Name(s)	Project Number
Harsha Pillarisetti	**J1820**

Project Title

Effect of Intelligent Watering Systems on Plant Growth and Water Consumption

Abstract

Objectives
To understand if a sensor-based watering system uses water more efficiently and also improves plant growth at the same time by optimizing the water required by the plants.

Methods
Grew beans, radish, sunflower seeds in different soil types using different watering patterns. A total of 54 samples were used and laid out in 9 potting trays and were subjected to different watering patterns over 11 days. Measured amount of water consumed and plant growth (leaf count, plant height) among all the samples. Could not measure surface area (warped leaves) or color (no access to chromatograph) but visually observed leaf health (color) and estimated surface area differences using a graph sheet. The watering system used a soil moisture sensor, a raspberry pi controller and a submersible pump in a tank. 3 trays were watered without sensor (control samples), 3 trays were watered at a fixed frequency using a sensor and remaining 3 trays were watered multiple times a day using a sensor.

Results
The 3 trays that were watered multiple times a day using a sensor showed lower water consumption (36%) than control samples in loamy soil, while potting mix soil showed higher water consumption (14%). However, plant growth (as measured by leaf count and plant height) did not show any significant change in loamy soil but was 49% higher for potting mix in these trays. The leaf health (color, surface area) was also observed to support this data.

Conclusions
Since loamy soils retain moisture, frequent sensor-based watering results in significant (36%) reduction in water consumption with no impact to plant growth in most plants. In non-succulent soils (peat soils like potting mix) frequent sensor-based watering marginally increases (average 14%) water use to keep the moisture in desired levels, but also significantly increases (average 49%) plant growth in all types of plants. These findings have a deep significance for our irrigation systems in future in a world with significant fresh water shortages.

Summary Statement

I found that frequent sensor-based watering not only makes efficient use of water but also improves plant growth since it reduces water stress in plants caused by overwatering or excessive dryness.

Help Received

I designed the watering system based on research and internet study and performed the experiments myself. I received help from my parents to install the pump.