



**CALIFORNIA STATE SCIENCE FAIR  
2014 PROJECT SUMMARY**

<b>Name(s)</b> Avantika Vivek	<b>Project Number</b> <b>S1519</b>
<b>Project Title</b> <b>The Effects of Neem Leaf, Calendula Petal, Burdock Root, and Turmeric Extracts on the Prevention of Hand Bacteria Growth</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The purpose of this experiment was to determine the effects of four different herbs (neem leaves, calendula petals, burdock root, and turmeric) on their use as a viable defense against the growth of bacteria on the hands. <b>Methods/Materials</b> In this experiment, four different hot extracts, one per herb, were set up to be used as rinses, with hand soap and hand sanitizer used as two comparative washes. Three swabs were taken of the subject's hand before washing, as controls, with ten swabs taken as trials after the subject had washed for one minute with the cleansing substance. These swabs were plated onto Petri dishes, and left to incubate for five days, after which they were removed and the colonies were counted on each plate. <b>Results</b> The percentage decreases from initial control colony averages to trial averages were that calendula had a 79.8% decrease, neem had a 92.01%, burdock had 37.27%, turmeric had 92.04%, soap and water had a 12.21%, and hand sanitizer had a 99.08% decrease. The standard deviations for the substances were that calendula had 7.75, neem had 2.90, burdock had 11.38, turmeric had 5.59, soap and water had 18.49, and hand sanitizer had 0.40. <b>Conclusions/Discussion</b> The data did not support the hypothesis, as turmeric had a 92.04% decrease from the control average of colonies, but had a higher average deviation than neem, at 92.01% decrease, whereas burdock only had a 37.20% decrease. This could have meant that although turmeric performed slightly better than neem, neem was more reliable in terms of decreasing colony growth over periods of time, while burdock did perform the least effective of the herbs tested. On the other hand, the trials done with hand sanitizer had a 99.08% decrease, as the effectiveness of alcohol-based cleansers exceeded that of the natural extracts, but it should also be considered that alcohol-based cleansers cause long-term damage to skin. Although hand sanitizer yielded the highest results, at 99.08% decrease, the effects of both neem and turmeric on the bacterial colonies represents a starting point for further research into their effects on bacteria	
<b>Summary Statement</b> My project is about studying the effectiveness of previously untested natural substances in the prevention of hand bacterial growth.	
<b>Help Received</b> Mrs. Gowri Selvan helped with experimental design and mentoring; mother was subject used; father helped to review layout and to set up incubator; Mr. Michael Antrim reviewed report	