



CALIFORNIA SCIENCE & ENGINEERING FAIR 2018 PROJECT SUMMARY

Name(s) Hari Subramanian	Project Number S0623
Project Title Effect of Ultrasound Treatment on Tomato Pomace	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this study is to understand the effect of ultrasound assisted extraction (UAE) of tomato pomace to extract soluble solids.</p> <p>Methods/Materials Tomato pomace was collected from 2017 processing season from a tomato processing factory based in California. The sonication horn used was from Heat Systems Ultrasonics, 24KHz, 200W, and maximum amplitude of 120 microns. Soluble solids were measured using a refractometer (Brix meter) with the capability of measurement till the nearest hundredth. A thick walled glass jar was used as the reactor to hold the mixture during UAE treatment. Two solid-liquid ratios 1:4 and 1:5 were used for the treatment. UAE treatment was undertaken for 30 minutes, with soluble solids measured every 5 minutes. At the end of every 30 minute treatment, the mixture was taken to a pressing machine to separate the juice from the fiber and seed in the pomace. Soluble solids extracted from the combined steps was measured.</p> <p>Results UAE treatment increased the extraction rate and mass of soluble solids extracted. Rate of extraction increased with intensity (measured as amplitude) of UAE. 1:4 ratio of solids to liquid ratio was sufficient for the UAE to be effective. We were able to extract around 50% of the available soluble solids at the maximum amplitude of 60 microns which was 1.89g/100g of pomace. We observed that this was 62% increase when extraction was performed without UAE. The rate of extraction followed a logarithmic model. We estimate the value of the extracted soluble solids is equivalent to \$ 630,000 per million tons of tomatoes processed.</p> <p>Conclusions/Discussion Tomato pomace is currently considered as a by-product or waste from the tomato processing industry. This study shows that UAE can be used to significantly increase the rate and mass of soluble solids extraction present in tomato pomace. This study can be used as a base for industrial scale up. We estimate the value of the extracted soluble solids is equivalent to \$ 630,000 per million tons of tomatoes processed.</p>	
Summary Statement Can ultrasound treatment act as a process intensification method for extracting soluble solids from tomato pomace?	
Help Received Dr. Leonard Fong helped me with the set up of the UAE treatment. My dad helped with the value estimation and creation of the presentation.	