



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

<b>Name(s)</b> Natalie J. Wu-Woods	<b>Project Number</b> <b>J1732</b>
<b>Project Title</b> <b>Do Essential Oils from Herbs Inhibit the Growth of Bacteria?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My question is "do essential oils from herbs have an effect on bacteria growth?" I will be focusing on growth of E. coli on bacterial plates to test this experiment.</p> <p><b>Methods/Materials</b> I used the disc diffusion assay to measure the effect of the oils on E. coli growth. I diluted essential oils from seven different herbs (Cilantro, Sage, Anise, Rosemary, Cinnamon, Thyme, and Oregano) with dimethyl sulfoxide (DMSO). I made five different concentrations -- 100%, 50%, 20%, 10% and 5% in DMSO. I used a micropipettor to put ten microliters of diluted oil onto a paper disc. The is put onto a plate with bacteria in it. The plates are placed into an incubator at 37 degrees Celsius. After 20 hours of incubation I measured the distance of the clear ring from the paper disc that does not have bacteria growth, record data and take pictures.</p> <p><b>Results</b> I tested the herbal oils from Cilantro, Sage, Anise, Rosemary, Cinnamon, Thyme, and Oregano at 50% concentration. I did two trials for Oregano, Thyme, and Cinnamon in the second round after eliminating Cilantro, Sage, Anise, and Rosemary because they didn't work well. Oregano was better at killing bacteria at 20% concentration than the other oils. At 10 percent concentration, Oregano worked much better. I also test Oregano at a 1% concentration and found it still inhibited bacteria from growing on the plate</p> <p><b>Conclusions/Discussion</b> Do oils extracted from herbs block bacterial growth? In my experiments, I tested oils from seven different herbs for their effect against bacteria. Cilantro, Sage, Anise, and Rosemary did not inhibit bacterial growth, while Cinnamon, Thyme, and Oregano oils had clear inhibition rings where bacteria did not grow. Based on my background research, I knew Cinnamon would work very well. For Thyme I did the same dilutions as Cinnamon. In summary, Thyme worked better than Cinnamon but not nearly as well as Oregano. Oregano worked at a lower concentration compared to any of the other oils. At 1% I still saw a measurable ring of inhibition. The outcome for 20% Oregano is about equal to Thyme's 50%. This shows Thyme is not as strong as Oregano but fairly strong compared to Cinnamon. In conclusion, Cilantro, Sage, Anise, and Rosemary, did not work very well. One the other hand, Cinnamon, Thyme, and Oregano worked great.</p>	
<b>Summary Statement</b> I measured the ability of essential oils from 7 different common herbs to inhibit the growth of E. coli on bacterial plates.	
<b>Help Received</b> My Father helped design the experimental method and I used lab equipment under his supervision at Inscent, Inc.	