



**CALIFORNIA STATE SCIENCE FAIR  
2016 PROJECT SUMMARY**

<b>Name(s)</b> <b>Juan A. Velasquez</b>	<b>Project Number</b>  36754
<b>Project Title</b> <b>The Effects of Ultraviolet Radiation on the Growth of Bacteria</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> This investigation tests if ultraviolet (UV) radiation decreases the bacterial load on the surface of produce such as tomatoes and broccoli as compared to regular washing of produce.</p> <p><b>Methods/Materials</b> Tomatoes and broccoli were divided into six test groups: washed produce, unwashed produce, UV exposed groups for 5, 10, 20 and 30 minutes. An ultraviolet light bulb with wavelength of 254 nm was used for the UV exposed groups. Four petri-dishes were inoculated per test group for both tomatoes and broccoli. All petri-dishes were incubated for total of 72 hours in homemade incubator maintaining a constant temperature of 85 degrees that was measured with a digital thermometer. An electric space heater was used to control for temperature.</p> <p><b>Results</b> The number of bacterial colonies per square centimeter were recorded at 24, 48, and 72 hours for all test groups for both tomatoes and broccoli. Unwashed broccoli grew the most bacteria per square centimeter and washed broccoli grew the second highest number of bacteria. UV exposed groups grew the fewest number of colonies per square centimeter. Broccoli exposed to 30 minutes of UV radiation grew no bacterial colonies. Unwashed tomatoes grew many colonies but not as many as the unwashed and washed broccoli groups. There was no significant difference in number of colonies between the washed and UV exposed groups of tomatoes.</p> <p><b>Conclusions/Discussion</b> Ultraviolet radiation significantly decreased the bacterial load on the surface of tomatoes and broccoli. This effect was most significant in the broccoli groups which demonstrated that washing was not as effective in decreasing the bacterial load on the surface of the produce. Also, UV radiation exposure duration had a significant effect in decreasing bacterial load: the longer the exposure time, the lower the number of bacterial colonies. This effect was not as pronounced in the tomato group and it is believed that produce surface impacts the surface bacterial load. I accomplished demonstrating that UV radiation can significantly decrease the bacterial load on the surface of vegetables, specifically produce that do not have smooth surfaces and this can be more effective than washing produce.</p>	
<b>Summary Statement</b> I showed that UV radiation is more effective in decreasing the bacterial load on the surface of produce than washing the produce.	
<b>Help Received</b> I designed the study but my mother helped me build the homemade incubation chambers.	