Interseeding red clover into corn
Hannah Francis, Matt Ruark, and Dan Smith

Interseeding red clover provides an alternative method to incorporate cover crops into continuous corn rotations. Red clover is a leguminous cover crop that can grow in low radiation environments and is winter hardy for much of the northern USA. In addition to the well-known benefits of cover crops to soil health and fertility, systems with red clover have previously demonstrated improved corn yield and a nitrogen credit. However, the potential nitrogen credit and the effect of interseeding red clover on subsequent corn yields has yet to be rigorously evaluated. The objectives of this project were to determine the effect of interseeding red clover on (1) corn yield in the interseeded year and subsequent year, (2) response to N fertilizer in the interseeded year and the subsequent year and, (3) residual (post-harvest) and early season soil N content in a continuous corn, no-till management system. The plot design was a randomized, complete block-split with four replications, treated with or without red clover, at eight rates of N-fertilizer (0 to 315 kg-N ha^{-1} in 45 kg-N ha^{-1} intervals). Corn yields were evaluated when red clover was continuously interseeded, or not interseeded following the first interseeding year. Red clover accumulated up to 300 kg ha^{-1} biomass pre-termination (10 kg N ha^{-1}) when interseeded with corn at the V4-V5 growth stage without detriment to yield. In 2018, corn following the interseeded year out-yielded corn on plots with no history of interseeded red clover with a small, but significant nitrogen credit. In 2019, there was not a significant difference in corn yield data between treatments. A statistical approach with bootstrapping was used to determine statistically significant nitrogen credits. Overall, we observed that interseeding red clover into continuous corn did not provide an agronomically meaningful nitrogen benefit to the cropping system. Funding provided by Wisconsin Fertilizer Research Council.

Cover crops and soybean production on sandy soil
Alexandra Walters, Matt Ruark, and Shawn Conley

In 2019 and 2020, soybean was grown on sandy soil under pivot irrigation following a winter rye cover crop. In both years, soybean yield were greater following no cover crop than following winter rye. Funding provided by Wisconsin Fertilizer Research Council

Cover crops in a corn-soybean-wheat rotational system: feasibility and yield impacts
Lindsay Chamberlain, John M. Gaska, Matthew D. Ruark, Joseph Lauer, Shawn P. Conley

Research was conducted in a long-term corn-soybean-wheat crop rotation trial at the UW Madison Arlington Agricultural Research Station. The objectives of this study were to assess the impacts of cover cropping on yield, and to address the feasibility of adding a cover crop to corn-soybean-wheat rotational systems in Wisconsin. Treatments include various rotation schemes of corn, soybean, and wheat that have been in place since 2002, as well as six different cover crop treatments that were established as split-plots in 2017, 2018, and 2019. Cover crop treatments after corn or soybean include cereal rye (*Secale cereale* L.) or oat (*Avena sativa* L.), either drilled after harvest individually, drilled in alternating rows (rye and oat), or broadcast into the senescing crop. Cover crop treatments after wheat include red clover (*Trifolium pretense* L.) or berseem clover (*Trifolium alexandrinum* L.), either drilled after harvest or frost seeded in early spring, as well as an alternating row oat/rye treatment. In 2018, rotation sequence significantly impacted yield for all three main crops. The highest yield for corn or wheat was observed in treatments that followed soybean. Soybean had the greatest yield when all three crops were in the rotation sequence. No yield response was found due to cover crop treatment. Results for 2019 and 2020 are currently being developed. This project was funded by the Wisconsin Soybean Marketing Board.

Planting soybean "green" after a rye cover crop
John Gaska, Adam Roth, Shawn P. Conley

Current recommendations for planting soybean following a rye cover crop are to terminate the cover crop 10-14 days before soybean planting. This recommendation does not align easily with recommendations for early soybean planting, and many farmers have had success planting soybean into a still-living stand of cereal rye – termed "planting green". There are also concerns about increased insect pressures for soybean following a rye cover crop. The objectives of this study are to evaluate soybean yield impacts and insect pressure following a rye cover crop. There are three termination timings: 2 week pre-plant, at plant, and 1-week post-planting, as well as a no cover crop control. This is a multistate project funded by the North Central Soybean Research Program. More information is available on www.coolbean.info.

Studies started in fall of 2020:
Winter rye seeding rate effect on growth and subsequent year corn yield
Matt Ruark and Jessica Ross
Funding provided by Wisconsin Fertilizer Research Council

Grass cover crop effects on yield of subsequent crop (corn grain, corn silage, and soybean)
Matt Ruark and Jessica Ross
Funding provided by Wisconsin Fertilizer Research Council

Winter rye effects on optimum N rate for corn
Matt Ruark, Jessica Ross, and Monica Schauer
Funding provided by USDA-NIFA

Winter rye effects on pest control in corn
Matt Ruark, Jessica Ross, Monica Schauer, and Bryan Jensen
Funding provided by USDA-NIFA