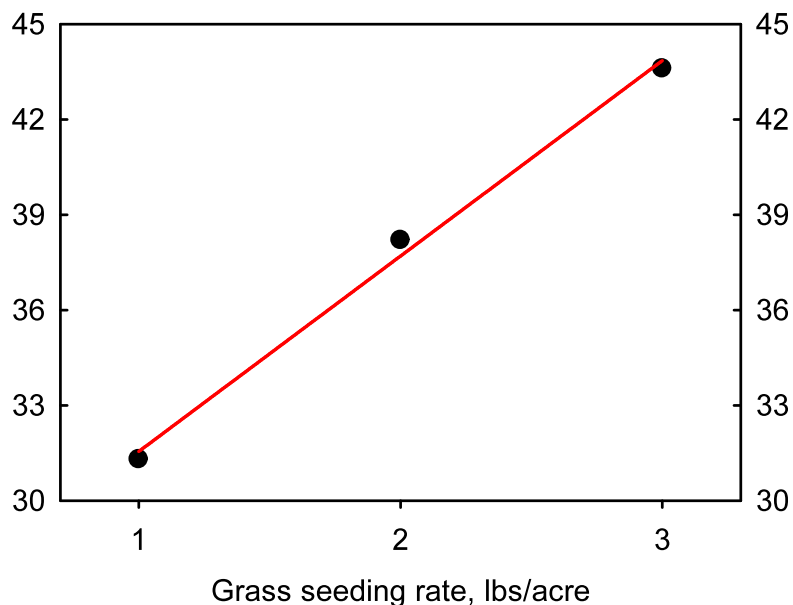


Figure 1. Grass percentage in mixture with alfalfa at the Kiechle farm site in Spring, 2021; Maximizing Both Alfalfa and Grass Quality of Mixtures, 2021 trials, NNYADP, 2021.

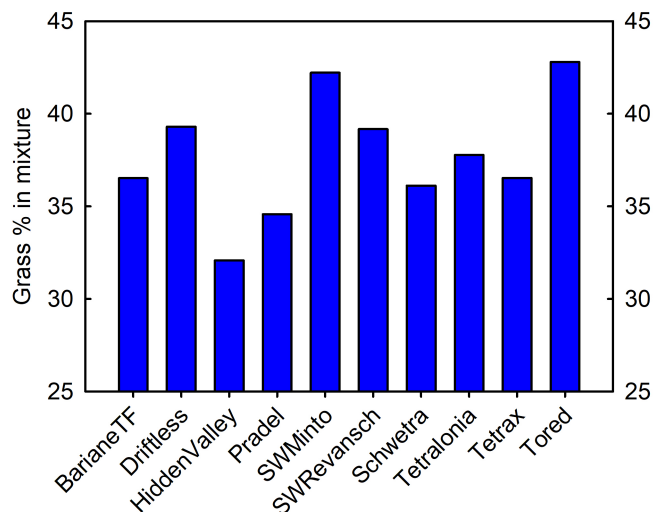


Figure 2. Grass percentage for 9 meadow fescue and 1 tall fescue varieties at the Kiechle farm site in Spring, 2021; Maximizing Both Alfalfa and Grass Quality of Mixtures, 2021 trials, NNYADP, 2021.

Regrowth. Samples were taken prior to harvests 2, 3, and 4 on July 2, August 10, and September 17, 2021. The site was very dry in May and early June, with only about one inch of rain in May and only about 32% of normal rainfall from May 1 to June 15. This resulted in no visible grass in the stands for the 2nd growth. The 3rd and 4th growth were lush and partially lodged, also with no visible grass present. We were able to find enough grass to sample and analyze for all four cuts, but could not visually estimate grass percentage. For cuts 2, 3, and 4, there was not more than 10% grass in any plots.

Forage Quality. On the sampling dates, alfalfa averaged 30, 23, 25, and 26% crude protein, and 56, 41, 44, and 42% NDF digestibility for the four cuts. On May 21, alfalfa averaged a very low 27% NDF.

Grasses were relatively low in CP for the spring cut, and very high in CP at the remaining harvests (Figure 3). If grass is present at low levels in alfalfa, it will always be relatively high in CP content. There was a small but significant decline in grass CP content with increased grass seeding rate. Grass CP averaged 25, 24, and 23% for 1, 2, and 3 lb/a seeding rates of grass. Grass varieties were relatively similar in CP (Figure 4).

