# Incorporation of Coconut Derivatives in Bio-Plastic Sheet Formation

Boge, Owen (School: Beckman Catholic High School)

Microplastic contamination via food container packaging and food itself is a pressing concern related to production systems, agriculture, and overall environmental health. Previous research attempted to observe any presence of petroleum-based microplastics in animal tissues through digestion methods, microscopy, and FTIR technology. Stemming from the results, an alternative to petroleum plastics was of interest for biodegradability and raw inputs. Current research investigates the possibility of creating a biodegradable plastic film using coconut-based materials as increased production of coconut milk and oil has spiked waste issues. Presently a high percentage of coconut waste is burned or dumped in landfills. Multiple iterations and formula alterations were prepared by heating combinations, forming a thin film, and allowing it to dry at room temperature. Films were evaluated for flexibility, texture, and strength. Samples of individual formulas were placed in distilled water and observed over a 7-day period. Samples were observed with a light microscope throughout the process. Degradation liquid was evaluated by a spectrophotometer, then filtered and massed. Formulas with high coconut flour content created fragile, crumbly material, while minimal flour formulas had increased flexibility but were often sticky and displayed extreme elasticity. Glycerin and cornstarch improved the overall bond compared to coconut-only formulations. Coconut incorporation created biodegradable plastic with ingredient ratios strongly impacting performance outcomes. The challenge of consistent strength and flexibility remains. This study shows the potential of coconut-based films and supports future research into biodegradable polymers to protect food systems and environmental health.

**Awards Won:**