CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)

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Project Number

J1908

Project Title

Effects of Different Light Wavelengths on Corn (Zea mays) Growth and Chlorophyll Content

Abstract

Objectives/Goals

The objective of this study is to determine if exposure to red and blue light, absorbed specifically by chlorophyll a and b, improves growth and chlorophyll content in corn seedlings.

Methods/Materials

Early maturing sweet corn seedlings exposed to different light wavelengths: red (660nm), blue (465 nm), blue + red (465 + 660 nm), and natural light (10nm - 0.01 cm). Plant height, root weight, chlorophyll content and total biomass production (mg) were measured. The chlorophyll content was measured with a SPAD handheld meter. Fall and winter season trials were conducted with growth parameters and chlorophyll content measured at 12 days after sowing (DAS), 16 DAS, 20 DAS, and 24 DAS. The study was terminated and final measurements were obtained at 20 DAS for fall trial and 24 DAS for winter trial.

Results

The results from winter trial showed that plants exposed to combination light wavelengths (red + blue) produced the heaviest roots (966.67 mg) which also yielded the highest total biomass production (1,516.67 mg). The high production of roots resulted in at least a 20% increase in total biomass yield compared to the other treatments. In addition, plants exposed to the combination light wavelengths produced the highest amount of chlorophyll in the leaves (29.28) compared to seedlings exposed to blue light (27.03), red light (24.17), and natural light (21.33). Similar trends on biomass yield, root yield, and leaf chlorophyll content were observed in the fall trial.

Conclusions/Discussion

The combination of blue and red lights produced significantly higher chlorophyll content, total root weight and biomass yield, thus, improving the overall growth of the corn seedlings. Exposure to both light wavelengths maximized photosynthesis, glucose production and synthesis of organic materials which lead to healthier plants and higher biomass yield. Farmers and seedling growers can use the combination of blue and red lights to produce healthy and hardy seedlings for field transplantation. Higher survival rate after transplantation due to the improved overall growth and health of the seedlings can potentially increase crop yield.

Summary Statement

This project is about the effect of different light wavelengths on corn seedling growth and corn leaf chlorophyll content.

Help Received

Over the past two years, my mother has taught me how to use and understand the statistical data that I discovered while completing this project. The actual project was done entirely by me.