Nutrient Availability Research

Berseem and Crimson Clovers After Winter Wheat

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In short…

- Planting cover crops after short season crops provides a great opportunity to capture the growing season's remaining precipitation and growing degree days to produce biomass that can strengthen soil health and provide late season forage if desired.
- This study observed general yield increases in corn yields following both Berseem and Crimson Clover cover crops.

What's the Question?

This study addresses three questions. 1) What dry matter yields can be obtained from Berseem Clover, Crimson Clover and Barley when planted following winter wheat in early to mid-August? 2) What nitrogen credit might be obtained from Berseem and Crimson clovers? 3) Do annual clovers provide a rotational benefit similar to what is observed when corn follows alfalfa?

Why Does it Matter?

The benefits of using legumes in crop rotations is well established. This study explores using annual clovers after shorter season crops (i.e. winter wheat, vegetable crops), to enhance rotational impacts, provide nitrogen credits and grow additional biomass to improve soli health and/or provide a late season forage crop.

Planting cover crops after short season crops provides a great opportunity to capture the growing season's remaining precipitation and GDDs to produce biomass that can reduce soil erosion, increase water infiltration, increase organic matter, improve soil structure and provide late season forage if desired. Around 40% of annual precipitation and Growing Degree Days (GDDs) occur after August 1st in Wisconsin

What are the Results?

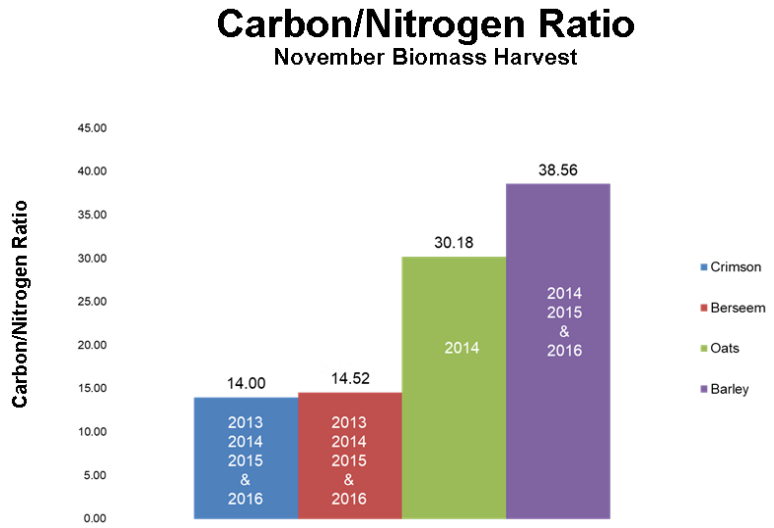
Carbon: Nitrogen Ratios

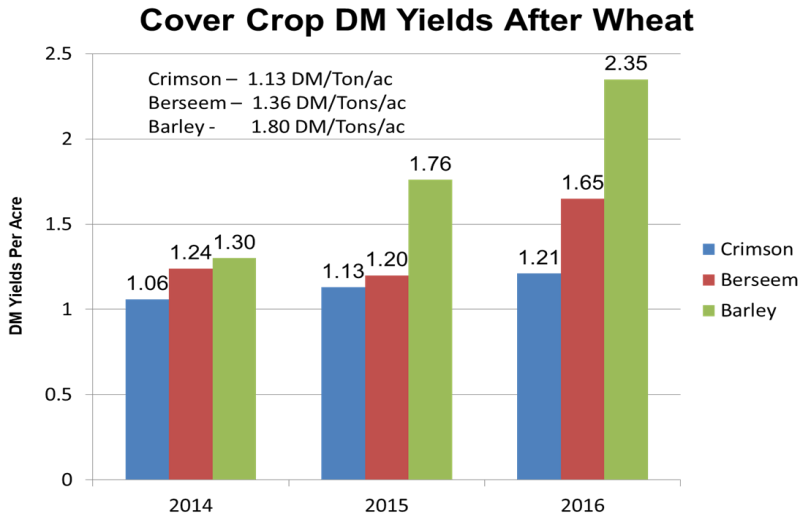
The species mix used as cover crops will impact the carbon to nitrogen ratio (C:N.) of the cover crop residue. C:N ratio is important because it directly impacts the amount of plant available nitrogen in the soil for your next crop. Cover crop residue with a C:N ratio of 25/1 is considered in the neutral range where nitrogen is neither added nor removed to the soil by soil microorganisms as it decomposes. If the residue has a higher ratio, soil nitrogen will be used to break down the residue and plant available soil nitrogen will decrease. If the residue has a lower ratio, nitrogen will be released back into the soil as the residue is decomposing.

