



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

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Project Title Edible Membranes to Protect the Environment	
<p style="text-align: center;">Abstract</p> <p>Objectives ABSTRACT Our science project is about protecting the environment by eliminating the use of plastic water bottles and minimizing water wastage, fertilizer runoff in gardening plants with the help of biodegradable and edible polymers.</p> <p>It bothered us when we read that a turtle got a straw stuck in its nose and that a jellyfish thought plastic bottles are their prey, ate them and fell sick. Although water bottles are convenient to carry around, they create hazardous environmental waste. So, we propose the idea of capturing water in an edible membrane for easy portability and eliminating the need for plastic bottles, now people can safely eat their edible water bottles! Another major problem we are facing is water wastage and contamination of water with harmful fertilizers. A lot of water is being wasted when we water the plants, and the fertilizers are also lost to the environment. To solve the problem, we propose the development of degradable membrane-based water pods that spiked with fertilizers slowly release water and plant nutrients directly to the plant. It saves water and is also convenient for us because we can water the plant once in two weeks or a month as opposed to every other day.</p> <p>We used sodium alginate, an extract from seaweed, for making edible water bottles that store water or fruit juices. Sodium alginate is a biodegradable and natural membrane, which you can eat and drink. It has a gelatin-like outside structure, with a liquid inside, it is tasteless. We can harden this gel structure using calcium chloride or calcium lactate. Similarly, we can also add fertilizing chemicals based on nitrogen, potassium, and phosphate to sodium alginate to develop water pods spiked with the required concentration and composition of fertilizers. We proved the concept of water and fertilizer releasing pods using potassium chloride and potassium nitrate solutions.</p> <p>The Objectives of our project are:</p> <ol style="list-style-type: none">1. Protect the environment by eliminating the use of plastic water bottles by replacing them with edible water bottles2. Prevent fertilizer runoff and water wastage due to evaporation by developing biodegradable water pods containing plant nutrients that slowly release water along with nutrients to the targeted plant. <p>Methods Materials:</p>	
Summary Statement Our project is about helping the environment by eliminating the use of plastic water bottles, fertilizer runoff and water wastage.	
Help Received We acknowledge our science teacher Ms. Kanchan Bhandare, Dr. Krishna Sharma, and Dr. Suhasini Kanagala for their help and advice.	