Algae Energy Project (AEP)

New Mexico
Supercomputing Challenge
Final Report
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Team 38
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Research

Diatoms have regular geometric shapes the reason for this is the sun and the temperature forms them to where they get shaped.They have a portion of hard, brittle silica. They are extremely abundant in both freshwater and saltwater. Even though, they are manly in saltwater. They are one of the most popular types of algae. There are ten groups of diatoms. They are: Eucentric, eccentric, araphid, eunotioid, monoraphid, naviculoid, cymbelloid, epithemioid, nitzschioid, and suirrelloid. The diatom is a very small algae. They are 20-200 micrometers in size. Another name for the diatom is

Bacillariophyta. They have a yellow-brown chloroplast. Diatom fossils have dated back to the cretaceous period in the time on Tyrannosaurus Rex. Diatoms are found in any moist environments. Many types of Diatoms stay connected after cell division. Sometimes only the tips of the Diatoms stay connected and they create a zigzag pattern. The extremely fine pores in the frustule of certain species of diatoms are used to test the resolving power of a microscope's lens. Live Diatoms attach to rocks, plants, or be free-floating. Of the 200 to 5,000 Diatoms known, all are eukaryotic and/or photosynthetic.

Blue-green algae is called “pond scum”. Blue-green algae isn’t eaten by other aquatic creatures because it isn’t an important part of the food chain. Blue-Green-algae grows so fast it can be grown overnight. Another thing they are known as is “primary producers”. It is fatal to dog *and* humans. The fertilizer used by farmers is washed into waterways and is the reason that they are in such abundance. Scientists have found blue-green algae from the 12th century. Blue-green algae grow naturally in Australian fresh and saline waters. The Blue-Green algae has usually, but not always, been found in small numbers. When the Blue-Green algae is found in large numbers the water around it has deteriorated and they have posed a threat to public health. When each Blue-Green algae dies they release toxins into the environment around them. The toxins in the Blue-Green algae have different side effects, some attack the liver and/or the nervous system, and others simply irritate the skin. Scientists found that Blue-Green algae can fix gaseous nitrogen. Blue-Green algae is able to migrate in calm water due to nutrients or light gradients. Blue-Green algae can be found in a string of cells. Blue-Green algae turns gases such as **nitrogen** into an organic form. Blue-Green algae was eaten by the Aztecs. Blue-Green algae is primarily eaten as a health food in the USA.

Green Algae wall has a lasso divers with over 7000 growing in different habitats. It is the most diverse group of algae. Green algae is a paraphyletic group of algae because it excludes the Plantae. It also has two types of chlorophyll. Another name for Green algae is Chlorophyte. The scientific name for the most common type of green algae is Hydrodictyon. The Hydrodictyon is also known as “the water net”. Over 5,000 species of Green algae are known.

Euglenoids are found in freshwater. They actually don’t have a cell but do have a flagella.They are single-celled flagellates. There are about 900 species of Euglenoids.They live in hard or soft water habitats of varied pH and light levels.

The Dinoflagellates at a certain point in their lifecycle release a nuclear structure. They contain two types of flagella that is located around the equator. Half of all Dinoflagellates are photosynthetic so they move photosynthetic and heterotrophic so it is dependent on organic solutes.

Industries are trying to turn algae into energy so that they don’t have to pay as much money for electricity. There is another type of algae called Phytoplankton. This is a microscopic type of algae. if algae feeds on phytoplankton is

called Zooplankton. They are trying to form an energy ball out of algae that is trying to light the entire building. Algae was one of the first forms on earth. there are six other types of algae.

Proposal

Algae Energy Project (AEP)

Our team's problem is the fact that cars do not get good gas mileage. Also the gasoline from the cars release harmful chemicals into the atmosphere causing Global Warming. So, for our project we are checking five different types of algae: Blue-green, Green, Euglenoids, Dinoflagellates, and Diatoms.

If we continue using gasoline for fuel at the current rate we will increase global warming which can melt the ice caps. Ice caps take up 75% of Earth's water and if that melts then coastal areas will be flooded and water could even move farther inland. Many could die in this event and it could result in apocalyptic matters.

This project is aimed to cause more people to use plants such as algae to power their cars and reduce global warming. This could be a breakthrough in the automobile industry. Imagine a world with no emissions and having to worry about having a car with harmful emissions and spending those precious dollars on gasoline and just going outside and just taking a scoop out of your pond or nearby lake. We want to make a change in the world and help this growing problem.

Using the program Starlogo TNG we are going to demonstrate that algae is the best source to increase fuel mileage and reduce harmful emissions from the exhaust emitted from combustion engines that primarily use fossil fuels and accelerate global warming.

Executive Summary

Algae Energy Project is working to find an alternate power source for cars. Gasoline is destroying, not only the ecosystem, but the economy as well. Why use the fuel source we are running out of when we have abundant other sources? Algae seemed to be the best source for us to use. Although, we don't want to make algae an endangered

species all on its own. So, we have studied ways to make sure that we don't over use it. We figured that we could use different types of algae for different cars. Such as Blue-Green algae to replace gasoline and Green algae to replace Diesel fuel. Or we can even use the waste part of the algae could be used for growing crops for food. It would be better than gasoline because it doesn't produce pollution like gasoline. People have started studying algae for energy already but we have thought about a lot of the probabilities. Scientists focus on one certain thing at a time. We, on the other hand focused on multiple things at a time. We studied both the proteins in Blue-Green algae and the toxins in it at the same time. We may not find the answer right away but we will find it eventually.

Report

Introduction

Around the world people use cars which require gasoline. Except gasoline is polluting the air. Around the world there are different kinds of fuel sources. Why not use one? For this project we have chosen to use algae for a bio fuel. There are five main types of algae: diatoms, blue-green, green, euglenoids, and dinoflagellates.