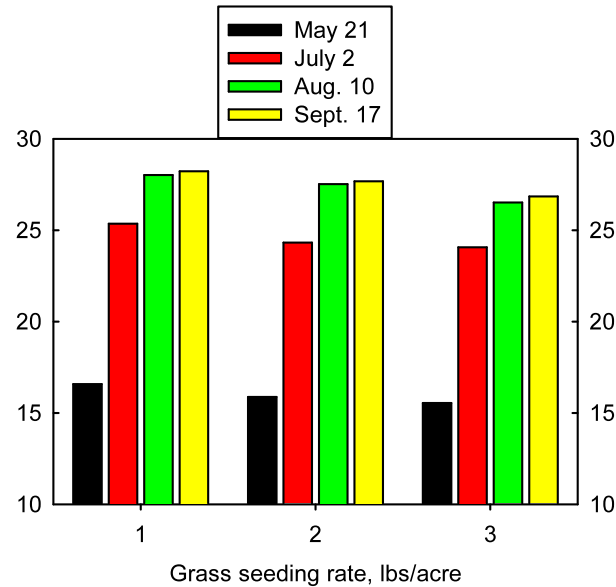


Figure 3. Grass crude protein content for four cuts at the Kiechle farm in 2021; Maximizing Both Alfalfa and Grass Quality of Mixtures, 2021 trials, NNYADP, 2021.

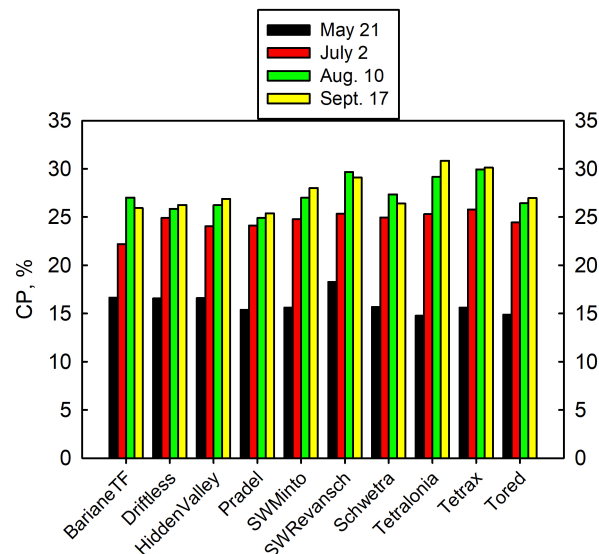


Figure 4. Grass crude protein content fo 10 grasses for four cuts at the Kiechle farm in 2021; Maximizing Both Alfalfa and Grass Quality of Mixtures, 2021 trials, NNYADP, 2021.

Grasses at all four harvests were relatively low in NDF (Figure 5). The three tetraploid MF varieties were considerably lower in NDF at all four harvests, compared to the other grasses. Bariane tall fescue averaged lower fiber digestibility (NDFD) compared to MF varieties (Figure 6), as was the case in other studies. Grass fiber digestibility was very high compared to alfalfa, and is always lower in the fall compared to the rest of the season. Grasses were not greatly different in acid detergent fiber or lignin. Driftless and Hidden Valley MF tended to be lowest in lignin content at all four harvests. Grass seeding rate did not influence fiber or fiber digestibility of grasses.

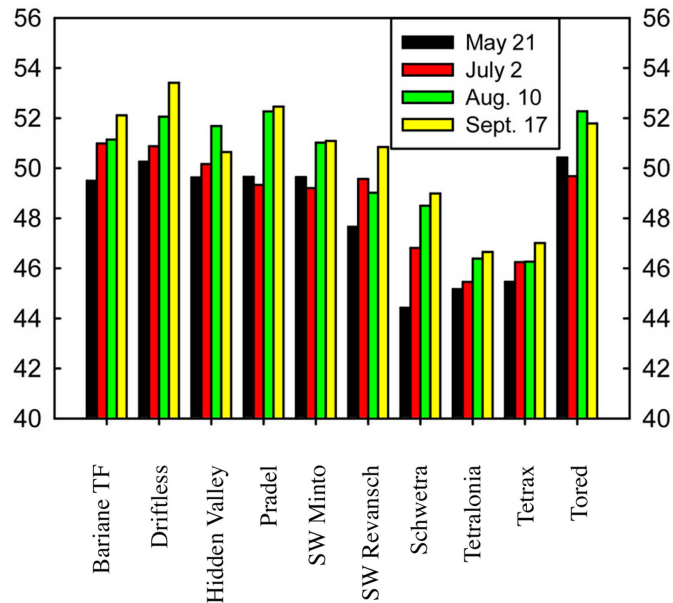


Figure 5. NDF content of grasses at four harvest dates at the Kiechle farm in 2021; Maximizing Both Alfalfa and Grass Quality of Mixtures, 2021 trials, NNYADP, 2021.

