No-till interseeding of winter rye and triticale into existing pastures to increase early spring forage availability.

Arthur Siller and Masoud Hashemi

Perennial pastures and hay fields are one of the core components of forage production in the Northeast. These grasslands are important because they can be grown on relatively steep and rocky land and can be highly productive. However, the primary cool-season species in pastures and hay fields are most productive in the late spring, early summer, and early fall. While a farm may also purchase hay, or grow and store annual grasses, to feed their animals these options may not work for all farms. Many farms do not have sufficient flat land suitable

for annual crops, and volatile hay costs can be very disruptive to farm budgets. These complications have led to interest in the use of annual crop interseeding within perennial fields. While farms will always need to use some stored forage in the Northeast during the winter, this approach could allow farmers to use annual crops to increase grassland productivity during the early spring.

However, the annual plants must be productive enough to pay for the extra labor and seed costs. Several factors interact to affect the overall productivity, including 1) the winter annual vigor, 2) the perennial cool-season plant vigor, and 3) market prices for additional inputs and purchased hay. These factors in turn are affected by pasture condition, agronomic management, weather, and the macroeconomic conditions.

While annual crops do not always enhance perennial forage systems, our experiments suggest that this strategy has promise. Over the last two years, experiments at the UMass research farm in South Deerfield MA show that planting winter small grains into pastures can increase high-quality early spring forage (Table 1). This research mainly addresses the utility of planting winter small grains into pastures as a way to get spring forage when an overgrazed pasture would be slow to grow in the spring.

Table 1. Yield and forage quality of pastures with interseeded rye and triticale harvested at boot stage in early May during 2021 and 2022 in South Deerfield MA.

Small Grain Seeding Rate (lbs/acre)	Nitrogen Rate (lbs/acre)	Dry Matter Yield (lbs/acre)	Relative Feed Value	Protein (%)	Acid Detergent Fiber (%)	Neutral Detergent Fiber (%)	NDF digestibility (% of NDF)
0 (control)	0	522	208	22	24	32	23
	40	815	210	20	21	33	24
60	0	741	159	20	27	41	27
	40	847	147	17	25	45	29
120	0	684	147	17	26	44	29
	40	1554	137	17	27	47	30

A mix of Aroostook rye and Fridge triticale was seeded into existing perennial pastures in late September using a Great Plains no-till drill at 0, 60, and 120 pounds per acre. The pastures were clipped low to simulate overgrazing because preliminary experiments had suggested that small grains have some difficulty competing with vigorous perennial grasses. The small grains were planted both with and without 40 pounds of nitrogen per acre. The forage was then harvested at boot stage the next spring in early May.

Interplanting rye and triticale substantially increased spring yield, nearly doubling the average yield of pasture alone at high seeding rates (120 lbs/acre). Intercropping 120 lbs/acre

of small grains with nitrogen fertilizer yielded an average of 1554 lbs/acre dry matter compared to 522 lbs/acre with unfertilized pasture grasses (Figure 1). At an estimated per acre cost of $40 for small grain seed and $35 for fertilizer, the cost of this increased yield would be $145 per ton of dry matter. This is similar to typical hay prices and the additional labor costs of planting may well be worthwhile to lock in costs and avoid potential hay shortages and price volatility.

Figure 1. Average Early May Forage Yield of Pasture with Interseeded Small Grains and Nitrogen Fertilizer in South Deerfield MA

