Zach Peagler Graduate Research Plan

August 2024 – May 2025

Here I outline a plan for the last two semesters of my graduate degree. My general plan is to finish the tomato inoculant trial in the greenhouse at the KSU field station, analyze the data, contrast the data in relation to the previous years’ trials, and then reorient to focus on chitosan/alginate comparisons with germination and viability.

**Goals**

1. Finish the TIP24 trial and analyze the data.
2. Determine the effect of alginate/chitosan biostimulant granules (BG) on tomato seed germination.
3. Determine the effect of alginate/chitosan encapsulation and subsequent long-term storage on the viability of encapsulated microbes.
4. Determine the difference in effects on germination and bacterial viability between chitosan and alginate biostimulant granules.
5. Attend conferences to network and gain understanding of the biostimulant market sphere.

**Path to Success**

1. Ensure all SOPs are updated and easy for undergrads to understand/perform.
2. Ensure all biostimulant granules are created prior to November 1st, 2024 to have enough time to finish out the viability assays.
3. Ensure smooth transition to next grad student.
   1. Find them soon, preferably, and provide them a clear direction and plan.

**Research Plan**

My major focus going forward is going to be on biostimulant granules. My current experimental design has 2 polymers (chitosan and alginate), 7 bacterial treatments (control, *A. brasilense, A. chroococcum, B. subtilis, M. oryzae, P. putida,* and all 5 bacteria), 8 time points (1 hour post-inoculation, 1 hour post-desiccation, 1 hour post rehydration, 1 day of storage, 1 week, 1 month, 3 months, 6 months), and 6 storage treatments ( combinations of 2 factors [temperature - -20C, 4C, 24C] and hydration [hydrated and desiccated]). This experimental setup provides 672 total groups that must be run through both the germination and viability assays (preferably in triplicate). However, this is rather resource intensive, requiring 4,032 petri dishes and 20,160 tomato seeds. If necessary, we can reduce the number of bacterial treatments, time points, or storage treatments to make this more feasible.

**Recommendations for future grad student:**

1. A study that I think would help with building a value proposition would be to examine the effect of biostimulant granules across fertilizer reduction treatments (eg. 100% fert, 75%, 50%, 25%).
2. Incorporate both mycorrhizal fungi and bacteria.