CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
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Project Number
J1125

Project Title
Rooftop Gardens: Are They a Cool Idea?

Abstract

Objectives/Goals
Rooftop Gardens (living or green roof) are an environmentally friendly option that provides many advantages: i)creates space for agriculture, ii)adds beauty to the landscape, iii)increases the air quality, iv)diminishes the urban heat island effect by reducing radiation, and v)lowers the energy bill for cooling in hot summer months. The purpose of my project is to study the effect of rooftop gardens on the internal room temperature under the roof compared to traditionally tarred rooftops. I hypothesized that rooftop gardens will reduce the indoor temperature under the roof more compared to rooftops with traditional tars after being exposed to certain amount of heat for a period of time.

Methods/Materials
For this research, I have taken experimental measurement using two same size, color and shape closed shoe boxes to simulate two environmental conditions: i)rooftop gardens were represented by placing a sod on top of the box covered with tar paper, and ii)traditional tar rooftops were represented by covering the box top with only tar paper. I have placed the two boxes side by side with a gap between them in where the red alcohol thermometer was placed to measure the external air temperature. Next, I placed a 250 watt heat lamp one meter above from both boxes. In addition I have placed a digital thermometer each inside one of the boxes. Temperature measurements were collected after both boxes were being exposed to 250 Watt heat for one hour representing the sunlight during a typical summer day. After the 250 Watt heat was turned off, which represented night time, new temperature measurement were recorded for an hour.

Results
After both boxes were exposed to 250 Watt heat, the internal temperature of rooftop gardens was about 8C cooler than the indoor temperature of rooftop with traditional tar. In addition, the indoor temperature of rooftop garden was also recorded to be 4C cooler than the external air temperature. When the heat lamp was turned off for one hour, rooftop gardens cooled down faster to reach the external air temperature compared to rooftop with traditional tar.

Conclusions/Discussion
My hypothesis was supported that temperatures measured under rooftop gardens would be cooler since it takes longer for sunlight/heat to go through sod/grass compared to temperatures measured under traditional rooftop with tar which absorbs the heat faster.

Summary Statement
The purpose of my project is to investigate the effect of rooftop gardens on the internal room temperature under the roof compared to traditionally tarred rooftops.

Help Received
Parents and Dr. Lian Jeeawoody guided me through the scientific methodology; Father purchased supplies and helped with preparing display board, mother and sister proofread report.