

Objectives and Rationale

Lipopeptides have proven to be excellent biologically-based control agents for the prevention of phytopathogens. However, the technology has been significantly limited by production processes – large scale fermentations, and more importantly, purification processes have not been developed. This leaves production uneconomical or unfeasible currently.

Building on a novel separation method in a previous Hortgro project, based on Aqueous Two Phase Separation, this project aims to develop a reactor specifically designed for production of LPs. The reactor integrates LP extraction from the broth, and their recovery as a salable product. The growth and LP production of *Bacillus* in this reactor will be evaluated and on the basis of the data generated, flowsheeting and economic analyses will be conducted

Methods

The bioreactor was designed by fabricating prototypes, testing fluid mechanics, and iterating. A final prototype was integrated into an existing fermenter, and fluid dynamic, mixing, settling, and separation studies were completed.

Growth experiments of *Bacillus* will be conducted in the modified reactor (once COVID allows), using methodologies developed in previous theses (Mazibuko, Johannes, Dlamini et al).

Key Results

Thus far the project is on track – we have successfully reviewed the literature, and written a review article on the state of the art. The bioreactor has been designed and fabricated, and tested with simulation bioprocess conditions. Mixing studies suggest good mixing and settling, for phase separation of the ATPS.

Conclusion and Discussion

The project milestones have been met to date. The bioreactor is operating well, and experiments will continue on demonstrating and optimising LP productivity in the reactor when COVID allows a return to the lab.