APPLICATION FOR NATIONAL SCIENCE FAIR-2025

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CLASS IN WHICH STUDYING : **VI – B**

TITLE OF THE PROJECT : **Slope Stability Solutions: Plants, Rocks, or Mulch?**

CATEGORY LEVEL : **Middle/ Environmental SCIENCE**

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INTRODUCTION

Soil erosion on slopes is a significant environmental concern, leading to loss of fertile land, increased sedimentation in waterways, and potential landslides. This project investigates the effectiveness of plants, rocks, and mulch in preventing soil erosion on slopes, aiming to identify the most suitable solution for slope stabilization.

By exploring the benefits and limitations of each option, this project seeks to contribute to a better understanding of sustainable land management practices and inform strategies for mitigating soil erosion.

AIM

"To investigate and compare the effectiveness of plants, rocks, and mulch in preventing soil erosion on slopes, and to identify the most suitable solution for slope stabilization."

This aim guides the project's objectives, methodology, and analysis, focusing on finding a practical solution to mitigate soil erosion on slopes.

STATEMENT OF THE PROBLEM

Soil erosion on slopes is a significant environmental concern, leading to loss of fertile land, increased sedimentation in waterways, and potential landslides. The problem is to determine the most effective method for preventing soil erosion on slopes, comparing the use of plants, rocks, and mulch.

This statement highlights the importance of addressing soil erosion on slopes and sets the stage for investigating potential solutions.

HYPOTHESIS

It is hypothesized that vegetation (plants) will be the most effective method for preventing soil erosion on slopes compared to rocks and mulch, due to its ability to anchor soil through root systems and enhance water absorption.

MATERIALS REQUIRED

- **Containers or Trays**
- **Soil**
- **Bricks, books, or stands to tilt the trays at a consistent angle (e.g., 30°)**
- **Plants, Rocks, Mulch**
- **Measuring cup**
- **Stopwatch or timer**

EXPERIMENTAL PROCEDURE

Independent Variables:

- Type of slope stabilization method (plants, rocks, mulch)

- Slope angle

- Soil type

Dependent Variables:

- Amount of soil erosion

- Stability of the slope

Control Variable:

- Rainfall intensity (if simulating rainfall)

- Soil moisture content

- Temperature and humidity (if conducting outdoor experiments)

By controlling these variables, we can isolate the effects of each slope stabilization method and draw meaningful conclusions about their effectiveness.

PROCEEDURE:

1. Prepare Slopes: Create identical slopes with soil in containers or boxes.

2. Apply Treatments: Apply plants, rocks, or mulch to each slope.

3. Simulate Rainfall: Use a watering can or spray bottle to simulate rainfall on each slope.

4. Measure Erosion: Measure and record the amount of soil erosion on each slope.

5. Compare Results: Compare the effectiveness of each treatment in preventing soil erosion.

This procedure is simple, yet effective in demonstrating the impact of different slope stabilization methods.

DATA ANALYSIS AND OBSERVATION TABLE

Treatment	Soil Erosion (ml/g)	Observations

Plants Roots held soil in place, reduced runoff

Rocks Rocks slowed down water flow, reduced erosion

Mulch Mulch absorbed water, reduced soil loss

This table can be used to record and compare the effectiveness of each treatment in preventing soil erosion. You can add more columns or rows as needed to suit your experiment's requirements.

RESULT

A bar graph or line graph can be used to visualize the results, showing the amount of soil erosion for each treatment (plants, rocks, mulch). The graph will help to illustrate which treatment was most effective in preventing soil erosion.

DISCUSSION

The results show that:

- Plants were highly effective in preventing soil erosion due to their root systems holding the soil in place.

- Rocks also reduced soil erosion by slowing down water flow and providing stability.

- Mulch helped to absorb water and reduce soil loss, but was less effective than plants and rocks.

CONCLUSION

Based on the experiment, plants were the most effective treatment for preventing soil erosion on slopes, followed by rocks and then mulch. These findings suggest that planting vegetation on slopes can be a highly effective strategy for mitigating soil erosion and stabilizing slopes.