

## Interseeding winter rye with red clover

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### Cooperators:

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### In a Nutshell

- Winter small grains are used as cover crops.
- The life cycle of winter grains lends itself to interseeding of a forage legume.
- Interseeded legumes increase ground cover late in the season and contribute nitrogen to succeeding cash crops.
- Dick Sloan tested 4 replicates of rye with and without red clover.
- Rye grain and straw was harvested and measured for each treatment.
- No statistical difference was found between treatments.
- Returns were greater with sole crop rye treatment, however, neither red clover nitrogen contribution nor weed control was quantified.

Project Timeline:

Fall 2012 – Summer 2013



*Sole crop rye stubble (left) and red clover growing in rye stubble (right)*

Dick Sloan sustains 720 acres of no-till family owned cropland in the Cedar River Watershed in Northeast Iowa, producing mostly corn and soybeans.

### Background

Winter small grain crops, such as winter rye, are sown in the early fall, grow and take up nutrients during times of the year that generally lie fallow, and mature in mid-summer in Iowa. The inherent competitiveness and life cycle of a winter small grain also lends itself to interseeding a forage legume, like red clover, in the following early spring. Studies have shown that interseeding a forage legume with winter rye can increase (Lynd et al., 1984) or maintain (White and Scott, 1991)

grain yield relative to rye grown without a legume. An interseeded legume has also been shown to supply N to the winter rye crop in the absence of added fertilizer (Lynd et al., 1984). Legume biomass growth increases following winter small grain harvest in July and provides ground cover where the field would otherwise lie fallow and vulnerable to runoff and soil erosion (White and Scott, 1991; Reynolds et al., 1993). A vigorously growing forage legume established with a winter small grain can also suppress late-season weed growth following harvest of the small grain (White and Scott, 1991; Blaser et al., 2011). Reynolds et al. (1993) observed improvements in soil organic matter where winter small grains were grown with a perennial forage legume. Moreover, a well-established stand of red clover can provide substantial nitrogen to the succeeding

crop in the rotation (White and Scott, 1991; Gibson et al., 2006).

The objective of this project was to compare the yields of winter rye grown with interseeded red clover and without interseeded red clover (sole crop rye) near Rowley, IA in eastern IA.

### Method

The experiment was established on the farm of Dick Sloan, near Rowley, IA, in fall 2012. Predominant soils in the area are Clyde-Floyd complex clay loams, Olin fine sand loams, and Kenyon loams. Four replications of each treatment were established making eight total plots: four plots of rye with red clover and four plots of rye without red clover (sole crop rye). Each plot measured 30 ft wide and ranged from 485-1,010 ft long. Winter rye was

drilled at a planting rate of 56 lb/a (one bu/a) on October 1, 2012 following harvest of soybean. Red clover was drilled into rye at a planting rate of 15 lb/a into four strips the following spring on April 20, 2013.

Winter rye grain was harvested from each plot on July 15, 2013. Rye grain was corrected for 14% moisture and a t-test was used to determine any difference in grain yield between rye with red clover and sole crop rye. Straw was raked and baled from each treatment a few days after grain harvest. Because straw was bulk harvested by treatment and not harvested by plot, no statistical analysis could be performed.

## Results and Discussion

Winter rye grain and straw yields between the two treatments are presented in **Figure 1**. Sole crop rye yielded 25.3 bu/a, and rye with red clover yielded 23.3 bu/a. The two bushel per acre difference was not greater than the least significant difference of 2.7 bu/a. Thus, there was no statistical

difference in grain yield between rye with red clover and sole crop rye. Similarly, researchers in upstate New York observed no difference in winter rye yield between rye interseeded with red clover and sole crop rye (White and Scott, 1991). Rye grain yields on the Sloan farm in 2013 were less than those observed in central Iowa in a study in 2010–2011 that saw rye grain yields ranging from 28–58 bu/a (Carlson and Anderson, 2012). The prolonged cool and wet period in spring 2013 in Iowa proved difficult for crop growth and likely contributed to reduced rye grain yields relative to the study in 2010–2011. Oklahoma is the leading rye producing state in the U.S. with a 5-year yield average of 19 bu/a (National Agricultural Statistics Service, 2013). Rye grain yields at the Sloan farm in 2013 exceeded the 5-year Oklahoma average (Fig. 1).

