CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
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Project Number
J0633

Project Title
Inhibiting the Enzymatic Browning of Avocados

Abstract

Objectives/Goals
The objective was to determine which preservation method would best inhibit the oxidation reaction that allow melanins to form on a cut avocado and turn the surface brown.

Methods/Materials
Used fifteen avocados cut into halves and applied six preservation methods. The methods used were pit, lemon juice, olive oil, onion, and plastic wrap. A plain avocado was used as the control method. The avocados were placed in identical plastic containers and stored in the refrigerator after applying the preservation method. A three day experiment was conducted, checking the avocados every nine hours and recording the data. The results were graded on a scale of 1-10 to estimate the level of enzymatic browning with 1 being no browning and 10 being completely brown on the surface.

Results
The lemon juice method performed the best. It remained at an acceptable level of browning for 36 hours where the other methods lasted between 18 and 27 hours. The ascorbic acid in the lemon juice slowed the oxidation better than the other methods by inhibiting the oxygen from reacting with the phenolic compounds and reducing the activity of the enzymes through lowering the pH. The other methods produced less effective results with the onion method slighter better than the others.

Conclusions/Discussion
My hypothesis that the onion method would slow the enzymatic browning of a cut avocado the most was proven incorrect. The use of ascorbic acid from the lemon juice was superior to the other methods tested by 33% to 100%. The propanethiol S-oxide gas released from the onion did not perform as expected. Opening the containers to observe the avocado dissipated the gas and made it less effective. In conclusion, this experiment shows that the best method inhibits the enzymatic reaction in multiple ways. S-oxide gas may have worked but the introduction of more oxygen every nine hours allowed the enzymes to stay active and continue the browning process. The ascorbic acid from the lemon juice inactivated the enzyme activity by reducing the pH and slowed the oxygen from reacting with the polyphenol oxidase enzymes.

Summary Statement
My project is about which preservation method inhibits the enzymatic browning of cut avocados the best.

Help Received
My mother supervised for safety. My father taught me how to develop the graphs. My mother, father, and sister helped me judge the relative level of browning for each sample during the experiment.