Growth Promotion of Hydroponic Lactuca sativa var. capitata and Microgreen Raphanus sativus When Exposed to Pseudomonas psychrotolerans Consistently Throughout the Growth Period

Fromm, Leah (School: East Hampton High School)

The fight to end global hunger in a sustainable fashion has been a struggle. There are still few agricultural technologies aiding the situation. Using the bacterial endophyte Pseudomonas psychrotolerans we determined if the growth of hydroponic Lactuca sativa var. capitata and microgreen Raphanus sativus increases post-inoculation. Both hydroponics and microgreens are possible technologies to aid world hunger troubles. We inoculated half of the hydroponic plants and the microgreen plants with 10μL (OD 600 = 1.0) of Pseudomonas psychrotolerans and half with a control solution. The plants were grown beneath LED lighting for nine weeks (hydroponics) and two weeks (microgreens). Observations of length, height, number of leaves, dry mass, and wet mass were recorded. Data was analyzed using a One-Way ANOVA test. This work was hands-on and bridged across multiple disciplines. Inoculated hydroponic plants demonstrated significantly larger sizes, in dry mass ($p<8.2x10-12$) and wet mass ($p<7.95x10-10$). They also had greater mean leaf growth (17 leaves vs. 13 leaves), increased length (39cm vs. 33cm), and height (11cm vs. 8cm). Inoculated microgreen plants also displayed a difference in the mean number of leaves (5 vs. 4). This study demonstrated Pseudomonas psychrotolerans has a positive effect on the growth of Lactuca sativa var. capitata and Raphanus sativus. Future experiments will utilize various plant species to determine whether the effects of Pseudomonas psychrotolerans are universal or localized to Lactuca sativa var. capitata and Raphanus sativus. The innovative use of bacteria within this study has laid the groundwork for research to promote humanity's future.

Awards Won:
Fourth Award of $500