The biomass of annual clovers had a C:N ratio of about 14:1 at harvest time in November. In contrast, the C:N ratio for barley straw is 70:1. Strategically plan the cover crop mix to provide both the desired soil cover as well as the timely release of nitrogen from the biomass.

Cover Crop Dry Matter Yields

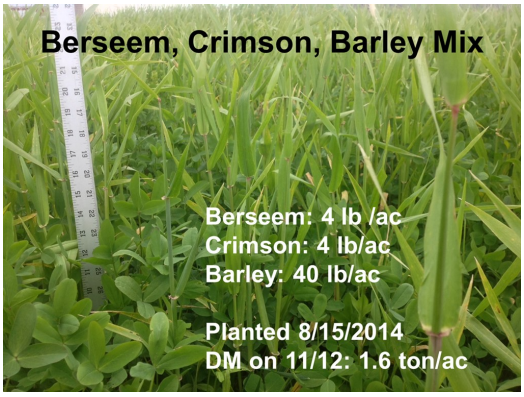
Cover crop fall biomass is important as a green manure for adding organic matter back into the soil. It also provides and option for a fall forage harvest. The table below shows the dry matter yields of the various cover crops in the three year study.





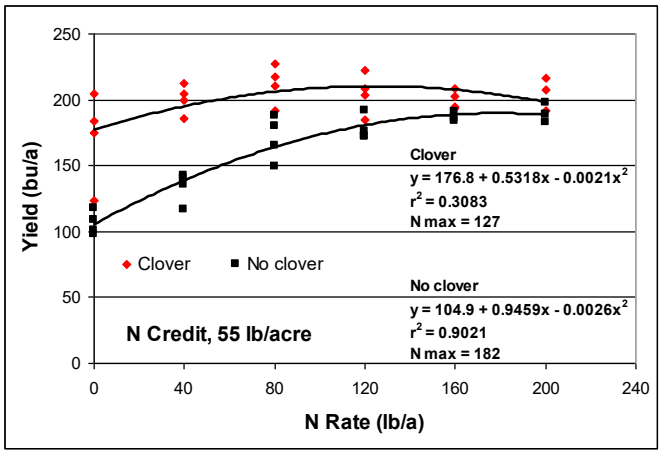
Annual Clover Mixes

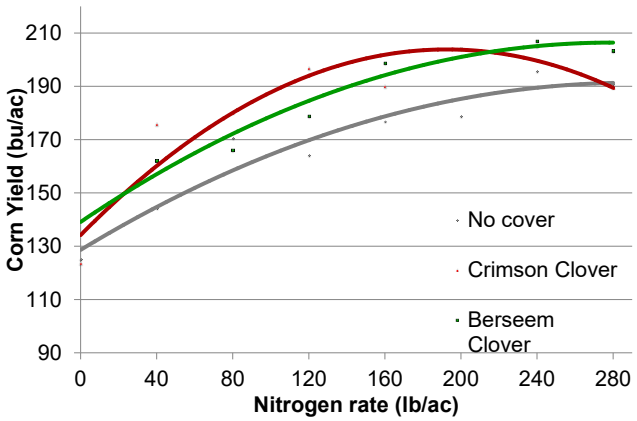
Below are pictures of Berseem and Crimson Clovers mixed together and planted in combination with Barley. Clovers will improve the C:N ratio thus increasing the mineralization of nitrogen while adding barley increases dry matter accumulations.



Nitrogen Rate Response Curves for 2015 &2016

In 2015 the nitrogen response curve showed about a 55lbs/acre nitrogen credit. Also noteworthy is that corn yields following clovers were higher yielding across all nitrogen rates suggesting a possible rotational effect when corn followed the annual clovers, similar to what is observed when corn follows alfalfa. While only a small nitrogen credit could be found in 2016, the response curves would suggest a positive rotational benefit when corn followed both Crimson and Berseem clovers. While the nitrogen credit from annual clovers is inconclusive from these two yeas of study, previous research would suggest that a 40 – 60 lb/acre nitrogen credit is reasonable. Further analysis of this data is needed.



