Optimizing legume establishment in winter cereal grains

Researchers found that the intercrop is highly resilient to agronomic management and the most important agronomic decisions are the winter cereal variety and legume used in the intercrop system.

What was done and why?
Incorporating winter cereal grains into the north central United States corn-soybean system could extend the rotation and increase yields of subsequent crops, build soil tilth, reduce erosion, and improve nitrogen capture. Addition of a legume intercrop decreases the fallow period after grain harvest, creates a forage crop to utilize solar energy, and provides nitrogen to subsequent crops as a green manure. The presence of a legume forage crop during the traditional fallow period has been reported to promote populations of beneficial insects and suppress weed growth and red clover has been successfully frost-seeded into winter cereals. However, winter cereal species effect on the productivity of the interseeded legume has been variable. Additionally, interseeded legume effects on grain yields have been inconsistent. To improve season-long management and select cereal varieties that are compatible with red clover and alfalfa establishment, we need to better understand what drives legume survival and productivity in the intercrop relationship.

Original project objectives were to:

- Determine winter cereal grain plant canopy traits that contribute to successful forage legume establishment using frost-seeding, and
- Develop a predictive tool for selecting high-yielding cereal grain varieties suitable as companion crops for forage legume establishment.

What did we learn?
Results from the project support the potential to diversify Iowa agriculture using winter cereals with interseeded legumes. Iowans can use the results of this project to help them select winter cereal and legumes, and to assess the annual variability and risk of using a winter cereal and interseeded legume under varying agronomic management.

More work is needed to predict legume plant densities before cereal crop harvest because the current prediction tool requires information that may not be readily available to the producer or would require the producer to collect information that he/she may not be able to easily collect.