

## **FY 2021 Mid-Year Report ND Soybean Council**

**December 1, 2020**

**Title of Project:** Utility of a Barley Crop for Iron Deficiency Chlorosis and Waterhemp Management

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### **Objectives of the Research:**

- 1) Evaluate barley/oat suppression of waterhemp in soybean.
- 2) Evaluate the time from planting to canopy closure of IDC-sensitive soybean with and without a barley/oat cover crop, and the effect of earlier canopy closure on late-season waterhemp management.
- 3) Evaluate the optimal termination timing of a barley/oat cover crop to alleviate IDC symptoms and reduce yield loss due to direct competition of the cover crop with soybean.

### **Completed Work:**

Trials were initiated at Northwest 22 in Fargo on May 19, 2020, and at Prosper on May 24, 2020. The trial was arranged in a split-block with one half planted with oats and the other half containing no oats. Oats were drilled in 7.5-inch rows at a 1-inch depth and soybeans (AG06X8) were planted in 30-inch rows at a 1.5-inch depth. Glyphosate (1.125 lb ae A<sup>-1</sup>) and dicamba (0.5 lb ae A<sup>-1</sup>) were applied when oats were 6, 12, 18, and 24 inches tall to terminate the companion crop and provide weed control. Weed densities and biomass were recorded at each termination timing. Visual IDC scores were assigned to each plot every other week and chlorophyll content was measured with a Soil Plant Analysis Development (SPAD) Logger at that time. The trial at Prosper was harvested on October 6, 2020 and the trial at Fargo was harvested on October 22, 2020.

A presentation was recorded and submitted to the Graduate Student Contest for the Virtual North Central Weed Science Society meeting that reported preliminary results from these trials. Unfortunately, field tours were not feasible this summer with the COVID-19 restrictions in place all summer.

### **Preliminary Results:**

It is worth noting that the plots were planted as soon as soils were dry enough to do so this spring. The seedbed quickly dried out and the first significant rainfall did not occur until June 7. This led to early season moisture competition between oats, soybean, and weeds. Fargo was particularly dry with no rainfall until 19 days after planting, and with a flush of waterhemp occurring soon after planting.

There were minimal IDC symptoms this year on the Xtend variety planted in the trials. There were no differences in IDC symptoms or chlorophyll content between treatments at Prosper. At the Fargo location, there was a slight increase in chlorophyll content in plots with the oat crop compared to plots without oats (data pooled across all termination timings).

The presence of an oat companion crop had no effect on waterhemp (Fargo) or Powell amaranth (Prosper) densities at any termination timing compared to plots without oats. The presence of the oat crop also had no effect on pigweed biomass at either location at the 6 or 12 inch termination timings. Pigweed biomass was lower in plots with oats compared to plots without oats at both locations at the 18 and 24 inch termination timings. Results at both locations suggest that oat suppression of pigweeds did not begin until after oats were 12-inches tall when oats and pigweeds germinate at the same time.

There were no differences in Powell amaranth control across any termination timings at Prosper. This is due to glyphosate controlling the glyphosate-susceptible Powell amaranth plants. Waterhemp control was greatest at the 6-inch termination timing, but was not different between plots with or without oats. There was less control at later termination timings, and control would not be deemed commercially acceptable at any application after the 6-inch termination timings on the glyphosate-resistant population tested.

Yield was more affected by treatments at the Fargo location than at Prosper. At Fargo, the plots with oats always yielded less than plots without oats across all termination timings. The two treatments with the highest yield were herbicides applied to plots without oats at the 6 and 12-inch termination timings. These still resulted in less yield than plots that were maintained weed-free throughout the year. At Prosper, there were no differences between plots with oats or without oats at any termination timing. The treatments with highest yield were the weed-free check and plots where herbicides were applied at the 6 and 12 inch termination timings. Delaying the first herbicide application until 18 or 24 inch termination timings resulted in lower yield.

Altogether, the oats did not provide suppression of pigweeds until the oats were 18-inches tall. Delaying first herbicide application until oats were 18-inches tall also resulted in lower soybean yields. IDC symptoms were minimal and transient on the variety used in these trials, and the addition of oats did not add significant value to weed control until oat was too competitive with soybean in 2020.

#### **Work to be Completed:**

Additional data analysis for individual treatments will be completed. Orthogonal contrasts for weed suppression within termination timing also needs to be completed. Trials will need to be repeated in 2021 for more confidence in data. An early May planting time, which is often a couple weeks prior to waterhemp emergence, would likely yield different results.