



**CALIFORNIA STATE SCIENCE FAIR  
2007 PROJECT SUMMARY**

<b>Name(s)</b> <b>Trenton D. Wilder</b>	<b>Project Number</b> <b>J1439</b>
<b>Project Title</b> <b>The Spinach Solution</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> I did my project on ways of washing spinach to eliminate bacteria. I used 5 different washes. My hypothesis was if I washed the spinach with a salt water solution then there would be fewer bacteria than the other washes. My goal was to see how to help people decrease bacterial contamination on their food.</p> <p><b>Methods/Materials</b> Method:1-Separate unwashed spinach into 5 piles; 2-Mix 15g salt with 250ml distilled water; 3-Swirl 3 spinach leaves in solution for 5sec; 4-Place leaves on paper towel; 5-Moisten sterile swab in Easygel test medium; 6-Swab 2cm of 3 spinach stems &amp; 2cm up veins of the leaves; 7-Put swab back into test medium; 8-Swirl in test medium for 5 sec; 9-Take swab out &amp; press against inside of bottle; 10-Pour test medium into Petri dish; 11-Mark test number on outside of Petri dish; 12-Let incubate at 26.67-32.22 degrees C. for 48hrs; 13-Count each coliform colony; 14-Repeat test 6 times; 15-Take unwashed spinach, repeat step 1 &amp; 4-14; 16-Take unwashed spinach leaves, repeat step 1, using 250ml distilled water, &amp; steps 3-14; 17-Take unwashed spinach, repeat step 1, using 250 ml tap water, &amp; steps 3-14; 18-Take unwashed spinach, repeat step 1, using 250ml tap water with 15ml vegetable spray, &amp; steps 3-14; 19-After incubation bleach Petri dishes so there is no unwanted contamination. Independent variables were the way I washed the spinach. Dependent variables were the amount of colonies. Control was the unwashed spinach test. Constants were methods used to obtain bacterial samples &amp; incubation time &amp; temperature. Materials:30 sterile Petri dishes; 30 sterile swabs; 30 bottles of Easygel test medium; 6 bunches of unwashed spinach; distilled water; tap water; salt; 6 clean plastic bowls to hold solutions; fireplace for incubation; thermometer; marker; timer; paper towels; vegetable cleaner; bleach.</p> <p><b>Results</b> On average the least amount of bacteria was on spinach washed in salt and distilled water,619 bacteria colonies. Second was spinach washed in vegetable spray and tap water,762 colonies. Distilled water wash left 865 colonies. Tap water left 911 colonies. The unwashed control had 1851 bacteria colonies.</p> <p><b>Conclusions/Discussion</b> My hypothesis was correct. The 6% salt solution had the least amount of bacteria colonies. Future experiments could be to use increments of salt in the same amount of water or test ingredients in the veggie spray to see which has the best bacteria removal.</p>	
<b>Summary Statement</b> Testing the amount of bacteria on spinach leaves after washing them in different solutions to determine which eliminates bacteria the best.	
<b>Help Received</b> My mother helped with the typing and took the photos; obtained information from Riverside County Environmental Health on prior bacterial outbreaks caused by produce; I spoke with Geoff Shouse of the Biology Dept. at UCR about the best way to take my bacterial samples.	