



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Michelle Q. Xu	Project Number J1613
Project Title Exploring the Use of Natural Herbs as a Novel and Safe Fruit and Vegetable Wash	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Fruits and vegetables are an important part of a healthy diet. However, harmful bacteria may contaminate them. Nearly one-third of the major foodborne illness outbreaks were caused by contaminated fruits and vegetables. Currently there is no solution that effectively removes the contaminants from fresh products and is also free of harmful chemicals. My project is to explore the use of natural herbs as a novel and safer fresh fruit and vegetable wash.</p> <p>Methods/Materials The herbs used in this experiment are Coptis Root (CR), Isatis Root (IR), Flos Lonicerae (FL), and Fructus Forsythiae (FF). After extracting herbs with the water boiling method, the diffusion test was performed to determine herb samples inhibitory activity. The test was repeated 3 times. Next, I chose the herb with large zone of inhibition to continue with the dilution test to determine herb minimum inhibitory (MIC) and minimum bactericidal concentration (MBC). At last, I soaked fresh fruit in the herb solution to see if the bacterial contamination can be removed from fruit surface. Grape tomatoes were used as the fresh fruit samples. Agar plates and broths were prepared as a medium for growing E-coli bacteria. Beakers, test tubes, forceps, a weight scale, mortar/pestle and cotton swabs were used in this experiment.</p> <p>Results CR and FL showed larger diameters of growth inhibition zones (16mm, 14mm) and are more effective than FF (9mm). IR had no zones of inhibition. FL is chosen to continue with the dilution test and fruit wash test for its favorable taste. Its MIC value is 0.0625g/ml and MBC value is 0.25g/ml. The fruit wash results showed that the agar dishes with swabs from tomato surfaces soaked in 50% and 100% FL solutions had no sign of bacteria, while those soaked in water did have bacteria.</p> <p>Conclusions/Discussion The tests showed that CR and FL effectively inhibited the growth of tested E-coli. MIC/MBC values and the results from the fruit wash test indicated that the experiment supports my hypothesis that natural herbs such as Flos Lonicerae can indeed remove contamination effectively to make a novel fresh fruit and vegetable wash. The solution is not only for cleaning fresh fruit and vegetables, but may also make a great cleaner for countertops, knives and cutting boards. This may lead to a safer and natural approach of minimizing the risk of foodborne illnesses associated with fresh products.</p>	
Summary Statement Exploring the use of natural herbs as a novel and safe fruit and vegetable wash to prevent foodborne illnesses	
Help Received The experiments were preformed at A Schmahl Science Workshop under the supervision of Mr. Sean Carroll who also helped me prepare agar dishes. Dr. Stephanie Yaung/MIT reviewed my project test plans and the results with mentoring via email. Mom helped to buy the herbs. Dad helped me on the display	