Characterization of Rhizoctonia seedling and root rot disease of corn and rotation implications

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Project Accomplishments:

- Developed large collection of *Rhizoctonia solani* isolates from Michigan
- Identified majority of *R. solani* isolates to AG groups
- Conducted extensive pathogenicity assays to determine aggressiveness of the various *R. solani* isolates to corn and rotational crops
- The characterized *Rhizoctonia solani* isolates will enable us to screen fungicides for improved management
- Leveraged CMPM dollars to conduct industry fungicide trials

We have obtained a *Rhizoctonia solani* collection of 235 isolates recovered from corn, soybean and dry bean from 2011-2016. We are utilizing enzymatic digests of an amplified fragment of rDNA internal transcribed spacer region to determine Anastomosis Groupings (AG). The vast majority of *R. solani* isolates have been identified as AG 2-2, with the remaining isolates belonging to AG2-4, AG 4, AG 5 and AG 11. Pathogenicity and virulence assays are currently being conducted with these identified strains of *R. solani* to determine their aggressiveness both on corn seed (Figure 1) and seedlings (Figures 2-4).

Corn seed assays are performed *in vitro* to aid in the determination whether *R. solani* isolates are capable of causing seed rot or severe disease on germinating seeds that could result in lack of stand in the field. Seedling pathogenicity assays are conducted in paper cups in the growth chamber under controlled environmental conditions to assess the impact *R. solani* isolates have on germination, emergence, root rot, and plant biomass (Figures 2-4).

Screening of new fungicide treatment studies have been conducted in the greenhouse to assess efficacy for management of *R. solani* with in furrow application of fungicides (Figure 5).

These initial screenings for pathogenicity and virulence provide us with useful characterization of strains and AG groups of *Rhizoctonia solani* that are most aggressive and warrant additional investigation. Future research will include inoculated field trials to assess impact on yield, and use of fungicides for management.

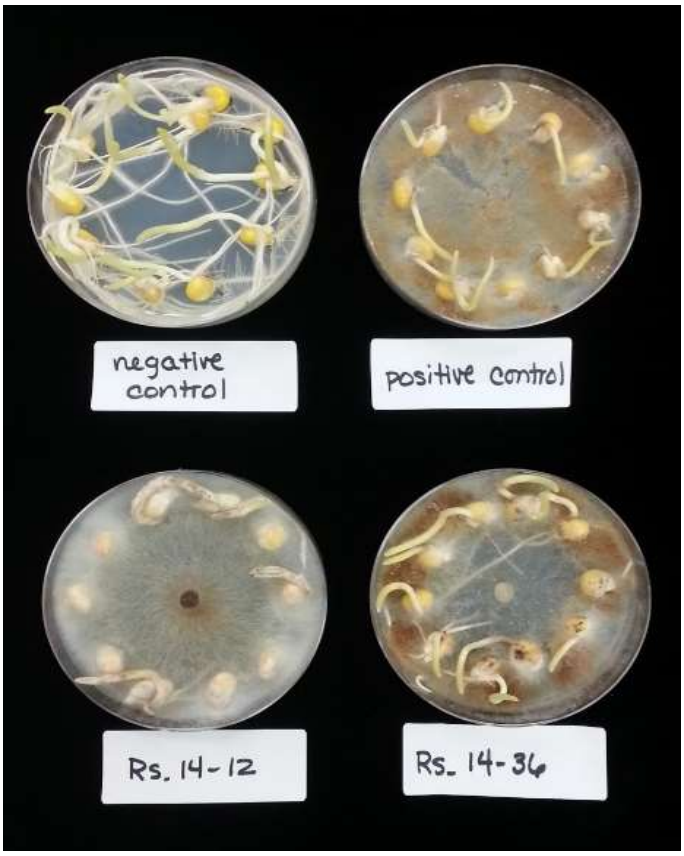

Figure 1: Rhizoctonia solani virulence assay on corn seed. Note differential impact of strains Rs_14-12 and Rs_14-36.