Blue-green algae is the most common of the algae, so it is most likely to be the algae turned into fuel. Once we find the algae to turn into fuel the chosen algae will be grown in a farm. So as to not make the algae go extinct. If we didn't grow the algae in farms then it might be overused and would go extinct. We are doing project because the fuel people are currently using isn't good for the environment and there are better fuel sources. The gasoline release byproducts after combustion and it causes global warming by all of the emissions released and the polar caps could melt and flood the coastlines of the world. killing thousands.

Methods and Materials

The materials required for this project are:

- Diatoms
- Euglenoids

- Blue-Green Algae
- Green Algae
- Dinoflagellates
- StarlogoTNG
- Computers
- People
- Blue-Green Algae w/ Toxins

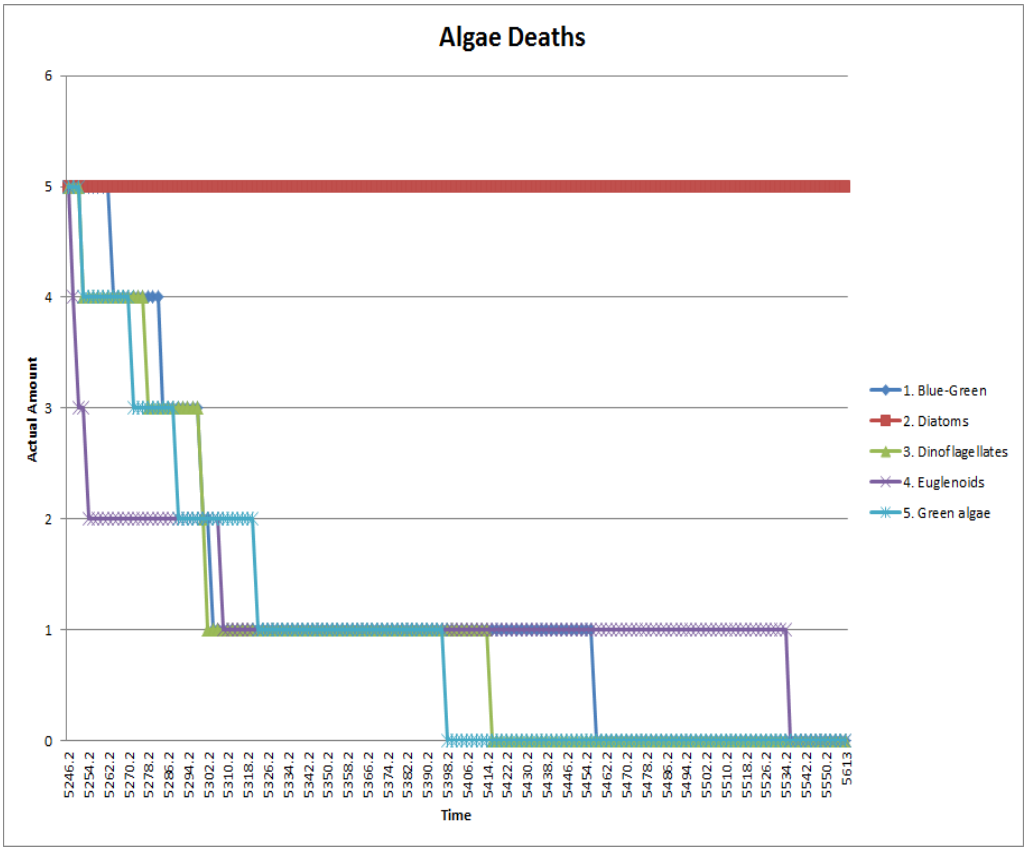
Methods:

1. Research all types of algae so you can optimize your computer program.
2. Set up all your algae in StarlogoTNG so that you can get the best algae to use as an energy source to use.
    a. Have all the algae set up to scatter around in random directions.
    b. Then set up a graph for each of the algae or make one single graph for all of the algae.

    2. See which Algae is left and this algae that's left is the best to use as fuel that scientists will convert from the type of algae.

Results

We ran the model 5-7 times each day we came. We found out that the diatoms were the best to use. It survived the longest out of all of them. Once we started the project each algae started dying off except for the diatoms. The green algae died of first. The dinoflagellates died second, then the blue-green algae, then the euglenoids. The diatoms lived the longest out of the five algae types.



Conclusions

Our hypothesis was wrong because we believed that the green and or blue-green algae would be the best. It turned out that the diatoms were the best. They survived the longest and also do not have any poison in them. We were too convinced it would be the blue-green algae so that we didn't pay attention to o+
ur research. We also focused on the Blue-Green Algae to poison people and that had nothing to do with our project. We were so focused on the blue-green toxins that we completely forgot about the nuclear structure in the dinoflagellates. When we did focus on everything we found out that the diatoms were the in fact the best to use.

Personal Statement

Sarah: This project was a lot of work, but I find that work to be worth it in the end. We will have helped the planet to stop global warming and make a better fuel source for cars.I hope the scientists will use this information to help with making better cars for the planet.
Riley: This project required a lot of hard and continuous work and a lot of time. We all hope to have helped the world become a better place. We all had some ups and downs but I think we all came together in the end and created a great project and we can only hope to win because I'm sure that all of the other projects are really good as well. Good Luck to all!
Dillon: I would like to say that this was a lot of work for all of my team and I would like to say that we all worked hard and we all did the best we did.

Acknowledgments

I would like to thank Mrs.Portillo for always coming, unless she had a Doctor appointment.. She has been here for our team ever since we started on this project. She has passed up practices meant for track, and tennis tournaments to be with us at Socorro. I would like to a thank team #37 for their help when we had trouble using StarlogoTNG.