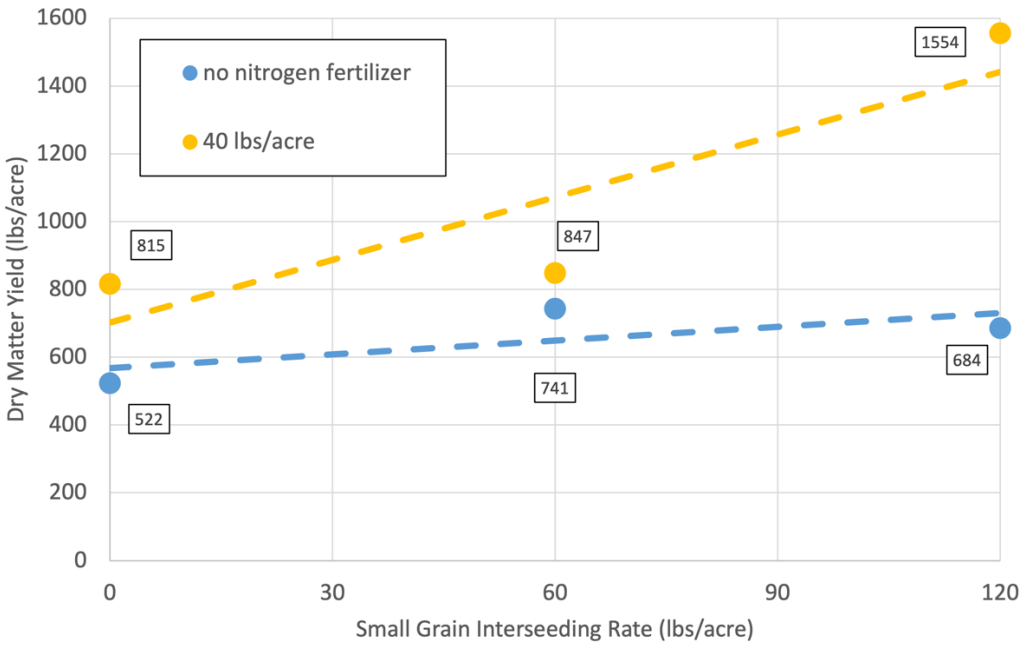
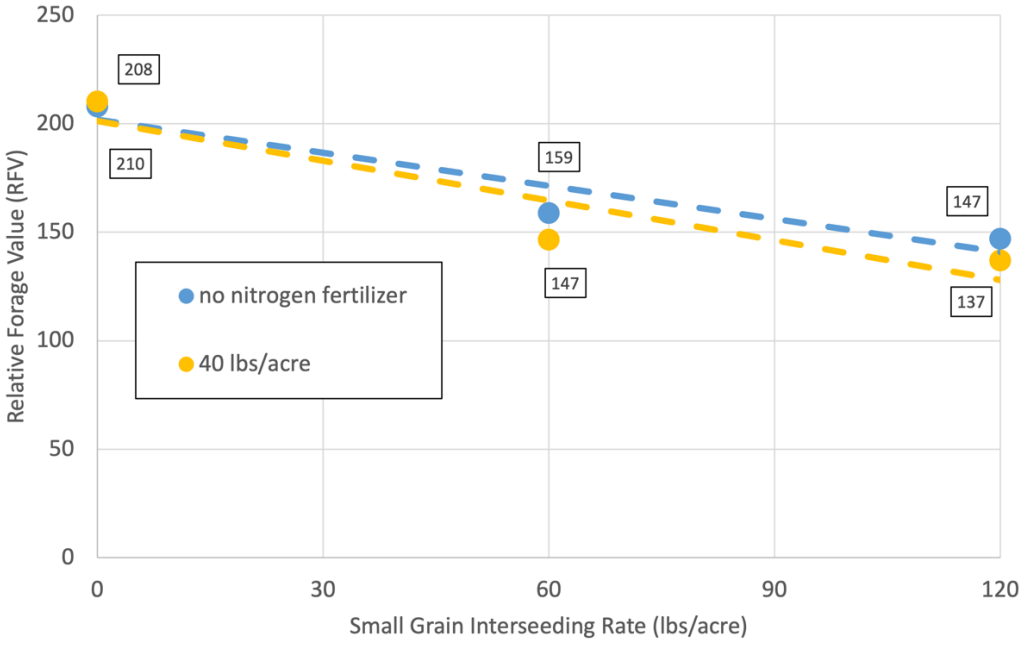


Figure 2. Average Early May RFV of Pasture with Interseeded Small Grains and Nitrogen Fertilizer in South Deerfield MA



While relative feed value (RFV) for the small grains was lower than in the early May pasture, the RFV for the pasture with small grains was still very good (137) and would provide high-quality forage for all grazing animal species (Figure 2). In fact, this may underestimate the quality of the forage; while the intercropped small grains had more ADF and NDF fiber (acid detergent fiber and neutral detergent fiber respectively) than the solo pasture grasses (Figures 3 and 4), the NDF digestibility was also 40% higher (Figure 5). Similarly, while protein content was lower in the intercropped plots, the protein content of all forages was acceptable (Figure 6).

