NON-DORMANT ALFALFA AND SMALL GRAIN ROTATIONS-TILLAGE AND FERTILITY EFFECTS

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OBJECTIVE

To study the use of non-dormant and high nitrogen fixing alfalfa cultivars as a possible source of nitrogen for spring and fall-seeded wheat and barley grown under tilled and no-tilled conditions.

METHODS

Hi-Nitro, a non-dormant, high-nitrogen fixing alfalfa variety, and RoundUp Ready Stratica, a traditional dormant alfalfa cultivars were clear seeded in Aberdeen in 2023 and 2024. Forage was harvested 4 times. Fall or spring tillage was done approximately 3-14 days before planting fall or spring barley and wheat. In the spring, five rates of SuperU nitrogen fertilizer were applied as a topdress at greenup (fall planted plots) or with the seed at planting (spring planted plots). Fall wheat and barley were replanted in the fall of 2024 and spring wheat and barley will be replanted in 2025 to evaluate alfalfa nitrogen supply in the second growing season after alfalfa termination.

RESULTS

The non-dormant alfalfa cultivar Hi-nitro continued to grow well into the fall affording an extra 4th cut which resulted in the highest overall annual yield. (See Fig 1.) The dormant alfalfa exhibited higher crude protein. (See Fig 2.) All varieties had adequate protein levels and reached dairy quality hay. There were no significant differences in alfalfa cultivar nodulation between alfalfa classes in 2023 or 2024 crops. (See Fig 3.) Grain yield following dormant and non-dormant alfalfa were not significantly different. Grain yields generally increased as added nitrogen reached 60lbs./ac., and thereafter tapered off. Grain yields were higher following tillage compared to no-till plots. (See Fig.4.) No interaction effects were found between alfalfa class and added nitrogen fertilizer or tillage. Hi-Nitro Alfalfa survived the winter as well as the dormant Stratica. Economic analysis showed that there was no reason to add more than 150 lbs. nitrogen to spring planted grain, and no reason to add more than 120 lbs. nitrogen to spring seeded grain crops. (See Tab. 5) In some instances less nitrogen could be added to maximize economic profit.

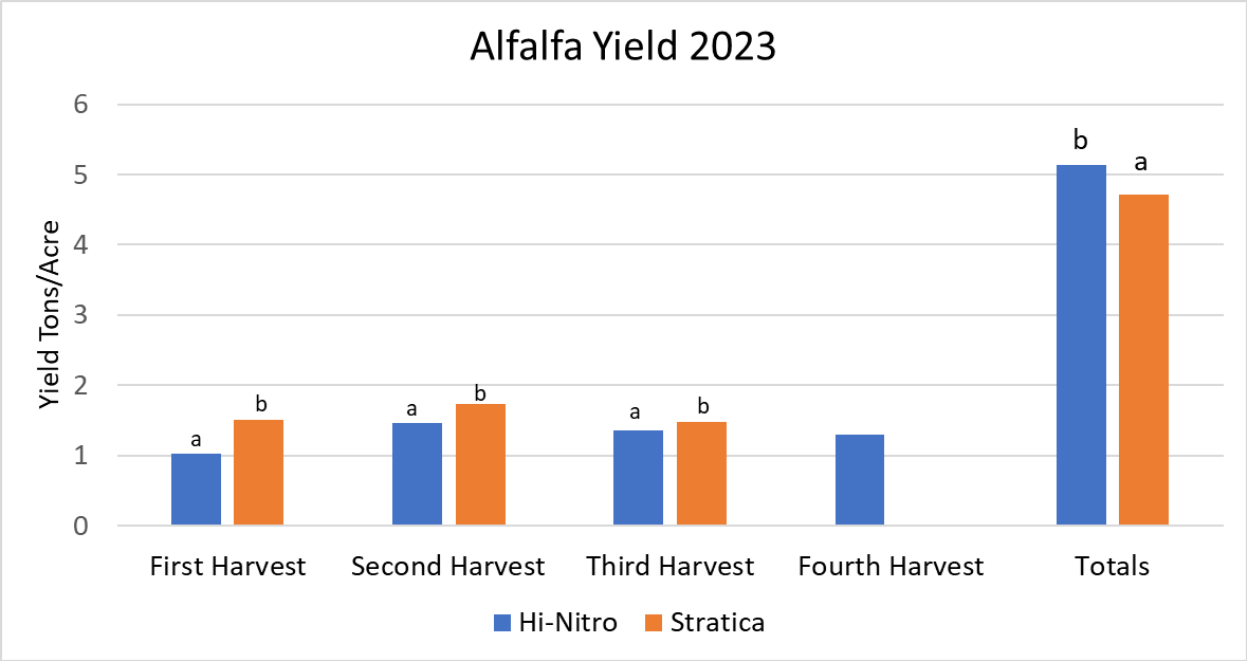

Figure 1. Non-dormant and dormant alfalfa yields 2023.

