



CALIFORNIA STATE SCIENCE FAIR 2011 PROJECT SUMMARY

Name(s) Julie A. Courtney	Project Number S1109
Project Title The Proof Is in the Roof	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to discover which roof worked best in cooler temperatures and warmer temperatures and to determine whether the use of a plant roof could be a solution to the Urban Heat Island Effect.</p> <p>Methods/Materials I constructed four model buildings by placing different materials on four wooden boxes, all the same shape and size. I put black asphalt roofing material on the 1st box, grey on the 2nd, and white on the 3rd. On the 4th box, I put a wooden barrier on the edge of the top (to hold the soil) and then planted miniature cactus plants inside the barrier. I placed a thermometer in each box, put the boxes on a table outside in direct sunlight, and set another exterior thermometer outside to record the air temperature. Every day for twenty days in February at 7 a.m. and 3 p.m. I opened each box and quickly recorded the temperature of each thermometer, remembering to also record the exterior thermometer's temperature. I then repeated this process again in March for eighteen additional days.</p> <p>Results The temperature recordings at 7:00 a.m. in February proved that the plant roof box was warmest, followed by the black, grey, then white. The temperature recordings at 7:00 a.m. in March indicated that the black roof box was warmest, followed by the plant, grey, then white. The overall averages for the 3:00 p.m. temperature recordings in both February and March showed that the plant roof box was coolest followed by the white, grey, then black.</p> <p>Conclusions/Discussion For the most part, my hypothesis that the eco-friendly green roof would be warmest in cool temperatures and coolest in warm temperatures was accurate. This experiment proves that the green roof provides the best of both worlds! The only problem that appeared in my initial experiment was that the afternoon temperature wasn't always hot. Since the plant roof insulates in cool temperatures, the plant roof insulated the wooden box in both the morning and afternoon on cold days. Since the afternoon temperatures during the initial test period varied widely, the cooler days increased the average 3:00 p.m. temperature calculation of the plant roof. In order to truly to discover if the plant roof would be as efficient or better at cooling a building than a white roof, I had another testing period in March and evaluated the data according to ranges of temperature instead of the time of day for true results.</p>	
Summary Statement My project tested the capability of insulation and cooling of the green plant roof vs. the traditional black, grey, and white asphalt roofing materials.	
Help Received My parents drove me to retrieve all of the materials and paid for them. My dad assisted me in constructing the boxes.	