



CALIFORNIA STATE SCIENCE FAIR 2008 PROJECT SUMMARY

Name(s) Manali S. Sawant	Project Number S0914
Project Title Starch-Based Biodegradable Materials: It's Time to Go Green!	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of my study is to create a biodegradable packaging material using starch, glycerin, vinegar, and baking soda solution. The quality of the biodegradable packaging material is based on two major standards: usefulness or practicality and the biodegradation rate. All materials will be created using similar procedures, differing only in the type of starch and amount of glycerin used.</p> <p>Methods/Materials To create the material, water, one of the three types of starch (potato, corn, or tapioca starch), vinegar, and glycerin were mixed so that the percentage composition of water was 67%, starch 11%, vinegar 11%, and three various amounts of glycerin 5%, 10%, or 15%. The solution was heated on low. When the mixture started to thicken, baking soda solution was added and the heat was increased. The thickened solution was then poured into molds and baked in the oven at 185 degrees Fahrenheit for four hours. The material was buried in soil for 1 week, 2 week, and 3 week intervals. Observations included the surface area and weight before and after the burial, the number of bacteria on the surface, and the colonial and morphological characteristics. The physical tests on the material included elongation, tensile strength, and torsional strength.</p> <p>Results The weight after removal from soil was less than the initial weight for most materials. The average number of bacteria on the surface of the material increased with the period of time the material was buried in the soil. The greater the level of glycerin, the weaker the material was and the less load it could hold. For potato and tapioca starch-based materials, torsional strength improved with higher glycerin levels. Glycerin added to the flexibility of the material.</p> <p>Conclusions/Discussion The materials biodegraded since their surface area after removal from soil was less than the initial surface area. The tapioca starch-based materials exhibited the fastest biodegradation rate, but they were the weakest. Potato starch-based materials took the longest time to biodegrade, however, they were the strongest. The strength and biodegradation rate of the corn starch-based materials were in between that of the potato and tapioca starch-based materials. This study suggests that potato starch with 5% glycerin content may potentially be a practical component in starch-based biodegradable materials.</p>	
Summary Statement The purpose of this study is to create practical biodegradable packaging materials with varying concentrations of glycerin and different types of starch.	
Help Received Ms. Alonzo, my mentor, guided me through this project and allowed me to work at lunch, after school, and seventh period. I would also like to thank other teachers at Lynbrook for their support. My parents encouraged me and helped me acquire all the needed materials.	