



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

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Project Title Is Your Watermelon a "Lemon"? Can "Tapping" a Watermelon Really Predict How Ripe or Sweet It Is?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to determine scientifically if percussing a watermelon predicts how sweet or ripe it is. I hypothesized that ripe watermelons transmitted a different sound wave frequency than unripe watermelons when percussed.</p> <p>Methods/Materials I tested 10 watermelons to find the average percussion frequency transmitted. I built a pendulum which could percuss a watermelon with constant energy each time it was struck. I recorded physical characteristics of each watermelon, such as density and volume (using the water displacement method). A microphone was set up to record the sound that traveled through the watermelon on the side opposite to where it was struck. The microphone was connected to a computer, which had an oscilloscope program. The watermelon was struck with the pendulum. The sound waves transmitted were recorded and converted into a graphical wave form by the oscilloscope program. Using this graphical wave form, I determined the sound wave frequency (percussion frequency) that was transmitted through the watermelon. This was repeated 10 times for each watermelon. I tested two controls, a wooden block and an air filled box, in the same manner. I cut and tested each watermelon's sugar content by taking out some watermelon juice and testing its sugar content using a refractometer. The sugar content was tested 3 times for each watermelon. The watermelon's sugar content and the percussion frequency were then correlated.</p> <p>Results Ripe or sweet watermelons transmitted a different sound wave frequency than unripe watermelons. The ideal percussion frequency for ripe or sweet watermelons was from 1000 to 1600 Hertz. If the density was high, then the watermelon was sweet. Personal sized watermelons were sweeter than large watermelons. Other physical characteristics of the watermelon did not correlate with its sweetness.</p> <p>Conclusions/Discussion My hypothesis that ripe watermelons would transmit a characteristic sound wave frequency was supported. For a sweet watermelon the ideal percussion frequency was between 1000 and 1600 Hertz. These results could be helpful to farmers to determine whether their crops are ripe. This would also be beneficial to consumers as they can now take home a sweet fruit. An extension to this project would be that I could create a hand-held device that could use ultrasound waves, record its reflected waves, and correlate them with the sugar content, all in one device.</p>	
Summary Statement My goal was to determine if percussing a watermelon really predicted how sweet or ripe it was.	
Help Received My family helped with the taste test and the poster; my grandfather helped with the building of the pendulum.	