



**CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY**

Name(s) Aditi Kiran	Project Number J0616
Project Title Effect of the Amount of Glycerin on the Strength of Starch-Based Bioplastics	
<p style="text-align: center;">Abstract</p> <p>Objectives Bioplastics address some of the environmental and health concerns of synthetic plastics. A plasticizer makes bioplastics flexible and strong. The objective of this project was to test the effect of different amounts of glycerin, a plasticizer, on the weight-bearing capacity of starch-based bioplastics used to produce shopping bags. My hypothesis was, the bioplastic made with 15ml of glycerin would have the highest weight-bearing capacity followed by the bioplastics made with 10ml, 20ml and 25ml of glycerin.</p> <p>Methods To create bioplastic sheets, a mixture of 15ml of glycerin, cornstarch, water, and vinegar was heated until the mixture turned transparent. Then the mixture was transferred to a mold comprised of two metal sheets lined with parchment paper and secured by binder clips. Once cooled, five strips were cut from the bioplastic sheet. To measure the weight bearing capacity, a single strip was looped around the handle of a bucket and lifted. Water was poured into the bucket until the strip broke. The weight of the bucket with water was measured using a spring scale. The steps to measure weight bearing capacity were repeated for the other four strips. The steps to create and measure the weight bearing capacity of bioplastic were repeated for 10ml, 20ml and 25ml of glycerin.</p> <p>Results The results showed that the average weight bearing capacity of the bioplastic strip decreased as the amount of glycerin increased.</p> <p>Conclusions My hypothesis was partially supported. The strips made with 25ml of glycerin had the least weight bearing capacity followed by 20ml and 15ml strips. Surprisingly, the strips with 10ml of glycerin had the highest weight-bearing capacity. Increase in the amount of glycerin made the strips become increasingly gel-like causing it to break easily. Even though the bioplastic made with 10ml glycerin was the strongest, given that it was brittle and hard, it is not best for creating shopping bags. Hence, the bioplastic most likely to be used for making plastic shopping bags would be the bioplastic made with 15ml of glycerin, which was both flexible and firm.</p>	
Summary Statement I tested the effect of the amount of glycerin on the weight bearing capacity of starch-based bioplastics, thus determining the ideal amount of glycerin for making shopping bags.	
Help Received Ms. Sampath provided valuable advice and support. My mother helped in getting supplies and supervised safety procedures in the kitchen.	