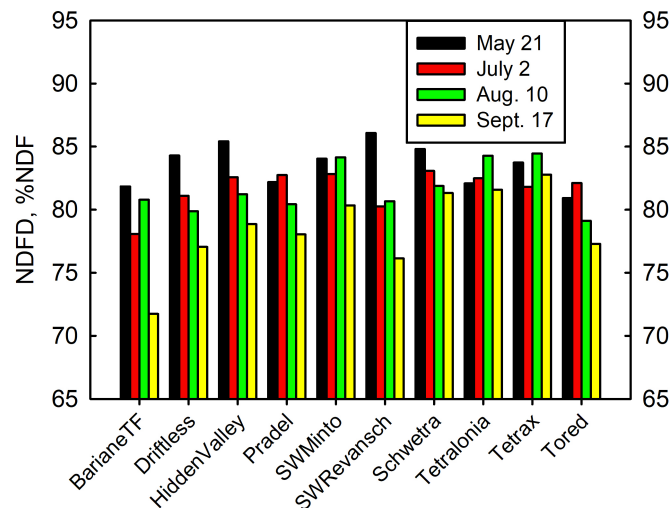


Figure 6. Fiber digestibility of grasses at four harvest dates at the Kiechle farm in 2021; Maximizing Both Alfalfa and Grass Quality of Mixtures, 2021 trials, NNYADP, 2021.

Conclusions/Outcomes/Impacts:

Weather following planting is the most crucial factor affecting establishment of grasses in alfalfa, resulting in either no grass present in stands, or relatively high proportions of grass in mixtures. Nevertheless, to minimize the chance of excess grass in mixtures, the seeding rate for meadow fescue with alfalfa probably should not exceed 1 lb/acre.

Crude protein content of mixtures is going to be sufficient for lactating dairy cows if the grass% is less than 50% of the mixture. Tetraploid meadow fescue varieties are

consistently lower in total fiber content, compared to other MF varieties. Meadow fescues on average are considerably higher in NDFD than tall fescue. Pradel, among the most popular of meadow fescues sown in the USA, generally has a high grass% in mixtures and tends to be among the lowest in NDFD among varieties tested. Hidden Valley consistently has a lower grass% in mixtures and tends to be among the highest in NDFD.

Although variety results tend to vary over locations, tetraploid meadow fescue varieties will be considerably lower in NDF than diploids at the time that mixtures are harvested. Hidden Valley has been the most consistent for having a relatively low grass% in mixtures and having very high NDFD. Since the consequences of having too much grass in mixtures are much greater than the consequences of having a mostly pure alfalfa stand for lactating dairy feed, the meadow fescue seeding rate in mixtures should not greatly exceed 1 lb/acre.

Outreach:

Alfalfa-grass research was reported at the following meetings and conferences in 2021:

- Feb. 24: Wisconsin Focus on Forage Series, online.
- Mar. 13: MidAtlantic Consortium Conf., online.
- Oct. 21: Cornell Nutrition Conference, Syracuse, NY
- Nov. 7-10: American Society of Agronomy Annual Conference, Salt Lake City, UT
- Nov. 15: Cornell Cooperative Extension Inservice, Ithaca, NY, online

Next Steps: Since there are many meadow fescue varieties that have never been grown with alfalfa, and have not yet been tested in northern NY, there remains considerable potential for improving meadow fescue-alfalfa yield and quality in the region.

Acknowledgments: The NNYADP grant funds, plus funding from the National Alfalfa & Forage Alliance (alfalfa seed checkoff funds) to evaluate forage quality of a wide range of alfalfa varieties in Ithaca, are allowing us to focus specifically on improving alfalfa-grass production in Northern New York and NY State.

Reports and/or articles in which results of this project have been published:

- Tacoma-Fogal, R. 2021. Variation in Forage Quality of Spring Growth in Meadow Fescue [Abstract]. ASA, CSSA, SSSA International Annual Meeting, Salt Lake City, UT.
<https://scisoc.confex.com/scisoc/2021am/meetingapp.cgi/Paper/137938>
- Tacoma-Fogal, R., J.H. Cherney, and D.J.R. Cherney. Meadow Fescue Grass Varieties for Optimal Forage Quality in Dairy Production Systems. Cornell Nutrition Conference, Oct. 21, 2021, Syracuse, NY.
<https://hdl.handle.net/1813/110229>.

For More Information:

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Photos:



**May 2021 meadow fescue-alfalfa study at Mike Kiechle farm, Philadelphia, NY;
Maximizing Both Alfalfa and Grass Quality of Mixtures, 2021 trials, NNYADP, 2021.**



**Sampling prior to 4th harvest of alfalfa-grass at Mike Kiechle farm, Philadelphia, NY. There
was no visible grass present for cuts 2, 3, or 4. Maximizing Both Alfalfa and Grass Quality
of Mixtures, 2021 trials, NNYADP, 2021.**