Cover Crop Interseeding Effects on Establishment, Weed Control, and Crop Yield: Overcoming Winter Cover Crop Establishment Issues for Improving Soil Health

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Introduction

Post harvest cover crop establishment is often cited by grain farmers as the greatest obstacle to incorporating winter cover crops (WCC) into their existing cropping systems. Sufficient WCC biomass is essential to achieving soil health benefits such as nitrogen cycling, reduced soil erosion, offsetting carbon losses via grain harvest or biomass removal, and pest control.

Potential solutions to overcome timely establishment have included aerial seeding WCC, but results can be variable as there is often poor seed-to-soil contact. We evaluated the effectiveness of a new implement, the InterSeeder, at establishing WCC in the Northeast in both research and production farm experiments.

Materials & Methods

The InterSeeder **(**Fig. 1**)** plants three WCC rows between existing 76-cm rows in corn at recommended growth stage V5-V7 (Fig 1. A & D). Each drill unit row has a wavy coulter (Fig 1. B) and double-disc opener to create the seed furrow followed by press wheels to provide adequate seed-to-soil contact (Fig 1. C).

Figure 1. InterSeeder operating components

Experimental design consisted of a RCBD at each site with at least three replications. Sites were at both research and production farms in New York, Maryland, and Pennsylvania. Crop management practices specific to each farm were maintained over the duration of the experiment. Seeding rates for each treatment were calibrated prior to seeding.

Cover Crop Treatment	Species Number	Seeding Rate (by treatment)	Seeding Rate (by species)	Common Name	Species Name
		----------kg/ha----------			
Control	NA	NA	NA	NA	NA
Annual Ryegrass	1	22.4	22.4	Annual Ryegrass	*Lolium multiflorum*
Daikon Radish	1	5.6	5.6	Daikon Radish	*Raphanus sativus*
Legumes	3	50.4	11.2	Hairy Vetch	*Vicia villosa*
			22.4	Crimson Clover	*Trifolium incarnatum*
			16.8	Red Clover	*Trifolium pratense*
Grass + Legumes	4	36.4	8.4	Hairy Vetch	*Vicia villosa*
			11.2	Crimson Clover	*Trifolium incarnatum*
			5.6	Red Clover	*Trifolium pratense*
			11.2	Annual Ryegrass	*Lolium multiflorum*

Table 1. Cover crop treatments and rates

Sampling methods included collecting cover crop and weed biomass samples between crop rows in 0.5 m^2 quadrats after which they were oven-dried at 60°C. Corn yields were adjusted and standardized to 15.5% grain moisture. Silage dry matter yields are adjusted to 35% dry matter.

Results & Discussion

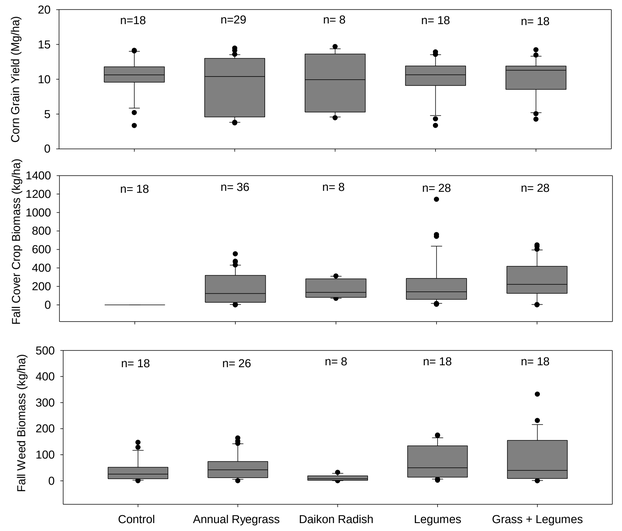

Figure 2. Crop yield, fall cover crop and weed biomass across 8 sites in 2013.

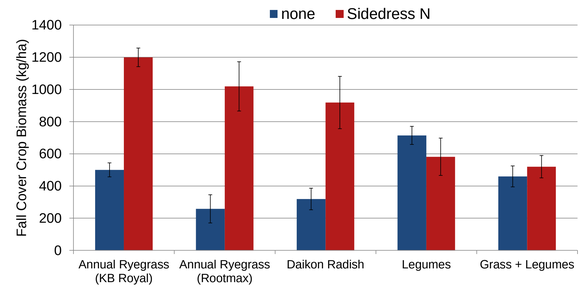

Figure 3. Effect of sidedress nitrogen (UAN, 60 kg N/ha) on fall cover crop biomass at the research farm in Willsboro, NY in 2013.

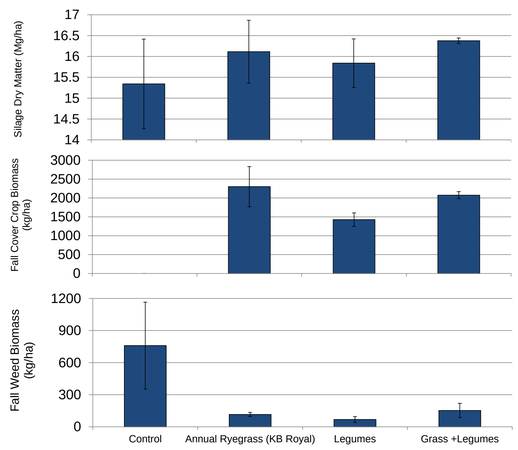

Figure 4. Silage yield, fall cover crop and weed biomass at Pine Hollow Farm, Virgil, NY in 2013.

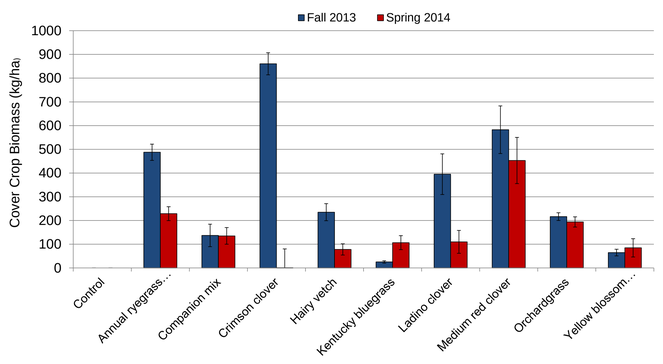

Figure 5. Effect of overwintering on cover crop biomass at Rock Springs, PA .

Figure 6. Grass + Legumes mixture under corn canopy (top). Grass + Legumes treatment stand prior to corn grain harvest (middle). Ryegrass treatment immediately after corn silage harvest (bottom).

Conclusions

- Interseeded cover crops had a negligible impact on crop yields; however, crop populations and yields were reduced in some cases when cover crops were interseeded when the host crop was too tall.
- Cover crop biomass was greatest in cases when shading from the host crop was reduced.
- Cover crop treatments differed in their response to sidedress nitrogen with grasses increasing in biomass but not legumes.
- Cover crops differed in their winter hardiness, and this should be considered when selecting cover crop species.
- More research is needed to better understand the effects of interseeded cover crops on host crop performance and how competition for light and nutrients can influence results.

Acknowledgements

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