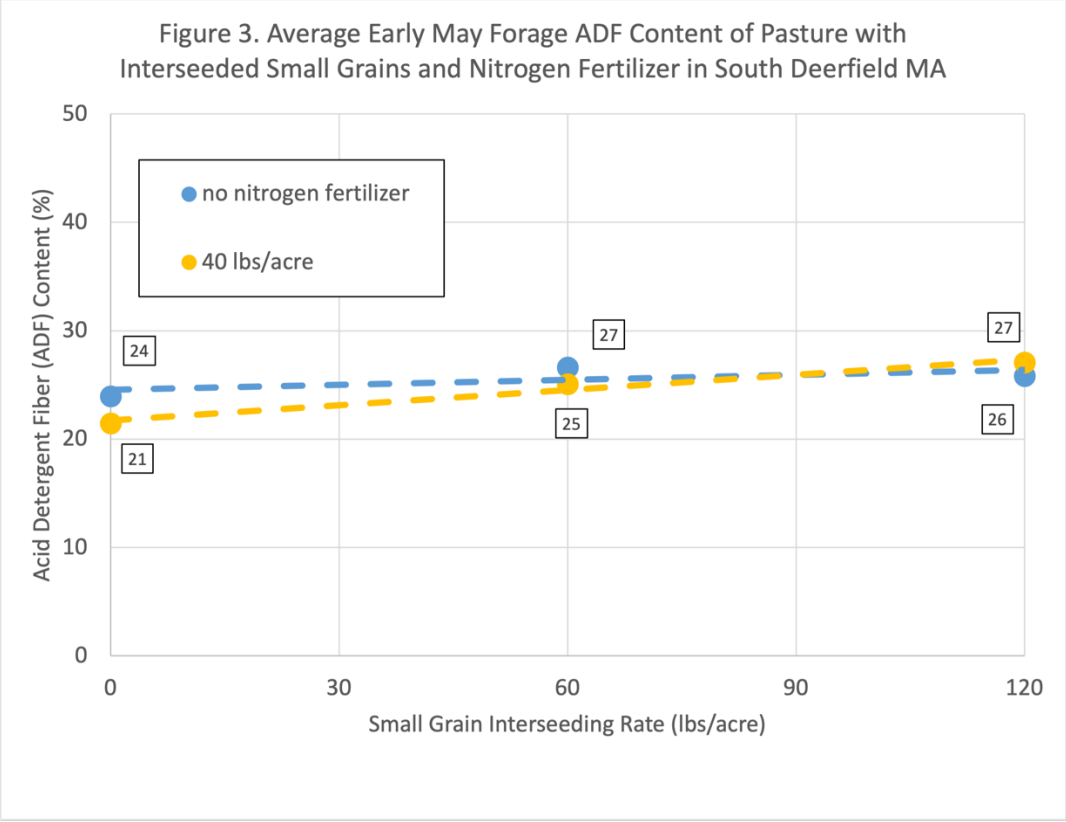


Figure 5. Average Early May 48-hour NDF Digestibility of Pasture with Interseeded Small Grains and Nitrogen Fertilizer in South Deerfield MA

