CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

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Project Number

36771

Project Title

Designing an Environmentally Friendly Fire Retardant and Extinguisher Using Kelp

Abstract

Objectives/Goals

Design an environmentally-friendly fire retardant and extinguisher using Macrocystis pyrifera, a species of kelp, that can substitute toxic chemical fire retardants and extinguishers. Compare the designed fire retardant and extinguisher to other types used today through flame tests and forest fire simulation apparatus.

Methods/Materials

I designed a fire retardant and extinguisher from samples of Macrocystis pyrifera, which were collected at Newport Beach. Macrocystis pyrifera based fire retardant was compared to other fire retardants in a flame test on a Bunsen burner using polyurethane foams and cotton shirt strips. The types of fire retardants were borax, alum, ammonium chloride and sodium bicarbonate, aluminum hydroxide, magnesium hydroxide, magnesium oxide, and Macrocystis pyrifera. The number of swipes over the fire the foam or the cotton strip took to catch on fire was recorded.

Macrocystis pyrifera based fire extinguisher was compared to other fire extinguishers in the market with a forest fire simulation apparatus I created. The types of fire extinguishers were baking soda, soil, Macrocystis pyrifera powder, and dried Macrocystis pyrifera. The number of seconds to fully extinguish the forest fire using each of the fire extinguishers was recorded.

Results

Macrocystis pyrifera#based fire retardant was the third most effective fire retardant for polyurethane foam and the most effective for cotton strips. Dried Macrocystis pyrifera was the most effective for fire extinguishers.

Conclusions/Discussion

The results showed that Macrocystis pyrifera based fire retardant and extinguishers could be an alternative to toxic chemical fire retardants and extinguishers that are being used today. Furthermore, large mounds of kelp overwhelm the California beaches and are left to rot. Using them as a source of natural fire retardant and extinguisher will help the environment by eliminating waste and protecting wildlife from fire.

Summary Statement

Macrocystis pyrifera, a species of kelp, was used to design an environmentally-friendly fire retardant and extinguisher then compared to different fire retardants and extinguishers used today.

Help Received

I used lab equipment at Concordia University under the supervision of Dr. John Kenney. I also got advice from Mr. Ethan Barbour about the scientific process.