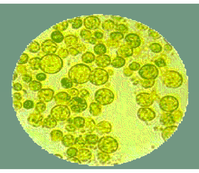

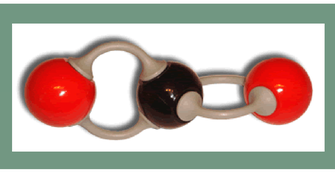

Effects of Red Light and Blue Light on Algae Growth

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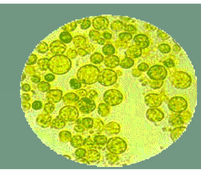


Introduction

Algae are currently one of the most important and promising sources of biofuel for the future. Compared to other agricultural products such as corn or soybeans, algae contain much higher lipid content and are more likely to produce a higher amount of biodiesel at a less expensive and more efficient rate. Algae's growth and development depend on the photosynthetic process, which uses carbon dioxide, water, and light to produce energy. This experiment studies how different colored lights affect the growth of algae. One control group grows under regular sunlight, one group grows under red light, which has low frequency and long wavelength, and one group grows under blue light, which has high frequency and short wavelength. Each group is exposed to its respective light color for sixteen hours each day and growth is recorded. The light color group with the most growth is determined.

Hypothesis :

It's hypothesize that blue light would help algae grow the most efficiently because blue light contains shortest wavelength and the highest energy level of

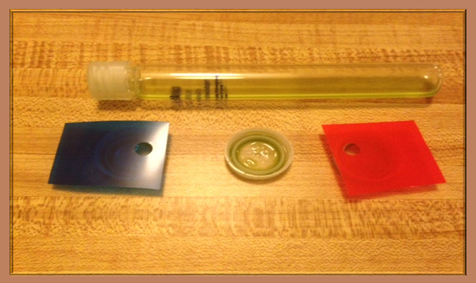
Methods & Materials

Materials :

+ Bottle Caps
+ Translucent Red and Blue Filter Paper
+ White Fluorescent Light
+ Carolina Chlorella Alga-Gro Freshwater

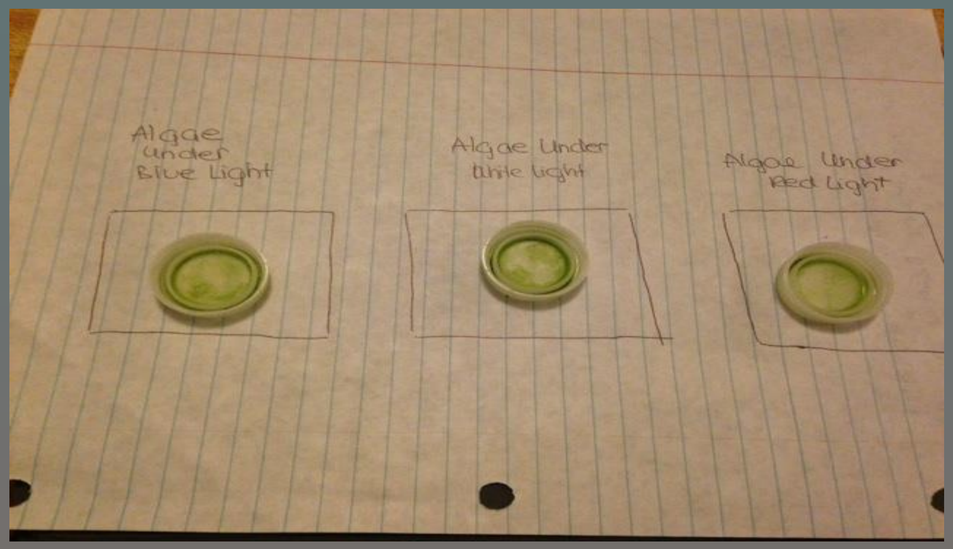
Methods :

1) Create 3 different growth of algae (10 ml each) in each bottle cap
2) Place all three groups under white fluorescent light , place one piece of translucent red filter paper with holes on top of one bottle cap, place one piece of the translucent blue filter paper with holes on top of one bottle cap, the remaining bottle cap remains stay under the white fluorescent light as the control variable (16 hours of light and 8 hours of darkness cycle)
3) Everytime the water level in each growth either evaporates , add the same amount of water to each bottle cap
4) After 2 weeks, determine the group that shows the most growth by weighing the solution by graduated cylinder



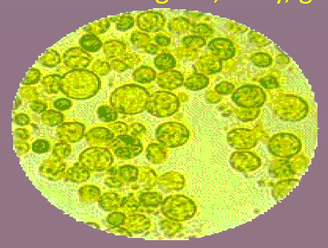
Results

The hypothesis is rejected because the group of algae under white light displayed the most growth of all of the groups. This means that white light allows for algae to utilize light energy the most efficiently for production of ATP (adenosine triphosphate) and NADH (nicotinamide adenine dinucleotide). ATP and NADH are energy molecules that the cell consumes during cellular respiration. Photosynthesis and cellular respiration are two complementary and cyclic processes that algae undergo to reproduce.



Why Algae ?

The world cannot live on oil forever. With prices and availability that skyrocket and plummet like roller coasters, oil cannot and will not sustain our increasing energy demands in the future. Additionally, the burning of oil releases tons of carbon dioxide into the atmosphere that turn oceans acidic and raise the earth's body temperature. As catchy as "drill, baby, drill" is, it does not represent an ideology that is beneficial to… anything really. Drilling for and depleting oil resources may save a few bucks in our pockets now, but it is a very short-sighted approach. Algae is an alternative that we can use to replace those hydrocarbon CÒ2 factories. It is cheap, basically grows anywhere, and can be made into a clean fuel that engines can run on. So "grow, baby, grow!"



Conclusions

The hypothesis is rejected because the group of algae under white light displayed the most growth of all of the groups. This means that white light allows for algae to utilize light energy the most efficiently to produce sugars. The sugars are then used in cellular respiration to produce ATP (adenosine triphosphate) and NADH (nicotinamide adenine dinucleotide). ATP and NADH are energy molecules that the cell consumes during cellular respiration. Photosynthesis and cellular respiration are two complementary and cyclic processes that algae undergo to reproduce.

While blue light does have more energy than white and red light, it does not maximize the efficiency of photosynthetic pigments in algae cells. The photosynthetic pigment Chlorophyll A plays the most important role in capturing light and blue light is slightly favored over red light in terms of absorption. But this does not mean that blue light can replacement all of red light in photosynthetic pigments. There are other pigments such as carotenoids which increase the range of light absorption in cells to green light.

So white light, which contains every color in the visible electromagnetic spectrum, would allow every photosynthetic pigment to be used to harness energy. This maximizes the energy input therefore allowing the cell to produce more sugars for cellular respiration and growth. The maximization of algae growth benefits the environment and mitigates carbon dioxide in many ways. Algae absorbs carbon dioxide during growth and releases it when used as a fuel. But unlike fossil fuels, biofuel made from algae does not produce more carbon dioxide than that was used for it grow, so there is no net gain of carbon dioxide in the atmosphere. If algae can be grown on a wider scale than it is today, there is the possibility that it can replace nonrenewable energy sources, which would be greatly beneficial to the environment.

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