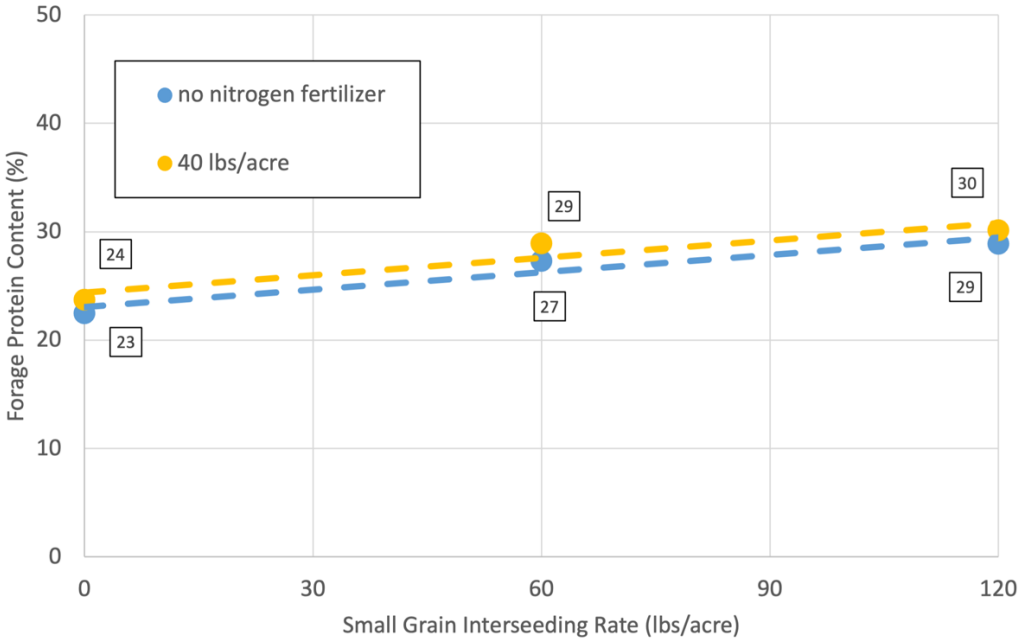
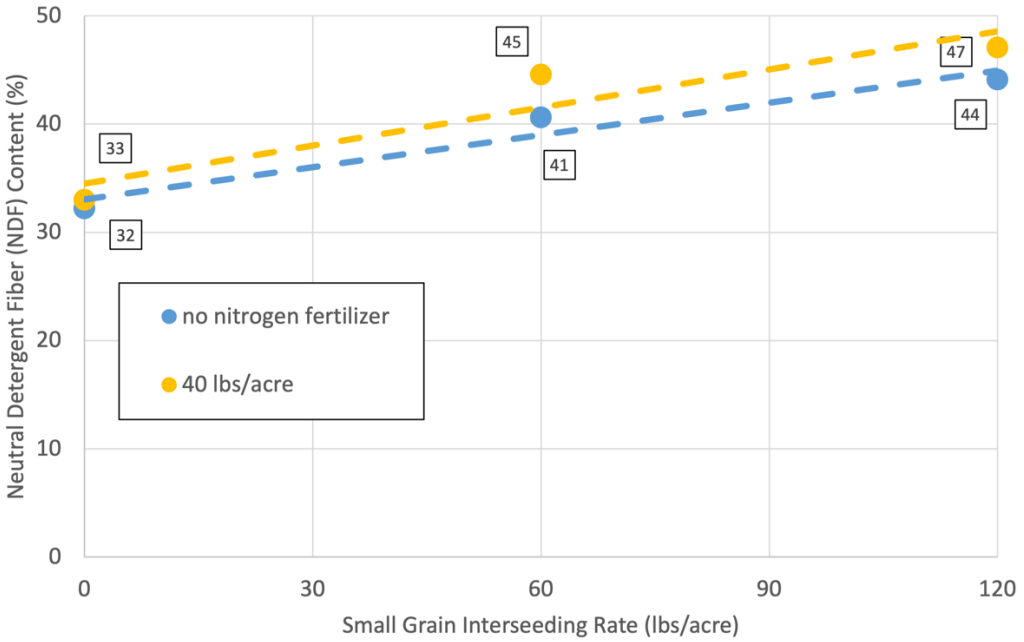
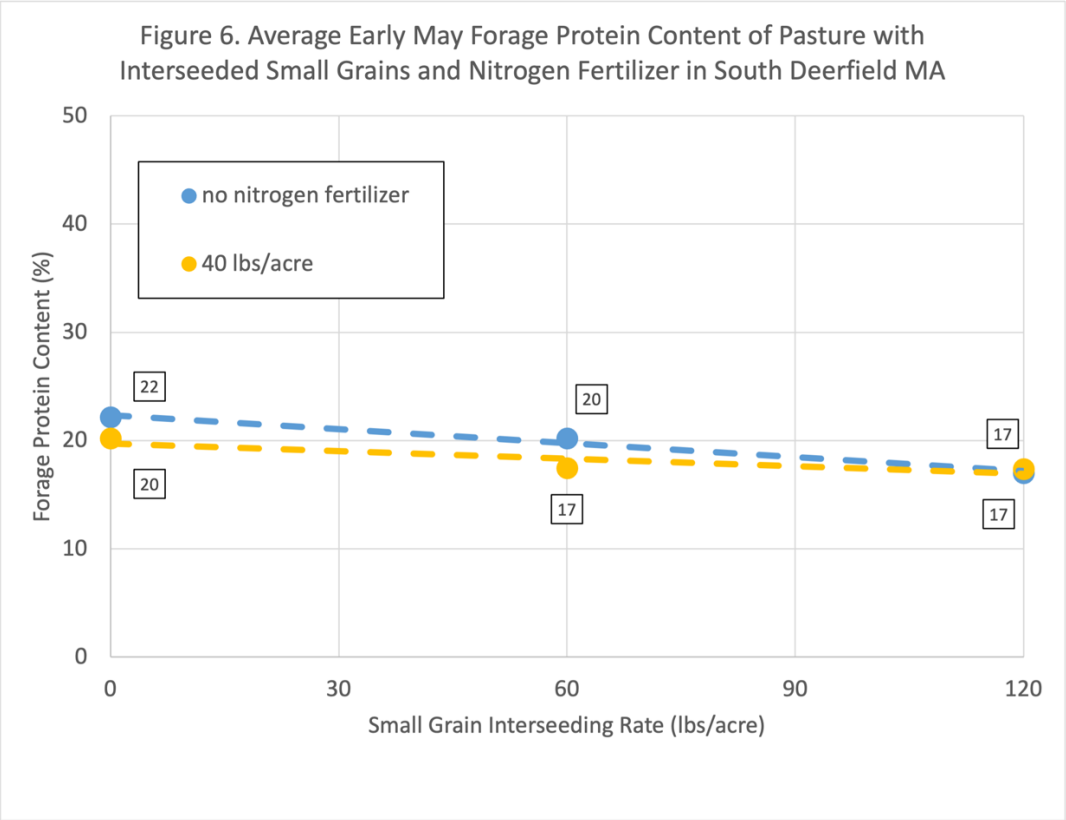


Figure 4. Average Early May Forage NDF Content of Pasture with Interseeded Small Grains and Nitrogen Fertilizer in South Deerfield MA





This research shows that interseeding small grains into pastures can be an effective way to boost spring forage yields while maintaining high forage quality in the correct conditions (Table 2). This system may be especially useful when pastures have been overgrazed or when early spring growth and fiber digestibility are priorities. Samples from on-farm demonstrations of vigorous pastures with interseeded small grains showed similar patterns in yield and forage quality but the differences were considerably smaller than those seen in the research plots with simulated overgrazing. Overall, the system needs additional development to be a reliable and economically profitable tool in most situations but should be considered as an experimental tool.

Table 2. Things to remember for interseeding small grains into existing pastures.

- On-time planting is important (mid to late September in Massachusetts).
- Nitrogen fertilizer will improve spring productivity. High yields were only obtained with 40 lbs/acre nitrogen.
- Perennial grasses are competetive. Benefits of intercropping have been small in vigorous pastures. This system is more promising for overgrazed or low-cut fields.
- No-till planting equipment is needed to get good soil contact and establish small grains.

For more information or to share your experiences with similar production practices, contact:

Arthur Siller - asiller@umass.edu