



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

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Project Title The Textile Strength of Homemade Bioplastic	
<p style="text-align: center;">Abstract</p> <p>Objectives Our ecosystem is suffering from a major problem that includes only one thing: plastics. Plastics tarnish our air and cause damage to many sea creatures. Well that is a problem that needs to be fixed. The purpose of my science fair project is to find an alternative for plastics that will not harm the environment. Instead, it will help the environment thrive from it. Plastics are harming our present day world more than anything, and I am trying to find a way to stop this by making a substitute for plastics. My question for my project is "Which alternative bioplastic mixture will be the best replacement for plastics?"</p> <p>Methods First, I created 20 bioplastic samples, 5 samples of each material made. Meaning, I had 5 samples for corn, potato, tapioca starch, and agar. After the bioplastic process was complete, I cut them all into equal sizes, dimensions, and lengths to test their strength. To test their strength, I drilled a hole in the center of the sample and attached a ribbon to it. I then had a hanging scale where I would pull on the sample onto the scale until the sample would break. The scale would give me the amount of weight that I applied in order to break the sample. The weight of the sample signifies how much weight was needed in order to break the sample. I then repeated the strength method for all of the samples and averaged out their average amount of weight/strength in order to break the sample. I also included temperature for a diversity in strength testing of the bioplastic.</p> <p>Results I averaged the amount of strength required to break the sample at each temperature. At 21oC, tapioca had an average strength capacity of 2.3 kg per cm, agar had 6.8 kg, corn had 5.0 kg, and potato had 3.6 kg. At 3oC, tapioca had an average strength capacity of 2.6 kg per cm, agar had 7.5 kg, corn had 6.4 kg, and potato had 3.7 kg. At -15oC, tapioca had a strength of 3.8 kg per cm, agar had 9.3 kg, corn had 8.9 kg, and potato had 4.5 kg. At 38oC, tapioca had a strength capacity of 3.6 kg per cm, agar had 5.4 kg, corn had 5.0 kg, and potato had 2.4 kg. Lastly, at 66oC, tapioca had a strength capacity of 2.8 kg per cm, agar had 3.1 kg, corn had 3.4 kg, and potato had 2.2 kg. In the end agar performed the strongest, than corn, potato, and tapioca starch.</p> <p>Conclusions In conclusion, my hypothesis was incorrect! My hypothesis stated: If I were to make 4 bioplastic mixtures using agar, starch, potatoes, and corn, then the corn would be the strongest because it is a commonly used bioplastic substance that is already manufactured. Agar turned out to be the strongest compound out of all 4</p>	
Summary Statement To help save our environment, I created a bioplastic substance from naturally occurring materials and tested their strength to see which substance performed the strongest.	
Help Received Throughout this project, I have been lucky to have such a supportive teacher who is always willing to help me out whenever I would need it. My family has always been by my side and I appreciate that the most. Lastly, I presented to some seniors for presentational advice.	