Northern NY Agricultural Development Program
2013 Project Report
Early Interseeded Cover Crops for NNY

Project Leader:
Matthew R. Ryan, Sustainable Cropping Systems Lab (SCS), Assistant Professor, Department of Crop and Soil Science, Cornell University, mrr232@cornell.edu

Collaborator(s):
Cornell University:
Phil Atkins, Research Support Specialist
William Cox, Professor of Agronomy, Department of Crop and Soil Sciences
Michael Davis, Willsboro Research Farm Manager
Casey McManus, SCS Lab Research Assistant
Chris Pelzer, SCS Lab Technician
Cornell Cooperative Extension: Mike Hunter (CCE of Jefferson County)

Cooperating Producers:
Essex County: Willsboro Research Farm, Michael Davis (see above)
Jefferson County: Reed Haven Farm, Dan & Adam Reed are integrated crop and livestock farmers near Adams Center.

Background:
Winter cover crops can improve soil health, minimize soil runoff, and retain nitrogen (N). Despite these benefits, cover crops are not widely adopted with many farmers citing limited time to plant the cover crop after fall crop harvest as the primary barrier. One new tool that can potentially overcome the fall planting barrier is the 3-way interseeder. The 3-way interseeder bundles three operations into one implement, permitting farmers to simultaneously seed cover crops while also applying post-emergent herbicide and sidedress N in corn at vegetative growth stage. Early frost dates in NNY create a brief period of time for post-harvest cover crop seeding and establishment. Alternatively, earlier cover crop establishment through interseeding could potentially increase fall growth and environmental benefits of cover crops in NNY. Compared to alternative cover crop seeding methods, it is expected that interseeding cover crops will be most profitable by decreasing fuel and labor cost while maximizing the environmental benefits due enhanced cover crop growth. The objectives of this study were to: (1) evaluate a new tool to seed cover crops (2) determine what cover crops produce the most biomass and (3) examine any yield gains or losses from the cover crop treatments.

Methods:

In summer of 2013, field experiments were established at two sites in Northern New York (Reed Haven Farm, Adams Center, NY and Willsboro Research Farm, Willsboro, NY) were. The experiment compared 6 cover crop treatments arranged in a randomized complete block design with 4 replications. Treatments consisted of cover crops and seeding rates as follows:

1. *Control*: no cover crop
2. *KB Royal*: Annual ryegrass (20 lb/a)
3. *Legumes*: Red clover (10 lb/a) + crimson clover (20 lb/a) + hairy vetch (15 lb/a)
4. *Grass Legumes*: KB Royal (10 lb/a) + red clover (5 lb/a) + crimson clover (10 lb/a) + hairy vetch (7.5 lb/a)
5. *Radish*: Tillage radish (5 lb/a)
6. *Rootmax*: Annual ryegrass (20 lb/a)

Cover crop treatments were seeded with the 3-way interseeder into existing 30-inch row-spaced corn before V7 corn growth stage. Corn grain yield and moisture were measured in the fall and yields were adjusted to 15.5% grain moisture. A combined biomass sample consisting of fall cover crops and weeds were collected during time of grain harvest using a 0.5 m^2 quadrat placed between crop rows. Cover crop components and weeds were manually separated before oven drying at 150˚F. The dried cover crop and weed samples were then weighed to determine dry matter biomass. Corn population was determined by counting living plants within a 17.5 ft row length at time of grain harvest.

Results:

Reed Haven Farm

Fall cover crop biomass dry matter was greater in *Radish* (300 lb/a) and *Grass Legumes* (200 lb/a) treatments compared to the remaining cover crop treatments of *KB Royal*, *Legumes*, and *Rootmax* which all averaged approximately 50 lb/a dry matter (Fig. 1). Corn population averaged 26,180-30,090 plants/a between all treatments (Fig. 2) and showed little effect on corn grain yields (Fig. 3). However, the *Control* averaged the greatest corn population which potentially reflects interseeder induced plant damage (Fig. 2). Cover crop treatments showed no significant detriment or benefit to corn grain yield as the *Control* performed similarly to all cover crop treatments (Fig. 3).

Willsboro Research Farm

Due to excessive rain and poor corn performance that was not related to cover crop interseeding, grain yield data was not recorded. Interseeded cover crops did however achieve significant fall biomass. Sub-treatments of sidedress nitrogen (*Sidedress N*) and no sidedress N (*None*) were contained within the cover crop treatments. *Sidedress N* increased fall biomass dry matter in cover crop treatments not containing leguminous crops compared to treatments containing no N sidedress (Fig. 4). Compared to the no sidedress N treatments, sidedress N increased *KB Royal* by 139%, *Rootmax* by 295%, and *Radish* by 188%. Cover crop treatments containing legumes were not as affected by sidedress N (Fig. 4).