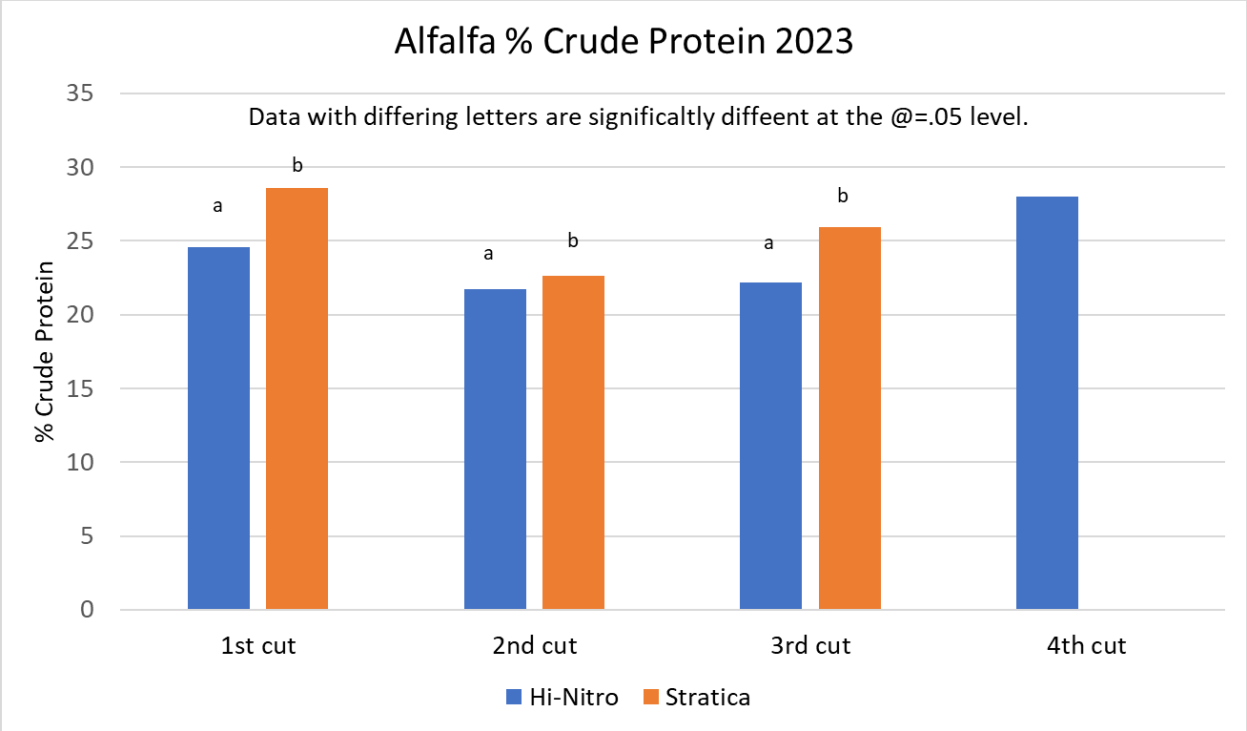

Figure 2. Non-dormant and dormant alfalfa crude protein levels at 5% bloom.

