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優勝作品專輯

作品編號 **160036**

參展科別 **物理與天文學**

作品名稱 **Filtered Light Frequencies versus Pigment Frequencies**

得獎獎項 **四等獎**

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ABSTRACT

Purpose of the research

Experiments were performed to determine if the frequencies of the colours of pigment differ from the frequencies of the colours of filtered light. The third experiment was performed to determine whether the different colours of filtered light have an influence on plant growth.

Procedures

Experiments I and II were performed in sunlight and the temperatures of different colours of paper, as well as a white paper underneath different colours of transparencies, were measured by means of an infrared thermometer. The Stefan-Boltzmann equation was used for calculations.

Experiment III was performed by placing ten spinach seedlings under each of the Code 40 red, green, blue and black/white shade nets. The control, 10 spinach seedlings, had no Code 40 shade net covering. All these spinach seedlings were grown under similar conditions and harvested after 4 weeks.

Data

In Experiment I the yellow paper was the only colour that did not perform according to the sequence of the white light spectrum (ROYGBIV). The temperature of the different colours of paper determined the amount of energy that was re-emitted.

In Experiment II it was determined that the primary colours red, green and blue, as well as yellow of the filtered light, performed according to the white light spectrum.

In Experiment III the spinach plants underneath the blue shade net have the highest average fresh mass (g), as well as the largest average leaf area (cm^2), while the spinach plants underneath the red shade net have the lowest average fresh mass (g), as well as the smallest average leaf area (cm^2).

Conclusions

In Experiment I the primary colours of the white light spectrum are red, green and blue. When red and green are combined, yellow is obtained. Therefore the temperature of the yellow paper was lower than expected, because only blue light was absorbed, while red, green and yellow light were reflected.

In Experiment II all the colours of the transparencies performed according to ROYGBIV. By comparing the amount of energy of the colours of pigment to the colours of the filtered white light spectrum, it became apparent that there is a difference between the frequencies of the colours of pigment and the frequencies of the colours of filtered white light spectrum.

The hypothesis was proven true!

Experiment III is a practical application to this physics project. Uncontrolled 100% blue light has too much energy for the spinach plants, thus some of this energy must be dissipated by the plants. According to ROYGBIV, blue light has a high amount of energy and therefore the blue shade net provides the optimum controlled light intensity for the spinach plants to grow.

There is a direct correlation between the sequence of the colours of the white light spectrum and the plant growth of spinach plants underneath these shade nets. Research has to be done to determine the optimum light frequency for other crops.

During the research it was discovered that different colours of shade net have a substantial influence on plant growth!

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This project discovers that shinning blue light to spinach provides better grow rate when with sun light. It's rather interesting. If a reason can be given, this project is more complete.

This experiment is well prepared. And the author is encouraged to try more vegetables to see if blue light is more suitable for growing vegetables.