Colorado Science and Engineering Fair

2024 Individual Project Abstract Form

Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.

Title of Project: To Grow or Not to Grow: Testing Biomass-based Alternatives for a Greener World

Finalist's Name: Cameron Kempisty

School and City: Eagleview Middle School, Colorado Springs

Sponsor's Name: Elizabeth Busler

Category: Earth & Enviornmental Sciences (EAEV)

Division: Junior (6th - 8th grades)

Abstract (250 words or less):

Climate change is one of the biggest challenges today. With the world's population surpassing 8 billion people in 2022, the demand for resources to feed this population is increasing. The current way to grow food is carbon-intensive, thus contributing to climate change. Finding new methods to grow crops efficiently is crucial to combat climate change.

A California-based company has developed a biomass-based soil product from pistachio shells. The company claims the products enable crops to grow better with less water and have a more efficient use of nutrients. To validate the claim, I conducted an experiment using six different soil conditions, three different plants, and two watering conditions. Germination data was gathered throughout the experiment, and the root length and plant height were measured upon completion. Statistical tests, specifically t-test and ANOVA, were performed on the results.

The results showed plants using biomass-based amendments had shorter times to germination than those using conventional fertilizer. In half-water conditions, two bio-based amendments displayed statistically earlier germination than conventional fertilizer and the control, suggesting better performance under water-scarce conditions. There was no statistical difference in root length, but ANOVA revealed a difference in plant height/day with the conventional fertilizer being the greatest. However, this is a preliminary experiment and further research is necessary to compare biomass-based amendments' growth and crop yield with conventional amendments.

Overall, this research suggests biomass soil amendments have better water and nutrient retention abilities than current conventional amendments, thereby providing a potential solution to growing crops more efficiently.

I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.

Finalist's Signature: Cameron Kempisty Date: 3/3/2024

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES o all of these forms to your Regional Fair Director with you Finalist Verification/Permission Form. A signed copy of this form must be included in your notebook.