CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Jaydev N. Bhateja

Project Number

J1804

Project Title

What Is the Effect of Dry Farming on the Sugar Content of Pisum sativum?

Abstract

Objectives/Goals

In a drought, it is important to save water. A way to do this is to give less water to plants. A common Californian crop is Pisum sativum, the sugar-snap pea plant. This project answers the question of how much water and at what frequency to give a plant for optimal sugar content.

Methods/Materials

A previous experiment found that 50 mL of water per 3 days was the optimal watering regimen for Pisum sativum. My hypothesis was that the highest sugar concentration would be in plants receiving this regimen. Saving water was the goal of this experiment, so this regimen was used as a maximum and applied to the control group. Another group was given 75% of the optimum, or 37.5 mL per 3 days, another 50% of it, or 25 per 3 days, and the last, 25% of it or 12.5 per 3 days. 4 more groups were created. Water was given to each of these at ½ the frequency, but twice the amount of water, keeping the total amount of water constant. Therefore, the 5th, 6th, 7th, and 8th groups were given 100, 75, 50, and 25 mL per 6 days. These groups were grown outside. The same groups were inside. There were 64 plants in all. The plants were grown for 9 weeks, then processed into extracts, and the glucose content of each was measured with a glucometer.

Results

Surprisingly, plants outside given the least water had an average glucose concentration (in mg/dL) of 7% more than plants given the most water. But plants given between 50-75 mL every 6 days and 25 mL every 3 days had glucose concentrations of 65% - 130% higher than those of the plants outside with the most water. Because the humidity inside is greater than it is outside, plants inside had more water, and therefore more glucose. They converted extra sugar to starch, while the plants outside did not. My glucometer could not detect the low levels of glucose left in the plants inside.

Conclusions/Discussion

My hypothesis was proven false. Glucose levels were not highest in the control group. They changed only with moderate amounts of water. Future improvements would be to add hydrochloric acid to extracts to break down starch into sugar. More accurate data on the sugar content of plants would be obtained.

Summary Statement

This project analyzes the effects of decreased water supply to the sugar-snap pea plant.

Help Received

My advisor, Dr. Anuradha Murthy, was very helpful in carrying out the experiment. My parents, Rajiv and Meera Bhateja, and my brother, Chet Bhateja, helped oversee the growth of the plants.