Straw yield was greater with sole crop rye (Fig. 1), but no statistical analysis could be performed as straw was bulk harvested by treatment. Straw yield from sole crop rye

was 1,824 lb/a, and straw yield from rye with red clover was 1,530 lb/a.

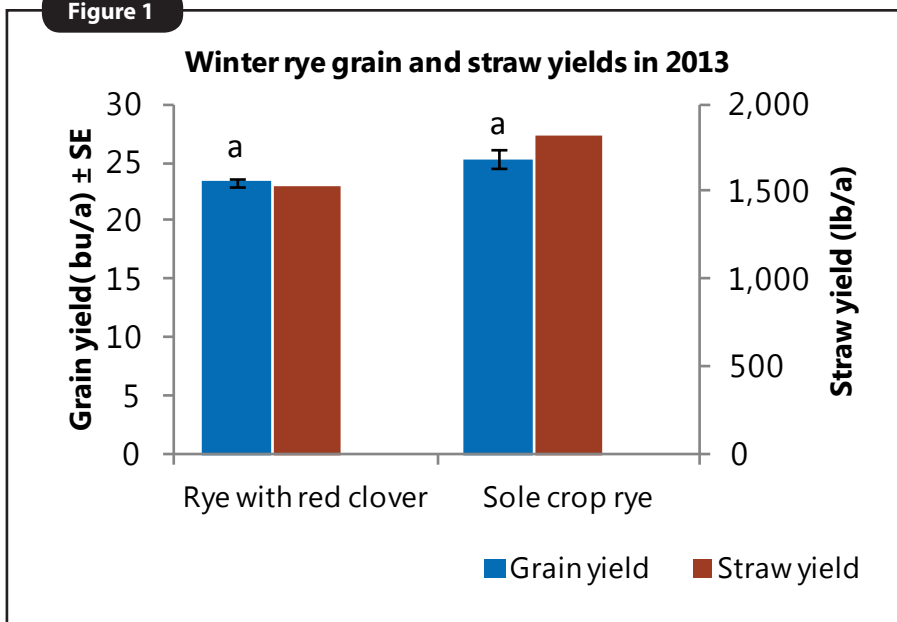
Production costs for growing rye and red clover are listed in **Table 1**. Sole crop rye production would not incur the costs associated with red clover seed and drilling red clover.

Costs, revenues, and net returns for rye with clover and sole crop rye are presented in **Table 2**. Sole crop rye produced greater net returns, and this was almost entirely due to reduced costs compared to rye grown with red clover.

## Conclusion

Results of this study show the promise of growing winter rye in Iowa with interseeded red clover as rye yield was no different when grown with or without red clover. Net returns, however, were decidedly greater from sole crop rye owing to lesser production costs incurred from not purchasing and drilling red clover. The continuation of this project will seek to determine any effect on yield of a succeeding corn crop.

**Figure 1**



**Table 1**

Per acre costs of field activities and materials	
Field activity or material	Cost (\$/a)
Rye seed (1 bu/a)**	\$17.10
Drilling rye*	\$14.90
Red clover seed (15 lb/a)**	\$47.25
Drilling red clover*	\$14.90
Harvesting rye grain*	\$29.70
Cleaning and bagging rye grain (24 bu/a)**	\$60.00
Raking rye straw*	\$6.25
Baling rye straw (large round)*	\$10.95
<b>TOTAL (rye with red clover)</b>	<b>\$201.05</b>
<b>TOTAL (sole crop rye)</b>	<b>\$138.90</b>

\*From Iowa State Custom Rate Survey (Edwards et al., 2013).

\*\*Reported by grower.

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**Table 2**

	Costs, revenues, and net returns	
	Rye with red clover (\$/a)	Sole crop rye (\$/a)
Costs	\$201.05	\$138.90
Grain revenue*	\$279.60	\$303.60
Straw revenue**	\$19.13	\$22.80
Net returns***	\$97.68	\$187.50

\*Rye grain price, \$12/bu, reported by growers in IA.

\*\*Straw price, \$15/bale (1,200 lb/bale), reported by grower.

\*\*\*Net returns are revenues less costs.