



# CALIFORNIA STATE SCIENCE FAIR 2017 PROJECT SUMMARY

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| <b>Name(s)</b><br><b>Anirudh Venkatraman</b>  | <b>Project Number</b><br><b>J0623</b> |
| <b>Project Title</b><br><b>Production of Bio Plastics from Vegetable Waste</b>  |                                       |
| <p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b><br/>The goal of this experiment was to produce bioplastics from vegetable wastes like banana peels, potato peels, and avocado pits. It's been estimated that 200,000 barrels of oil are used each day to make plastic packaging for the United States alone. Also, oil based plastics cannot be rid easily and create landfills or environmental pollution. Bioplastics can replace petroleum based plastics and can be made from vegetable wastes that contain starch.</p> <p><b>Methods/Materials</b><br/>The process of creating bioplastic was to first collect the vegetable waste, then extract the starch through a process of making a homogenous solution, filtration and sedimentation. The starch extracted was then mixed with additives such as glycerol (to add flexibility) and vinegar (to break down the starch molecules), and heated over a stove so that the glucose molecules bonded and formed polymer chains. Then, the gel-like plastic formed was baked, and dried in an oven at 250 degrees F for ½ hour. A tensile test was conducted on the plastics using a spring scale and decay test was done over 10 days.</p> <p><b>Results</b><br/>My results showed that avocado pits produced the most starch at 59% of raw waste, plastic from banana peels produced the most flexible plastic at 360 degrees rotation, and plastic from potato peels produced the strongest plastic at 25 N. Plastic from avocado pits showed a layer of fungus after 7 days. Plastic from potato and banana peels did not decay at all.</p> <p><b>Conclusions/Discussion</b><br/>My conclusion is that vegetable wastes that contain starch can be used for making bioplastics, although the properties of the bioplastics will be different in terms of strength and flexibility and durability. The ratio of the amylose to amylopectin (both starch molecules) is what gives each plastic its unique property. Plastic from potato wastes can be used for making plastic containers or prosthetics because of its strength and durability. Plastic from banana peels can be used for making plastic bags and tubes due its flexibility and durability. The avocado pits plastic can be used for making short-term packaging materials that can be discarded.</p> |                                       |
| <b>Summary Statement</b><br>My project is about producing Bio Plastics from different types of vegetable wastes that contain starch and evaluating their properties.  |                                       |
| <b>Help Received</b><br>Mrs Shalini D'Souza (Science Teacher), Challenger Sunnyvale. Madhumita Mallik (my mother) for getting supplies and use the kitchen as a lab.  |                                       |