CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY

Name(s)

Michael Baghdassarian

Project Number

J1501

Project Title

What Isolated Substances in Manuka Honey Can Preserve Raw Unrefrigerated and Unpasteurized Milk from Spoiling?

Abstract

Objectives

The objective of this project was to identify which substances in manuka honey give it its anti-bacterial properties. It was also to determine if the same beneficial effects of manuka honey (from my previous experiments) could be independently replicated with only two isolated chemical substances, methylglyoxal and hydrogen peroxide.

Methods

1.Pour raw milk into sixteen beakers, two with only raw milk, one manuka honey (15mL), one manuka honey (5mL), two hydrogen peroxide (1.2mL), two hydrogen peroxide (2.4mL), two methylglyoxal (0.5mL), two methylglyoxal (1.0mL), two methylglyoxal (0.5mL)/ hydrogen peroxide (1.2mL), two methylglyoxal (1.0mL)/ hydrogen peroxide (1.2mL) 2. Stir the raw milk to mix components. 3. Let all the beakers sit in room temperature with no seal. 4.Check pH using a digital pH meter.

Results

The results of the experiment shows that methylglyoxal and hydrogen peroxide are the main contributors to manuka honey's antibacterial properties. Methylglyoxal was significantly better at preserving raw unrefrigerated milk and was even more effective than a combination of hydrogen peroxide and methylglyoxal. While hydrogen peroxide was effective in preserving milk the methylglyoxal by itself was significantly better and was able to preserve the milk for over 14 days.

Conclusions

In previous experiments I was able to show that manuka honey can preserve raw unpasteurized milk for a much longer period compared to regular honey or agave nectar. This project looks at which substance in manuka honey was contributing to my previous results. The results of the experiment clearly show that methylglyoxal and hydrogen peroxide are the main contributors to manuka honey's antibacterial properties but after several trials it was methylglyoxal that was able to preserve the raw milk for a longer period than the manuka.

Summary Statement

I showed that methylglyoxal and hydrogen peroxide where two important substances in manuka honey which were responsible for its antibacterial properties and would help it preserve raw unrefrigerated milk.

Help Received

All the experiments and data were compiled by me, however the digital pH meter and methylglyoxal were borrowed from Glendale Community College head of science department, Dr. Sevada Chamras. ACCU Bio-Chem Lab analyzed my manuka honey sample to see how much hydrogen peroxide it contains.