



**CALIFORNIA STATE SCIENCE FAIR  
2011 PROJECT SUMMARY**

<b>Name(s)</b> Riley A. Nolan	<b>Project Number</b> <b>J1927</b>
<b>Project Title</b> <b>The Impacts of Leaf Surfactants on Water Absorption Rates in Soil</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> While watering the yard, I noticed the leaves beneath an African Sumac tree foamed up whenever water hit them. This made me wonder about the leaves of that tree. I did some research and found that African Sumacs contain Saponins which contain surfactants. Surfactants are chemicals that reduce surface tension, potentially allowing water to absorb into the soil more effectively. I designed a test to determine if a variety of native and non-native plant leaves contained surfactants. I hypothesized that drought resistant plants related to the African Sumac would have the fastest percolation rates, and plants native to areas that receive more precipitation would have slower percolation rates.</p> <p><b>Methods/Materials</b> Materials in my experiment included 12 varieties of leaves, five gallons of soil, distilled water, a hygrometer, thermometer, soil moisture meter, and various containers for measurement. A liquid solution was made from each variety of leaves and poured over 240 cc of chaparral soil. The amount of water exiting each soil sample was measured at one minute intervals.</p> <p><b>Results</b> My test results showed the Lemonade Berry had the fastest percolation, followed by Sugar Bush, Cottonwood, Black Sage, Narrow Leaf Willow, Toyon, African Sumac, Liquid Amber, Laurel Sumac, Sycamore, Coast Live Oak, and Coffee Berry.</p> <p><b>Conclusions/Discussion</b> The African Sumac, Lemonade Berry, and Sugar Bush come from the order Sapindale. All Sapindales contain saponins. Since these three plants are from drought prone areas, I believe that saponins are an adaptation to drought. Future testing could include comparing leaf surfactants to testing commercial surfactants, more varieties of plants, and testing the partially decomposed leaf litter found at the base of each plant.</p>	
<b>Summary Statement</b> My project investigated naturally occurring surfactants in a variety of native and non-native leaves and their impacts on water absorption rates in soil.	
<b>Help Received</b> Thanks to my parents and science teacher for guidance and support. I would also like to thank Valerie Phillips from the Las Pilitas nursery for telling me where I could find various leaves.	