

Interseeding Legumes versus Applying Nitrogen Fertilizer

by Ken Barnett¹

Introduction

The legume and grass content of a grazed pasture changes over time. This occurs due to a cycling of the grass and legume portions of the pasture. When grasses do better, the competition reduces the legume content. When the legume content and its nitrogen contribution to the grasses decreases, the grass content declines. As the grass content decreases, the legume content will increase again. In maritime climates in England and New Zealand, this cycle takes about 5 years. For a temperate climate that we have, the cycle period has not been identified.

A 30 percent stand of legume in the pasture can supply 30 to 50 pounds of nitrogen per year to the grasses in the pasture. The cycling of nitrogen from urine, manure, dead plants, etc. may supply an additional 15 to 30 pounds of nitrogen per year depending on cow numbers and frequency of grazing. While this is significant, recent University of Wisconsin research showed a positive economic return with up to 100 pounds of nitrogen fertilizer per acre applied to mixed pastures (<http://www.uwrf.edu/grazing/PNNitrogen.pdf>). This paper will provide information comparing the cost of interseeding legumes with that of applying nitrogen fertilizers.

Advantages of Interseeding

What are the advantages of interseeding legumes in the grazed pasture? The first is a reduced need for nitrogen fertilizers. Second, the seasonal distribution of forage dry matter is improved by boosting summer production from the legume in the pasture. Third, the protein levels and overall digestibility of the forage are improved.

Some of the practices that one should do before interseeding legumes are as follows.

1. Do a soil test to determine if there is a need to apply lime or other nutrients. The soil pH should be near 6.3 to help maintain the legume in the pasture. If needed, fertilize with phosphorus or potassium. Phosphorus and potassium are important in maintaining legumes in pastures. When phosphorus and potassium are low, the grasses, which are more efficient at extracting them from the soil, can out-compete the legumes.
2. Do not apply nitrogen fertilizer either in the fall before or during the year of establishment. It will stimulate grasses and discourage the developing legumes.
3. Need to suppress the existing vegetation. Overgraze the pasture the previous fall to create openings in the sod.
4. Frost seed or drill in the seed in early spring.

After legume emergence, bring animals back in to graze as part of the normal rotational grazing cycle. Keep animals on an area for less than a day and remove them just before the new legume seedlings are grazed. Leave about 3 to 4 inches in the grazed pasture.

Costs for Nitrogen Fertilization versus Interseeding Legumes

There is no research that shows how much more nitrogen fixation and nitrogen transfer to the grasses occurs with interseeding more legumes into a pasture. So let's look solely at the economics of nitrogen fertilization versus interseeding. Based on a cost of \$0.416 per pound of nitrogen (\$383 per ton for

¹Extension Educator, University of Wisconsin-Extension
Phone: 715-355-4561
Email: ken.barnett@ces.uwex.edu

urea), the cost per acre for applying 50, 100, and 150 pounds of nitrogen per acre would be \$20.80, \$41.60, and \$62.40 per acre, respectively.

The costs for interseeding legumes into the grazed pasture are less than applying nitrogen fertilizers. Red clover and white clover are the legumes most-often interseeded in Wisconsin pastures. Let's use red clover in the following example. The cost for a custom no-till drill is \$15.65 per acre. The cost for red clover seed is \$3.48 per acre at a seeding rate of 3 pounds per acre (cost averaged over 2 years). The total costs are \$19.13 per acre. Frost seeding with a cyclone-type seeder mounted on an ATV or tractor would cost less.

Table 1 compares the costs for applying nitrogen fertilizer versus interseeding red clover.

Table 1. Economic Value of Interseeding over N Fertilization	
Amount of Nitrogen Applied	Cost per Acre for Nitrogen Fertilizer vs. Interseeding
50 lbs nitrogen per acre	-\$1.67
100 lbs nitrogen per acre	-\$22.47
150 lbs nitrogen per acre	-\$43.27

Regardless of the amount of nitrogen fertilizer applied, interseeding red clover was less costly. This difference would increase with additional yearly nitrogen applications.

Summary

Interseeding legumes into a grazed pasture is cheaper than applying as little as 50 pounds of nitrogen per acre. While nitrogen applications are more effective at increasing total dry matter yields, interseeding legumes improves the seasonal distribution of forage dry matter by boosting summer production in the pasture and improves the protein levels and overall digestibility of the forage. It is a long-term management tool for improving pasture productivity. If the legume content of a pasture drops below 25 to 30 percent, you should consider adding more legumes to the pasture or adding nitrogen fertilizer.

Fertilizing with nitrogen is a short-term management tool since its effect is usually immediate and does not last more than one grazing cycle. Additions of nitrogen fertilizer may cause a shift to more grass content in the year of application.

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