CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Suchitra Dara

Project Number
36108

Project Title
Improving Drought Tolerance with Beneficial Fungi

Abstract

Objectives/Goals
The main objective of this project was to see if commercial formulations of insect-killing fungi help plants grow in artificially created stressful drought conditions. This will identify the multipurpose role of beneficial fungi in crop production and promote sustainable agriculture, which is important for environmental and human health.

Methods/Materials
Materials used include cabbage transplants, commercial formulations of insect-killing fungi and other beneficial microbes, potting medium, plastic containers, plant lights, measuring cups, scale, pipettes, temperature data logger, and other basic supplies.

Cabbage transplants were planted in commercial potting medium in 650 ml containers. The eight treatments used in the study included three beneficial fungi, four plant enhancers, and water as control. Each treatment had 10 plants which were grown under artificial lighting. To each pot, 50 ml of water was added at the time of planting and again on 42, 50, 64, and 81 days after planting. Plant health rating was recorded at 40 and 70 days after planting on a scale of 0 to 5. Plant survival was recorded at 40, 70, and 90 days after planting. Shoot-to-root ratio was calculated after 90 days; the plants were dried to measure biomass and sent to an analytical lab for nutrient analysis. Data were subjected to statistical analysis.

Results
The beneficial fungus B. bassiana greatly improved the overall health and growth of the cabbage plants. Other insect-killing fungi also had a positive impact on some measured parameters. Other materials did not help with the plant growth and health.

Conclusions/Discussion
This is the first report of the direct impact of entomopathogenic fungi on cabbage plant growth. B. bassiana and to some extent M. brunneum had a positive impact on plant growth and health even under reduced water conditions. If they could be used to promote plant growth, improve water and nutrient absorption, withstand saline or drought conditions, increase yields in addition to their typical use as biopesticides, then they can play a critical role as holistic tools in sustainable agriculture. This also shows that plant enhancers can have a negative impact if used in the wrong conditions.

Summary Statement
This is the first report that the insect-killing fungus, Beauveria bassiana, promotes the health and growth of cabbage plants subjected to water stress, demonstrating additional uses for this beneficial fungus.

Help Received
My project advisor helped me set up and effectively monitor the study.