

Developing Novel Fungicides for Sustainable Potato Production

- PI: Marty Ytreberg
- Grant #: IGEM25-008
- Reporting Period:
7/1/24 –12/31/24



Summary of progress towards proposed milestones

Number of potential fungicides	<ul style="list-style-type: none">• This the culmination of the metrics below and are compounds that inhibit fungal growth and are not toxic to the potato plant.• Found 12 compounds that inhibit fungal growth (year goal: 5-10).• In progress. Toxicity has not yet been tested (more on this below).
Number of potential protein targets	<ul style="list-style-type: none">• Using bioinformatics to identify proteins in fungal pathogens that are not in plants/animals.• Found 15 possible protein targets (year goal: 10).• Completed.
Number of protein targets used in virtual screening	<ul style="list-style-type: none">• Using molecular modeling to predict molecules that will bind the protein target and disrupt fungal infection.• Screened against 2 targets so far (year goal: 6).• In progress. Key challenge is lack of structural information for most of the protein targets.
Number of compounds tested in laboratory	<ul style="list-style-type: none">• Testing compounds from modeling predictions in the laboratory for ability to inhibit model fungi <i>S. cerevisiae</i>.• 62 compounds tested in lab (year goal: 45-90).• In progress. Key challenge is determining mode of action of compound.
Number of compounds tested in greenhouse	<ul style="list-style-type: none">• Testing compounds that show promise on potato plants in the greenhouse for toxicity and efficacy against pathogens.• 0 compounds tested in greenhouse (year goal: 40-80).• Starting these tests on at least 20 compounds by end of January 2025.

Summary of expenditures and budget performance

Key Insights

- Spending is on track.
- Major expenditures include salary for bioinformatics postdoc and greenhouse personnel, and purchasing compounds for testing in the laboratory and greenhouse.

Challenges/Changes

- Key challenges are confirming the mode of action for the compound and setting up greenhouse assays.
- No changes to plan

	Budgeted	Spent	+/-
<i>Personnel</i>	\$77,700	\$36,965	\$40,730
<i>Supplies</i>	\$15,000	\$4,205	\$10,795

Projection of work in next reporting period

By end of funding period, June 30, 2025

- Perform virtual screening on 2-4 additional protein targets
- Laboratory and greenhouse tests of additional 100+ compounds based on screening

Future plans

- Applying for IGEM HERC - Initial Startup track
- Goal is to refine the binding properties of promising compounds to make them more effective fungicides
- To accomplish this goal we need to perform more complex biophysical tests to confirm mode of action of compounds