Conclusions/Outcomes/Impacts:

Corn Grain Yield and Fall Cover Crop Biomass

Cover crop interseeding appears to be a viable option for establishing cover crops in NNY. Importantly, there were no negative effects of cover crop treatments on yield. Additionally, both sites achieved respectable fall cover crop biomass. Between sites, the grass legumes treatment achieved the greatest fall cover crop biomass on average. Sidedress N increased fall cover crop biomass in non-leguminous treatments (*Radish*, *Rootmax*, and *KB Royal)*, but had negligible effect on leguminous treatments (*Legume and Grass Legumes*) at Willsboro Research Farm. To achieve greatest fall cover crop biomass while not negatively affecting grain yield, the data suggest the *Grass Legumes* treatment is a sound choice when interseeding.

Farmer Impressions

Dan and Andrew Reed (Reed Haven Farm) observed that cover crops were "patchy", but were impressed with the interseeded *Radish* growth. They also commented that cover crops were difficult to establish on their farm because it is often too cold and wet or there simply is not enough time in the fall. They see the 3-way interseeder allowing timely establishment of cover crops and liked the concept of being able to apply sidedress N and post-emergent herbicide in one pass. They also remarked the best use for the interseeder would be corn silage saying, "Silage would be best, corn is gone sooner and isn't shading out the cover crop." Their primary concern with interseeding was potential damage to the grain crop while interseeding. They also noted that the interseeder could be wider to accommodate more rows although it would be more cumbersome to operate. In general, they see the potential of cover crops on their farm and the 3-way interseeder assisting in timely cover crop establishment.

Outreach:

1. Ryan, M.R., Davis, M.H., Pelzer, C.J. (2013). Cover crop interseeding update. Northern New York Agriculture Development Program (NNYADP). Watertown, NY, January 31, 2013. 15 min, ~40 people.

2. Ryan, M.R., Davis, M.H., Pelzer, C.J. (2013). Cover crop interseeding update. Northern New York Agriculture Development Program (NNYADP). Chazy, NY, February 28, 2013.

Information generated in this project will be delivered to farmers in NY through additional means including a NOFA NY grower conference on March 7 in Auburn NY. Results will be summarized and distributed to Extension offices in NNY and published on-line in a webpage that includes grower profiles and case studies. This site is still under construction, but will be available by April 2014.

Next steps.

We will collect additional data on cover crop biomass production in the spring and then evaluate the effects of cover crops on the performance of corn at both NNY sites. The 3-

way interseeder is a new agricultural tool, and thus more testing through year/environmental replication is necessary to determine effects on grain or silage yields. Further, there are knowledge gaps with what cover crop mixtures and species are best suited for cropping systems and site characteristics. In 2014, research will address sidedress N application effects on interseeded cover crop growth and quality. Additionally, the effect of interseeded cover crops on soil health will be evaluated.

Acknowledgments:

We appreciate the supplemental funding that we received from the NRCS CIG project titled 'Maximizing conservation in the Chesapeake Bay Watershed with an innovative new 3-way interseeder for early establishment of cover crops in no-till corn and soybean'. Contributions from other collaborators including Bill Curran and Greg Roth are also appreciated.

Reports and/or articles in which the results of this project have already been published.

Interseed Legume Cover Crop In The North Country? American Agriculturalist. January 28, 2013. http://farmprogress.com/story-interseed-legume-cover-crops-north-country-9-107953

NNY Agriculture Development Program Funds Early Interseeding Cover Crops Research. December 16, 2013. http://www.cceslc.com/nny-agriculture-development-program-funds-early-interseeding-cover-crops-research/

Expanding the Utility of Cover Crops in the Northeast. University of Vermont, Plant & Soil Science seminar. February 28, 2014. http://www.uvm.edu/~pss/documents/Ryansprng14bio.pdf

Interseed Legume Cover Crops In North Country? January 28, 2014. American Agriculturist. http://farmprogress.com/story-interseed-legume-cover-crops-north-country-9-107953

For more information:

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Photos

Interseeder at Reed Haven Farm, Adams Center, NY, July 1, 2013 (photo: M. Ryan)

Interseeding in corn at Reed Haven Farm, Adams Center, NY, July 1, 2013 (photo: M. Ryan)

Grass Legumes at Pine Hallow Farm, Virgil, NY, July 7, 2013 (photo: M. Ryan)

Annual Ryegrass at Pine Hallow Farm, Virgil, NY, October 30, 2013 (photo: C. Pelzer)

