Interseeding Legumes with Hard Red Spring Wheat

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Interest in reducing fertilizer inputs has increased recently in North Dakota. Seeding legumes with Hard Red Spring Wheat (HRSW) is not new. Our ancestors seeded sweet clover, or alfalfa, with HRSW prior to the widespread adoption of commercial fertilizer. However, numerous fertility options are available. Through literature review and local knowledge inquiries, interseeding potential for thirteen species was evaluated as well as sweet clover as the legume check.

For the duration of the study (Table 1), no nitrogen fertilizer was added to limit confounding treatment differences. During the first year, legumes were interseeded with HRSW at no more than ½" seeding depth. Traditionally, HRSW is seeded deeper than this study depth. In general, legumes are seeded shallower than in this study. These trials were conducted with conventional tillage until 2021 and then no-till starting in 2022.

Table 1. Comparison of interseeded legume species performance on spring wheat and the effects on the subsequent crop the next season.

First year HRSW seeded with legumes					Test crop the following year			
Treatment	Test Weight	Protein	Grain Yield	Legume Stand	Treatment	Test Weight	Protein	Grain Yield
	lb/bu	%	bu/a	plants/sqft		lb/bu	%	bu/a
Check (no legume)	60.5	15.1	28.5	0.0	Check (no legume)	54.1	12.0	25.9
Indian Head black lentil	60.1	15.3	27.5	7.5	Indian Head black lentil	54.9	11.3	24.0
Alsike clover	60.3	15.1	28.0	11.3	Alsike clover	54.3	11.1	19.0
Balansa clover	60.2	15.2	28.9	6.1	Balansa clover	56.1	11.5	25.0
Berseem clover	60.2	15.3	30.4	12.1	Berseem clover	57.3	11.3	24.3
Crimson clover	58.4	15.2	27.7	25.4	Crimson clover	56.3	11.1	22.2
Hubam clover	59.5	15.4	28.6	18.2	Hubam clover	55.2	12.2	30.0
Persian clover	59.6	15.2	26.3	4.9	Persian clover	56.3	10.8	24.5
Red clover	60.0	15.1	27.9	26.3	Red clover	56.3	11.3	23.8
Subterranean clover	59.9	15.3	28.0	16.3	Subterranean clover	54.8	11.2	24.6
Sweet clover	60.0	15.3	28.9	14.3	Sweet clover	56.7	12.0	20.1
Barrel medic	60.7	15.0	27.7	19.0	Barrel medic	55.5	11.5	26.1
Burr medic	59.9	15.3	27.9	18.6	Burr medic	54.5	11.2	30.0
Snail medic	60.0	15.0	26.9	19.7	Snail medic	55.7	11.4	26.5
Birdsfoot trefoil	60.3	15.3	29.9	4.4	Birdsfoot trefoil	55.3	11.7	27.1
Trial Mean	60.0	15.2	28.2	13.6	Trial Mean	55.6	11.4	24.9
C.V. (%)	5.4	4.2	18.8	57.8	C.V. (%)	5.0	11.2	31.9
LSD (0.05)	NS	NS	NS	4.3	LSD (0.05)	NS	NS	NS

Below are observations from additional years at the CREC with HRSW as the cereal crop.

- 2018 started out dry in April, followed by below average precipitation in May, above average precipitation in June and below normal precipitation the remainder of the growing season but with timely rains.
- 2019 also had below average precipitation in April and May, which was followed by above average precipitation in June and July.

- 2020 rainfall was well below average for the entire season with the exception of July.
- 2021 also had little significant rainfall after seeding. This lack of rain impacted grain yield and cover crop establishment with no treatments being significantly higher than others.
- 2022 April and May had rainfall amounts that were well above average, followed by well below normal precipitation the remainder of the growing season.
- 2023 the precipitation was near normal throughout the growing season.

We will also grow a test crop without fertilizer the following year to determine if there is any impact based on the residual effects of these treatments.

To bolster a successful herbicide program, these practices should be utilized in cleaner, more weed-free fields, if possible. None of these treatments had a negative impact on the first-year HRSW production. Also, no treatments had a positive or negative detectable impact on the following year's HRSW test crop.

Crimson clover and red clover had the highest stand establishment, followed by the medic spp., hubam clover, and subterranean clover, which were significantly higher than sweet clover and the remainder of the treatments. Treatments with successful establishment had green ground coverage immediately after harvest and maintained this coverage throughout the fall, reducing potential effects of wind erosion, providing a larger window for living roots during the year, and potentially reducing new weed seed emergence.