



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Kerris L. Lassley	Project Number J2011
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Project Title
Which Household Substance Will Increase the Ice Nucleation Process of Dew on Oranges?

Abstract

Objectives/Goals
The purpose of my science project is to determine which household substance will increase the ice nucleation process of dew on oranges. The reason I am doing this investigation is to find out how to speed up the freezing process of dew on oranges. By doing this I will find a method for farmers to protect their crops from frost damage, which causes farmers to lose thousands of dollars each year.

Methods/Materials
1.LABELS 10.FLOUR
2.FREEZER 11.DISH SOAP
3.SPRAY BOTTLE 12.SALT
4.MEASURING CUP 13.FLOUR
5.MEASURING SPOON 14.SUGAR
6.FREEZER THERMONITER 15.BAKING SODA
7.HYDROMETER 16.KNIFE
8.REFRACTOMETER 17.JUICER
9.BEAKER 18.WATER

I am using water droplets in my investigation to determine how to speed up the freezing process of dew on oranges. In the first group for my control I will be spraying plain droplets of water on oranges and placing them in the freezer and time it to see how long it takes for frost damage to occur. Then I will record results in a data book. I will repeat test with salt, baking soda, flour, sugar, and dish soap. Performing 10 tests per variable.

Results
The results of my investigation to determine which household substance will increase the ice nucleation process of dew on oranges show that all of my variables increased the freezing process, causing less damage to the oranges.

Conclusions/Discussion
After completing my project, which household substance will increase the ice nucleation process of dew on oranges, I have found my hypothesis to be incorrect. The dish soap did increase the process of freezing on oranges however the flour was most effective. Water by itself froze quickly, and caused significant damage in 24 hours, along with the other solutions. The baking soda, sugar, dish soap, and salt solutions did increase the freezing process slightly, causing less damage to the oranges.

Summary Statement
I have tried to speed the freezing process by adding household substances to water to see if it increases the freezing process which will allow smaller ice crystals to form causing less damage to the fruit.

Help Received
Mother helped with typing