Appendix

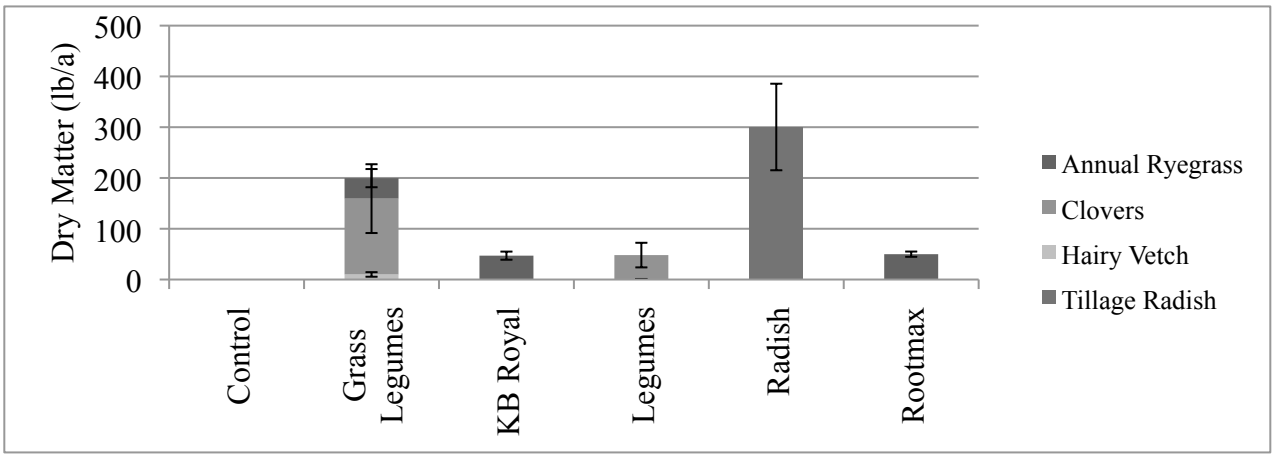

Figure 1. Fall cover crop biomass by species at Reed Haven Farm, Adams Center, NY (2013)

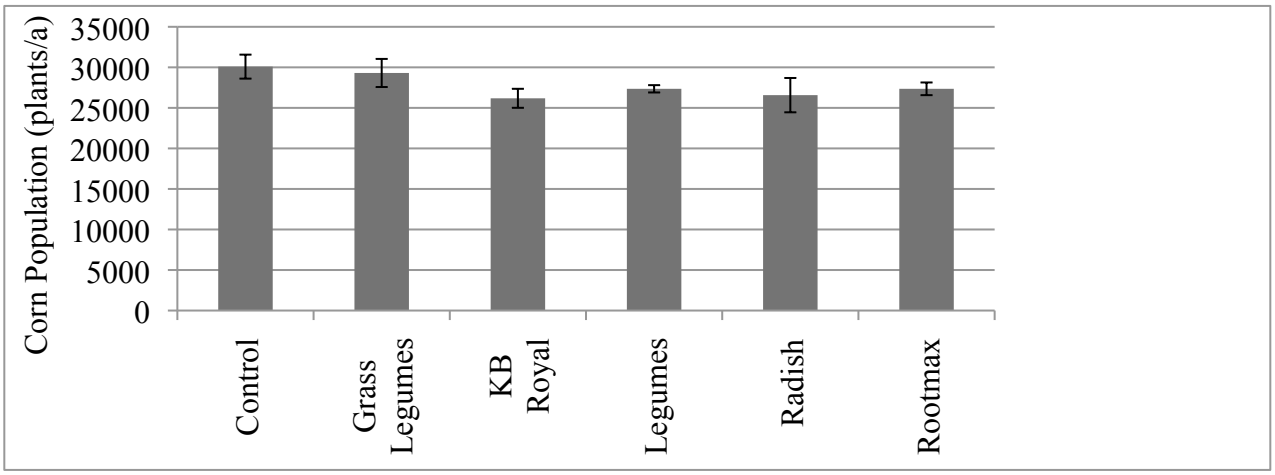

Figure 2. Corn population at grain harvest at Reed Haven Farm, Adams Center, NY (2013)

