CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

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Project Number

S1808

Project Title

Once in a Green Moon: A Study of Plants' Survival in a Simulated Lunar Day Cycle

Abstract

Objectives/Goals

Can plants that serve nutritional value to humans survive the limitations of light defined by the lunar day cycle?

Methods/Materials

Two identical light-sealed boxes were built to simulate the darkness of space. Fans blew air through baffles to allow sufficient airflow but omit external light. Full spectrum light emitting diode (LED) light bulbs were used to simulate sunlight and the box interior was covered with aluminum foil to prevent light loss. Each box contained five or more plants per species. The light and dark periods were incrementally lengthened until a 2-week period was obtained. The growing conditions of the plants were monitored throughout testing, using sensors that measured humidity, temperature, and carbon dioxide content. Following a testing period, the plants were evaluated based on leaf quality color, height, leaf spread, and number of leaves.

Results

The levels fluctuated with the timing of the fans (every 6 hours) and the light cycle of the boxes. The carbon dioxide levels in the experimental box were higher than the control box during the first 36 hours of the night of the experimental box indicating more cellular respiration occurred and thus growth. After the first 36 hours the carbon dioxide levels in the box lowered to slightly above normal daylight as the plant growth ceased and returned to standard metabolism levels to survive. The carbon dioxide levels dropped one more time significantly after another 72 hours of the night of the experimental box, as some of the plants began to stop metabolizing as their glucose reserves waned.

Conclusions/Discussion

The survival rate at 2 weeks of darkness was 27%. The carbon dioxide log supports the theory that the plants had depleted their reserves and were beginning to die. The surviving plants also showed significantly less chlorophyll and leaves, indicating that the plants were not growing. The combined results indicate that most of the plants would not survive the lunar night cycle and for those plants that do, the plants will not be able to provide nourishment for humans.

Summary Statement

This project was to test if nutritious plants for humans can survive the limitations of light and dark as defined by the lunar day cycle.

Help Received

Guidance from Ms. Laurie George, University of Illinois Extension, Unit 23, on box design. Advice from Reuben, Quartz Hill Garden Center employee on soils. Parents helped construct boxes and transplant plants into boxes.