



**CALIFORNIA STATE SCIENCE FAIR  
2013 PROJECT SUMMARY**

<b>Name(s)</b> <b>Ivonne A. Shih</b>	<b>Project Number</b> <b>S1922</b>
<b>Project Title</b> <b>The Effects of Ethephon, Its Decomposition Products, pH, and Calcium on Berry Cracking in Flame Seedless Grapes</b>	
<b>Objectives/Goals</b> The purpose of this study was to investigate the effects of the plant growth regulator ethephon, its decomposition products, and pH in increasing cracking in flame seedless grape berries. In addition, this project investigated the effectiveness of calcium in reducing cracking.	
<b>Abstract</b> <b>Methods/Materials</b> To induce cracking, grape berries were completely immersed in solution, with 30-55 berries in each treatment. At 1, 2, 4, 7, 20, and 47 hours, berries were inspected for macroscopic cracks; cracked berries were recorded and then discarded. To test the effect of pH, solution pH was increased by adding PBS buffer or sodium hydroxide (NaOH). The effect of ethylene (a decomposition product) was tested by exposing berries to air or 100ppm ethylene gas. After 48 hours, all remaining uncracked berries were soaked in water and inspected at the set time intervals. Berry cracking was compared in terms of mean cracking time.	
<b>Results</b> Neither ethephon's decomposition products (chloride, phosphate, and ethylene) nor its buffered analogs (phosphorous acid and ethylphosphonic acid) significantly increased berry cracking. Acidic solutions, including ethephon, promoted cracking. Calcium was effective in reducing ethephon-induced cracking only when in the same solution as ethephon, and increasing the pH of ethephon solution suppressed cracking even more than adding calcium did.	
<b>Conclusions/Discussion</b> The low pH of ethephon, rather than the chemical itself, appears to be one of the main reasons for increased cracking in grapes. Adding calcium and increasing the pH of ethephon solution are both potential practical solutions to reduce cracking. Cracking is a costly problem that reduces fruit quality and storage life; this study will help identify a practical solution to cracking in grapes and other fruits, benefiting industry and consumers.	
<b>Summary Statement</b> This project investigated the effect of ethephon and pH in promoting grape berry cracking and the effectiveness of calcium in suppressing cracking.	
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