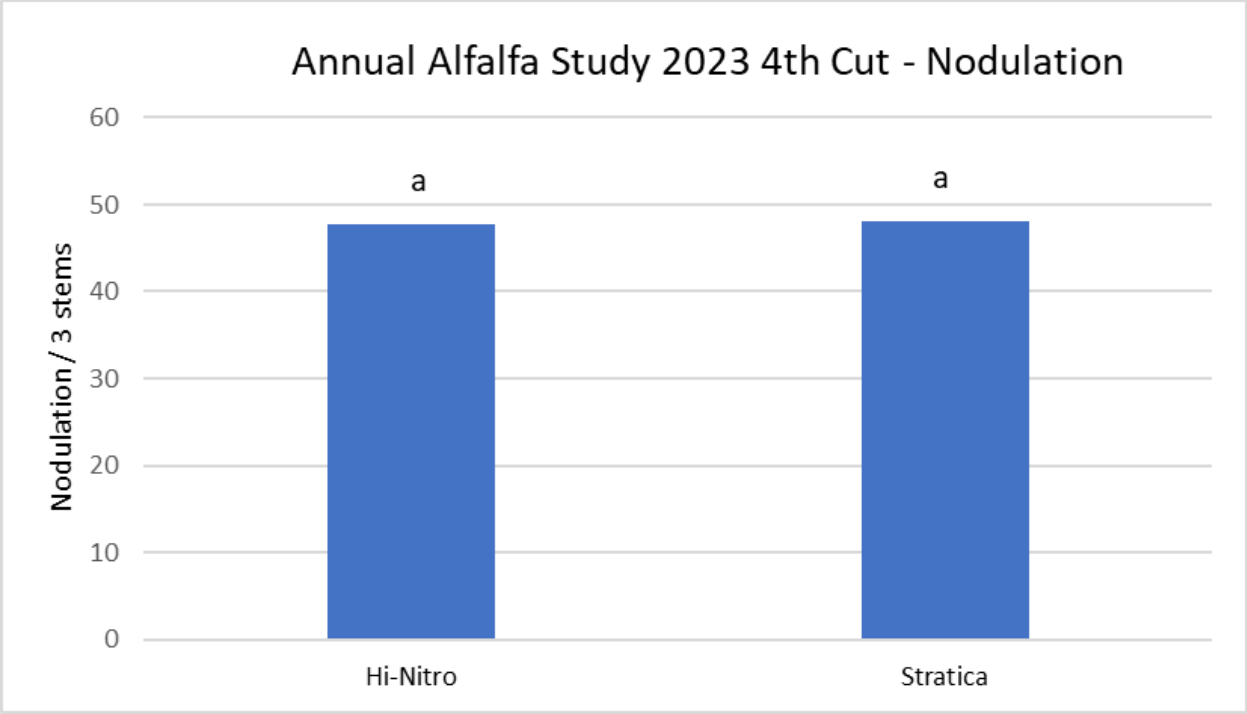

Figure 3. Non-dormant and dormant alfalfa nodulation at final harvest.

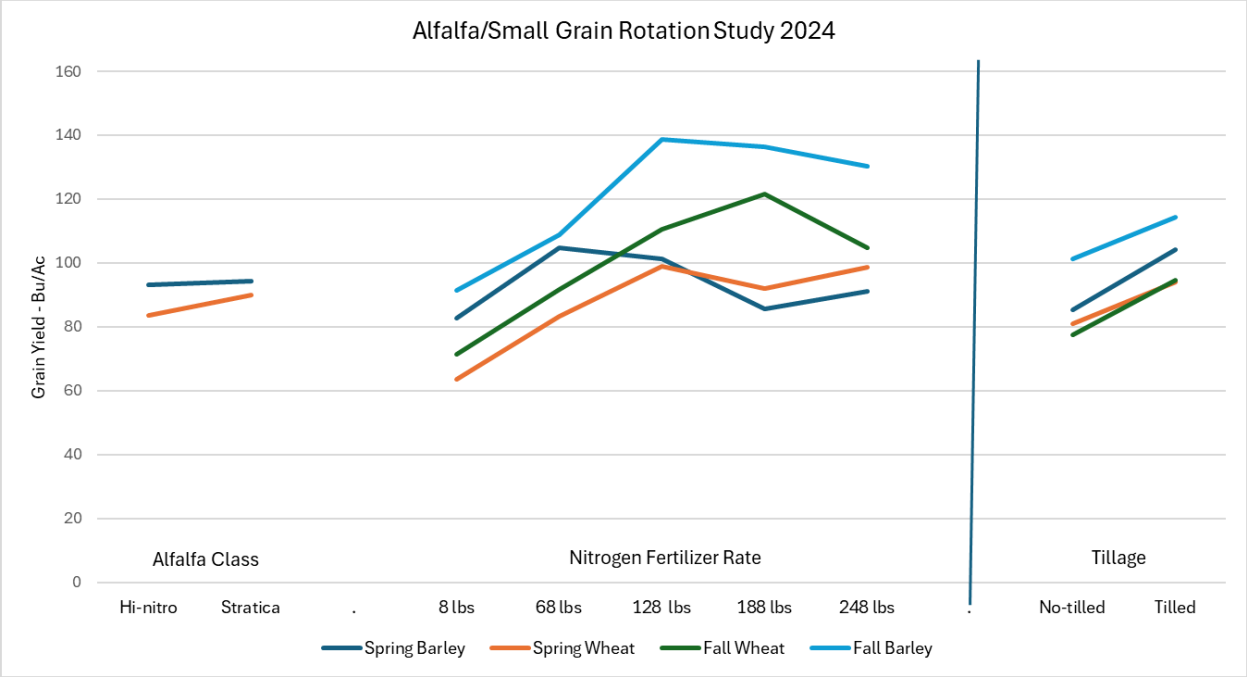

Figure 4. Small grain yield following alfalfa crop.

Economic Analysis 2024 Growing Season					
	Gross Profit				
	Till	No-till		Till	No-till
Thunder- winter malt barley			ABI Eagle- spring malt barley		
N Rate			N Rate		
0	$ 581.36	$ 646.10	0	$ 570.31	$ 737.99
75	$ 692.32	$ 731.20	60	$ 632.09	$ 784.48
150	$ 769.50	$ 833.45	120	$ 570.91	$ 705.40
225	$ 684.02	$ 777.94	180	$ 488.99	
300	$ 591.28	$ 701.79	240	$ 433.27	$ 503.04
UI Sparrow- soft white winter wheat			UI Gold- hard white spring wheat		
0	$ 316.86	$ 429.84	0	$ 258.96	$ 309.82
75	$ 404.44	$ 535.12	60	$ 215.78	$ 340.14
150	$ 481.94	$ 509.09	120	$ 250.26	$ 292.05
225	$ 378.15	$ 501.64	180	$ 153.26	
300	$ 298.68	$ 363.00	240	$ 95.29	$ 181.94

Table 5. Economics of non-dormant alfalfa crop rotations. Economic analysis assuming N at $0.80/lb., and grain at $5/bu.