Colorado Science and Engineering Fair

2025 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: Plant Growing Conditions

Finalist's Name: Payal Gopinath

School and City: Nevin Platt Middle School, Boulder

Sponsor's Name: Rebecca Fellows

Category: Environmental Engineering

Division: Junior (grades 6 - 8)

Abstract (250 words or less):

My project is finding the best growing conditions for plants. The real-world problem I am trying to solve is that many places can't grow food because it is too light-dark, the soil is not good, or the climate is too wet or too dry. This is important because if places can't grow enough food then they have to import it, which makes it too expensive for some people to afford. My hypothesis is that the bean with medium light, a medium amount of water and full soil will grow the most.

For my experiment:
First, I will grow beans in different conditions including the amount of water, soil and light
Once they sprout, I will record the date they sprouted and plant them in pots (still in the different growing conditions)
Each day, I will water the plants, measure how much each plant grows, and record the data
Finally, I will build a circuit to meet all the best growing conditions according to the data and test it

Testing conditions
- Water - Low (20%) Medium (30%) High (40%)
- Light - Low (8 hr) Medium (12 hr) High (16 hr)
- Soil - 50/50% (½ sand ½ soil) 100% all soil

Required Materials:
- Bean seeds
- Lights (to meet the growing conditions)
- Sand + soil (one is going to be all soil the other is ½ sand and ½ soil)
- A light with a circuit (to control the amount of light)
- Cardboard and black trash bags (to control the amount of light)
- Spray bottle (to water)
- Soil moisture meter to measure the amount of water the plant receives

In summary, I am going to find the best growing conditions for plants and then make a circuit to meet all the conditions. I will do this to demonstrate the best growing conditions for plants so that it can help places that don't have the correct climate to grow plants.

References:
1) Gregarious Inc. "Blue Lake 274 Bean: How Much Water & Light Does It Need to Thrive?" Greg App , 2022, greg.app/plant-care/phaseolus-vulgaris-blue-lake-274-blue-lake-274-bean. Accessed 28 Feb. 2025.
2) "Growing Beans in Home Gardens." Umn.edu, 2024, extension.umn.edu/vegetables/growing-beans. Accessed 28 Feb. 2025.
3) Johnsen, Jaclyn. "14 Fast Growing Vegetables | Jung Seed's Gardening Blog." Welcome to Jung Seed's Gardening Blog!, 8 Apr. 2020, blog.jungseed.com/14-fast-growing-vegetables/. Accessed 1 Mar. 2025.
4) Seed. "Seed Germination | Definition, Process & Factors - Lesson | Study.com." Study.com, 2023, study.com/academy/lesson/what-is-seed-germination-definition-process-steps-factors.html. Accessed 1 Mar. 2025.

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: Date:

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 of 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.**