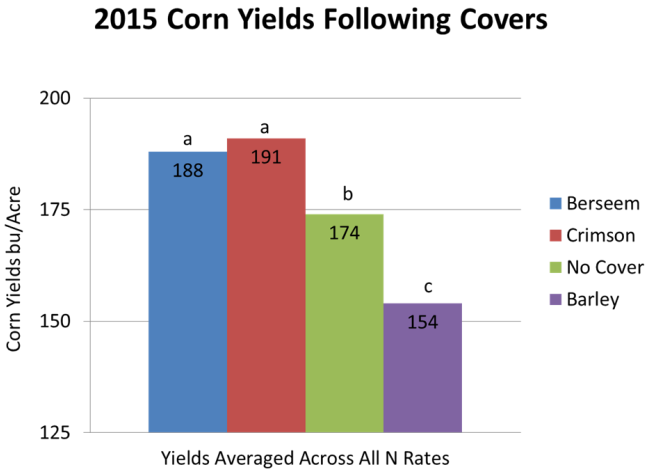


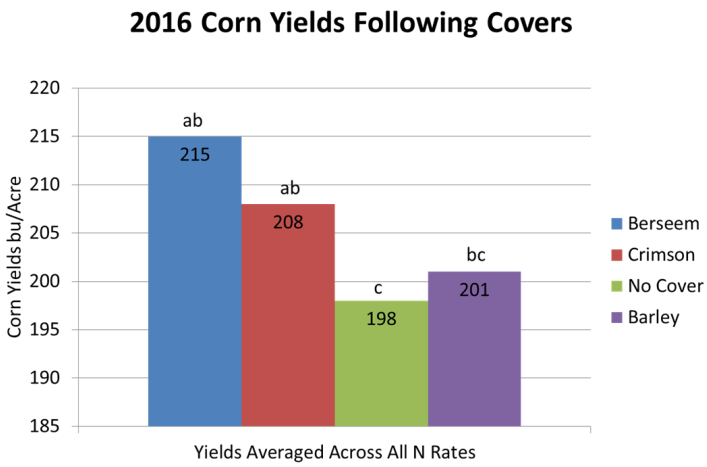
Corn Yield

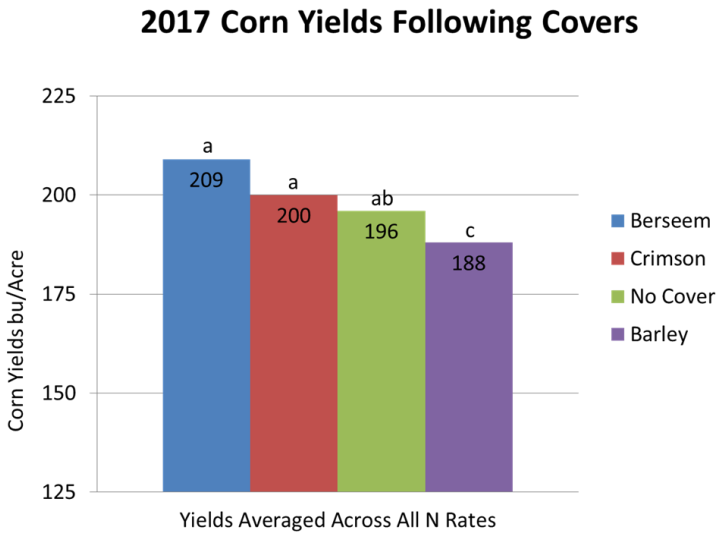
In 2015 corn yields showed an increase of 9% (15.5 bu./ac) when following Berseem and Crimson Clovers compared to no-cover crop and a 23% advantage when compared with corn following barley. These yield comparisons were averaged across all nitrogen rates except the zero nitrogen rate.

Corn yields in 2016 showed a very similar yield trend with a 7% (13.4 bu./ac) increase when corn followed clovers as compared to no cover crop. There was a 5% yield decrease for corn following barley when compared to the annual clovers.

The yield advantage in 2017 when corn followed clovers was 4.3% (9 bu./ac), although this was not statistically different. Corn following barley in 2017 had a significantly lower yield. Due to an extremely wet Fall in 2016 the volunteer winter wheat was not terminated until early November which may have impacted rotational benefits and nitrogen credits.







What's the Status of the Research? Are There Updates?

The research ended in 2017, however further data analysis is needed to help determine N credits and rotational impacts.