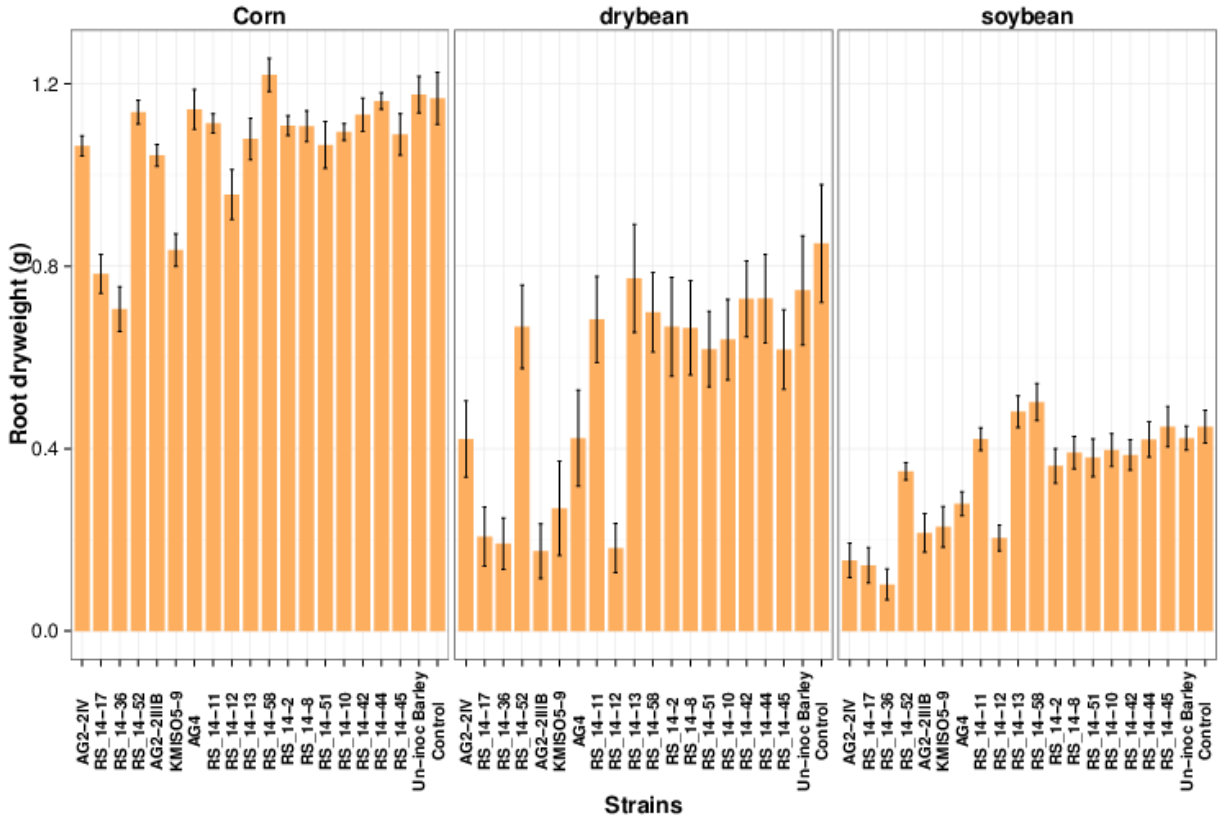

Figure 2: Rhizoctonia solani virulence assay on seedlings of corn, dry bean and soybean, expressed as dry weight of root systems.

Figure 3: Range of virulence across AG and isolates of Rhizoctonia solani in the corn seedling pathogenicity assay. Left most virulent and progression towards less virulent isolates, until on the far right is non-inoculated control.

Figure 4: Range of virulence across AG and isolates of Rhizoctonia solani in the corn seedling pathogenicity assay. Left non-inoculated control, plants show a progression of advancing symptoms of root rot and increased virulence towards the right.

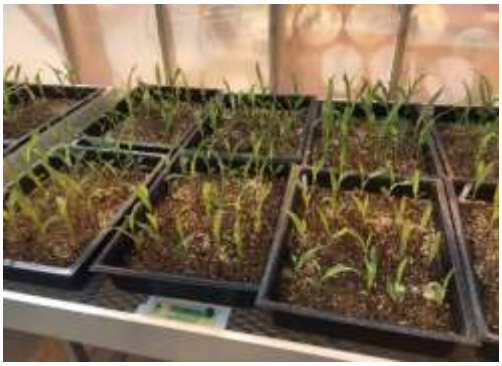

Figure 5: Testing of in-furrow fungicide treatments for management of Rhizoctonia solani (AG2-2) on corn. Treatments that included a fertilizer carrier had increased biomass both non-inoculated and R. solani inoculated treatment.