CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)

Kerris L. Lassley

Project Number

34199

Project Title

Which Household Substance Will Increase the Ice Nucleation Process of Dew on Oranges? Year 2 Study

Abstract

Objectives/Goals

The purpose of this experiment is to determine which household substance will increase the ice nucleation process of dew on oranges in orchards, with wind machines and without. In a previous experiment it was determined that flour had the greatest result in protecting oranges when a freezer was used to simulate a freeze. This study will provide a more accurate result due to the oranges remaining attached to the tree, during an actual freeze. This investigation is to find out how to speed up the freezing process of dew on oranges. By doing this, a method will be determined to allow farmers to protect their crops from frost damage, which causes valley farmers to loose thousands of dollars each year depending on the severity of low temperatures.

Methods/Materials

Test Set-up/Mix each independent variable with distilled water to create a 3:1 dilution solution. Applied independent variable solution mixtures to each test orange tree 1/day for 3 days prior to predicted freezes. Administration/Label and designate each tree with yellow tape to avoid any human contamination. Spray each tree completely, including trunk, branches, leaves, and fruit in orange grove with a wind machine and without.Sample collection and processing/After freeze exposure harvest 10 oranges from each tree, section each orange to assess observable freeze damage to fruit by %, log the results in data book. Measure sugar levels with a refractometer and hydrometer in Degrees Brix log the results in data book.

Results

The results of this investigation show that all of my variables increased the freezing process, causing less damage to the oranges. Water with carbon particles had the best affect on increasing the freezing process.

Conclusions/Discussion

In conclusion, by adding carbon particles to water it will increase the ice nucleation process of dew on orange trees. Still not clear if it was the thickness of the droplets or the film that increased the freezing process, by coating the leaves, branches and oranges. This process caused a thermal affect to the trees, protecting the fruit. Research and testing indicate by speeding up the ice nucleation process it will produce smaller crystals, allowing them to melt quicker and cause less damage to oranges, while providing hardiness to the tree. Further research and testing will provide a solution that would help farmers protect crops from frost damage, saving thousands of dollars lost each year.

Summary Statement

Research and testing indicate by speeding up the ice nucleation process it will produce smaller crystals, allowing them to melt quicker and cause less damage to oranges and the trees.

Help Received

mother helped with photos and Josh Marshall supplied Orange Grove