

FY 22 IRTD Final Report Summary

Project Title: Augmentation of Seed Film Technology with Probiotics in Support of Space Crop Production

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Project Description: Current plant growth technology systems aboard the ISS (Veggie Production System (Veggie) and Advanced Plant Habitat) intermittently supply the crew with fresh produce. Seeds utilized in both of these environments typically are surface sanitized and affixed pre-flight with no means for the crew to replant seeds if necessary. The VEG-03J plant growth experiment demonstrated a seed film technology which allowed the crew full control over seed placement and experiment initiation. As a follow up to VEG-03J, our study aimed to combine the concept of this seed film technology with the introduction of plant growth-promoting microbes. Seed film coupons containing 'Outredgeous' red romaine lettuce seeds were planted and grown for 28 days. A portion of these coupons were inoculated with either *Burkholderia contaminans* (*B. contaminans*), *Pantoea agglomerans* (*P. agglomerans*), or *Pseudomonas fulva* (*P. fulva*). The goals of this study were to determine the effect of these specific plant growth promoting microbes on the structure of the seed film as well their effect on the mature harvested biomass.

Project Closeout Summary: This project set out to establish a method for introducing Plant Growth Promoting Microbes to seed film for use in a flight-based crop production system. The inoculation method, demonstrated in this paper, succeeded in this introduction while simultaneously avoiding disrupting the integrity of the seed film material. Future research should continue to explore the idea of growth production and crop protection via intentional introduction of an exophytic microbiome including the verification of effects of varying inoculum concentrations on mature plants. Positive effects are more likely to be noted when multiple organisms are introduced simultaneously. Additional benefit is likely to be seen on an experimental basis when crops are challenged via the introduction of both biotic and abiotic stressors.