**Cereal rye cover crop termination and corn growth interaction**

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Cover crops can play an important role in many agronomic systems as a form of weed control, reducing soil erosion, and capturing and recycling soil nutrients. The benefits a farmer receives from a cover crop depends largely on the species of the cover crop and its termination time. For example, cereal rye is commonly used because it is very effective at covering soil to reduce erosion and suppress weeds. The later cereal rye is terminated, the more effective it can be at suppressing weeds. However, later cereal rye termination may also tie up soil nitrogen and increase potential for disease, insects, and other pests, particularly if followed by corn. Due to these trade-offs, this project focused on four treatments (no cover crop, three varying termination times of cereal rye). Corn growth and development was measured, as was pest pressure -- disease, insect, and weeds.

To determine the effects of cereal rye termination time, four treatments were created. The first treatment was a bare plot with no cover crop. Treatment two was cereal rye terminated about six weeks before planting ("early termination"). The third treatment was cereal rye terminated about four weeks before planting ("mid termination"). The final treatment was terminated late, about one week after planting ("late termination"). Cereal rye was terminated with an application of glyphosate. Corn was planted on 30" rows at a population of 30K/acre. Seed was treated with a fungicide, but not an insecticide. Plots were split at planting, with one subplot receiving a pre-emergence herbicide and the other subplot receiving no pre-emergence

herbicide. Nitrogen application was split between planting (50 lbs N/acre) and side-dress at V5 (150 lbs N/acre).

At the corn stage V3, seedlings from each plot were dug up and taken to the lab where height and biomass were measured. Roots were washed and photographed; these photos were then used to determine the amount of disease present on the seedling roots. Slug abundance was measured weekly. Insect activity (beneficial and pest) was measured at V3 and V5. Weed density was collected by species in subplots that did not receive a pre-emergence herbicide, also at V5.

Preliminary results indicated a few different outcomes. Corn seedling height and biomass was reduced in the late terminated treatment. This treatment also had a higher density of slugs relative to other treatments. This was an expected outcome as the increased presence of cover crop residue provides the slugs a more habitable environment. When the insect damage assessments were done at V3 and V5, however, no obvious difference was seen between all four treatments. The current hypothesis is that the increased presence of residue increases the insect populations in a given plot, but they are likely to feed on this residue not the corn. Weed density and biomass was reduced in the late terminated treatment as well, with the density of small-seeded annual broadleaf weeds being particularly reduced. These included smooth pigweed and common lambsquarters. Corn seedling disease is still being assessed, and yield will be measured in October 2021.

While data for pest pressure showed visible (statistical not determined, yet) trends the experiment will be repeated to account for seasonal variations. This research will help to determine the optimal cover crop termination time to control these pest pressures to better equip farmers to handle these pressures in a cost-effective manner.

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