



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

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**Project Title**  
**Mushroom Mycelium: An Eco-Friendly Insulating Alternative**

**Abstract**

**Objectives/Goals**  
 Heating and cooling of households uses one-fifth of the total energy consumed in the USA every year. To reduce energy expenditure, new and existing homes should be better insulated. While traditional insulation products take oil and petroleum to make, other #green# methods are in production. Recently, two inventors have found that mushroom mycelium has a binding effect that creates good insulating traits. To imitate and replicate their material for this project, perlite, sawdust and water were combined with oyster mushroom grain spawn, put into molds, and grown for 16 days, into panels. These grown "mushroom" panels were placed into the interior of a small house-like structure imitating insulation under varying temperature conditions. Results were then compared with similar traditional foam-board insulation.

**Methods/Materials**  
 Materials: Sawdust; Perlite; Inoculum (master grain spawn); 6#x6# house structures; R-Tech 1# foam board insulation; Sterile room-framed cubicle sheathed in plastic wrap; Cool mist humidifier; Refrigerator; Oven; Remote temperature gauge with base gauge.  
 Methods-24 trials as follows:  
 1.Cube interior was heated using a lightbulb to a temperature of 123 degrees F. Internal temperature was recorded, as it decreased.  
 2.Cube interior was stabilized to a temperature of 63 degrees F then placed in an oven at 170 degrees F. Internal temperature was recorded as it increased.  
 3.Cube interior was stabilized to a temperature of 63 degrees F then placed in a refrigerator at 30 degrees F. Internal temperature was recorded as it decreased.

**Results**  
 Findings show mushroom insulation is as insulating, or better insulating, than traditional polystyrene foam board insulation in multiple environments.  
 LIGHTBULB TEST    Foam Insulation:        48 degrees F change in 71 minutes  
                           Mushroom Insulation:    34 degrees F change in 70 minutes  
 OVEN TEST        Foam Insulation:        63 degree F change in 46 minutes  
                           Mushroom Insulation:    63 degree F change in 68 minutes  
 REFRIG TEST     Foam Insulation:        20 degree F change in 58 minutes  
                           Mushroom Insulation:    20 degree F change in 96 minutes

**Conclusions/Discussion**

**Summary Statement**  
 My project compared the insulating properties of polystyrene foam board and my homemade mushroom insulation.

**Help Received**  
 I would like to thank my Mom for all her encouragement, my Dad for his building and construction expertise, Mrs. Taylor for being a great teacher, and Eben and Gavin for their great mushroom ideas and information.