**Developing Profitable Double-Crop Systems after Winter Barley**

NCR- SARE Partnership Project Report

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## Double Cropping After Winter Barley

A replicated trial was conducted at KBS to evaluate the potential and profitability to double crop soybeans, forage crops and cover crops after a crop of winter malting barley (Puffin). Soybean maturity groups (MG) included 1.9, 2.4 and 2.8, all of which were planted at 140,000 seeds per acre and 200,000 seeds per acre. Additionally, one large block of the experiment was irrigated whereas another block was not irrigated. In each block, we also included a treatment of sorghum-sudan for forage, and a diverse cover crop mix.

The winter barley was harvested on June 30$^{th}$, and the second crops were no-till planted on July 2$^{nd}$. We received ample rainfall in August and September of 2018, but still applied 5 inches of irrigation water to the irrigated block, mostly in July after seeding. Due to a significant amount of rainfall in the fall, soybean plots weren't harvested until mid-December.

***Figure 1.*** *Double crop soybean project at KBS shown at the time of first frost (left) and harvest (right)*.

The 1.9 and 2.4 MG soybeans matured prior to the first frost in mid-October, but the 2.8 MG soybeans were still green and immature at the time of the first frost. Planting rate did not affect soybean yield, but variety (i.e. MG) did affect yield, as shown in Figure 2. The highest producing treatments resulted in just under 45 bushels per acre, which is worth $400 per acre in gross profits, with as little as $40 per acre in direct input costs (not counting labor or machinery depreciation).

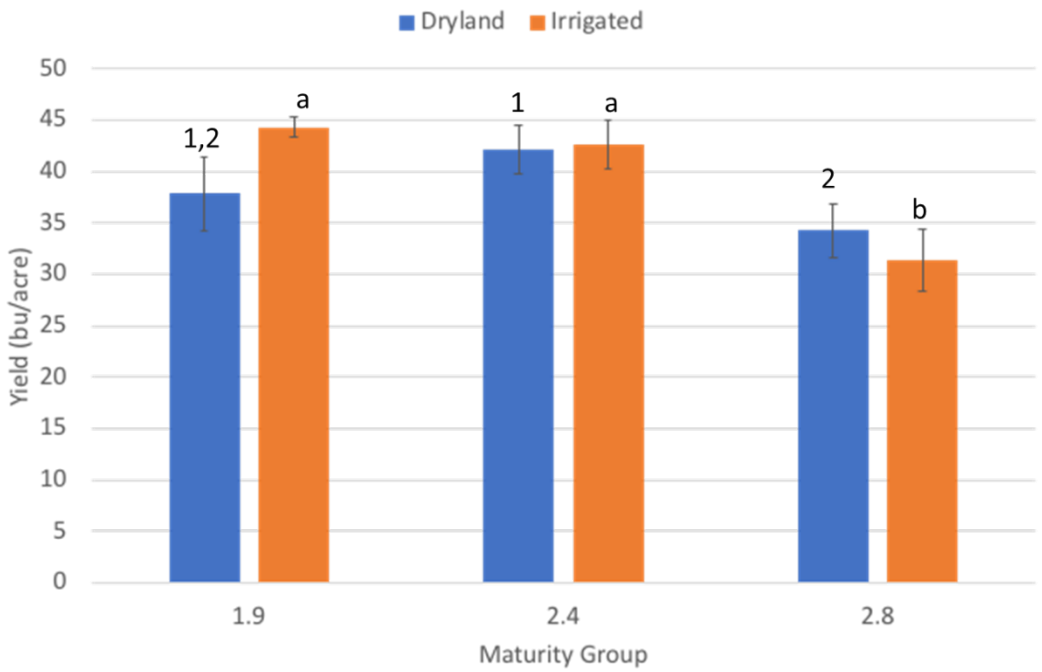


***Figure 2**. Grain yield of soybeans following winter barley. The design doesn't allow for direct statistical comparison of irrigated vs. dryland, so maturity groups are compared against each other within the irrigated or dryland block, using numbers and letters to indicate statistical significance.*

Soybean seed from each treatment is being evaluated for quality since the 2.8 MG did not reach physiological maturity (R8) prior to the first frost. The sorghum sudan crop was harvested once for forage, and produced between 2-4.5 tons of biomass per acre. The cover crop biomass was not measured, but visual evaluation (see plots in Figure 1 left) showed abundant growth of diverse species that will be returned to the soil prior to next year's crop.

Two of the cooperating farmers were able to follow winter barley with soybeans in 2018. One farmer in Kawkawlin, MI harvested 26 bushels of soybeans per acre using a 1.1 MG soybean. Another farmer near Crosswell, MI attempted to relay intercrop soybeans within his winter barley without success. A third farmer wasn't able to get soybeans planted after barley because the summer schedule got too busy. Three additional farmers that didn't have barley planted at the start of the grant, were able to plant barley in the fall of 2018 and will be double cropping soybeans in 2019.

Results of these trials have been presented at the AMBA BIC conference, and will be presented at the Great Lakes Hop and Barley Conference and other conferences / meetings that allow. We will also be creating a report that will be distributed through our listserv and social media, and posted to our website. Field days were held at KBS in June and November of 2018. The early field day highlighted the plans for the project, and the later field day showed the field trials.

After the project was initiated, we've developed a new relationship with Eric Richer with Ohio State University Extension – Fulton County (https://fulton.osu.edu/people/eric-richer), who is working with a number of farmers to evaluate double cropping after winter barley in northern Ohio. We invited Eric to join and present at our Great Lakes Hop and Barley Conference in Traverse City, MI, and will plan to

continue developing that relationship to learn together. We've also initiated a relationship with Dr. Tim Boring, Vice President of the Michigan Agribusiness Association (https://miagbiz.org/index.php/about/staff). Dr. Boring is a leader related to innovative agricultural practices in Michigan, including implementing many trials on his own family farms, and leading innovation groups and networks such as the fall 2018 Underground Innovations Conference in Frankenmuth, MI.

As for research, we plan to replicate the same trial in 2019 at KBS. We will also be looking to add any additional treatments to the study to further examine the intricacies of improving the success of double cropping after winter barley. We will invite additional farmers that are growing barley to try double cropping with soybeans to expand our group of farmers that are learning together, but encouraging the farmers to use methods that they are eager to trial.