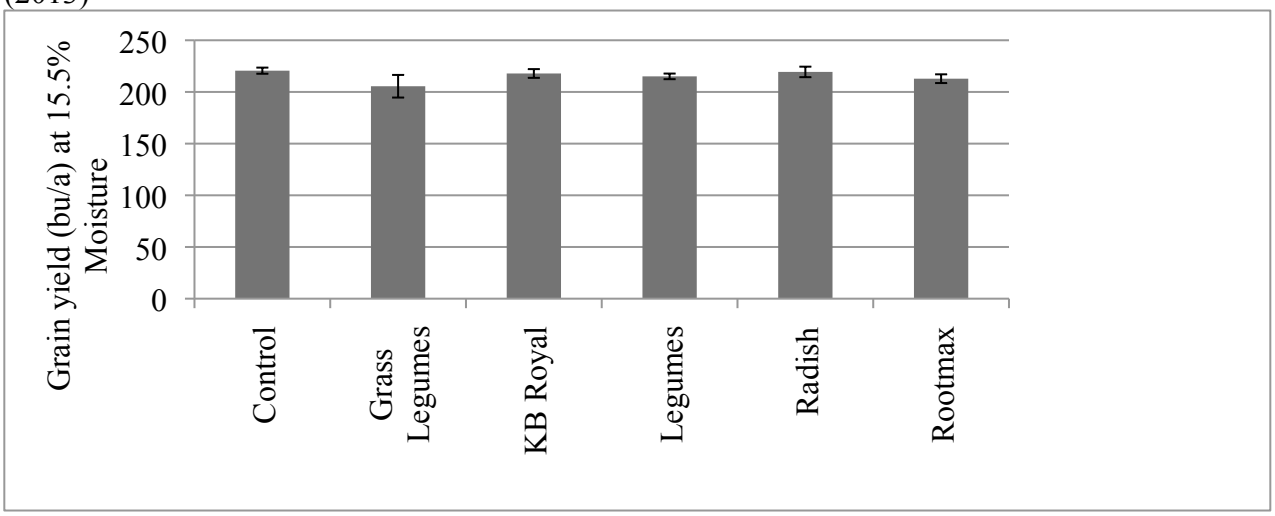

Figure 3. Corn grain yield at Reed Haven Farm, Adams Center, NY (2013)

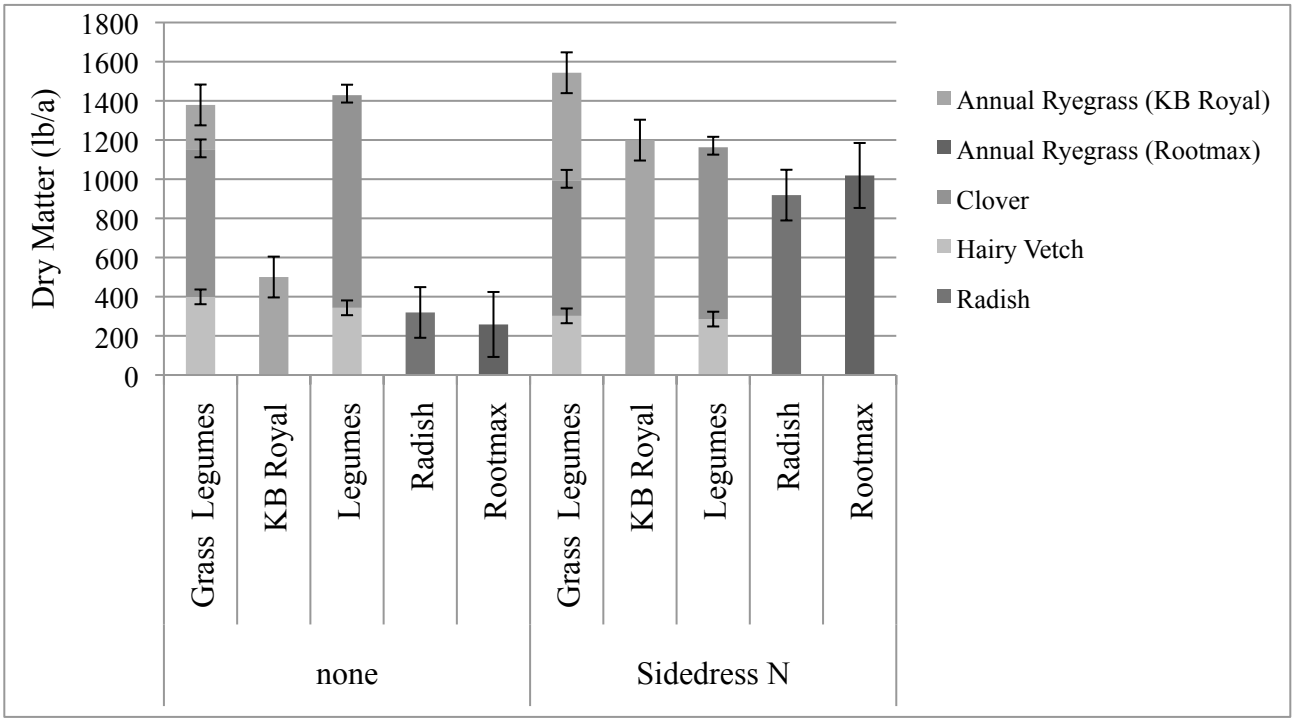

Figure 4. Fall cover crop biomass by species at Willsboro Research Farm, Willsboro, NY (2013)