



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) George J. Khouri, III	Project Number J0806
Project Title Earthquake! Put Your Soil to the Test!	
<div><div>Objectives/Goals<p>This experiment was purposed to find soils that are earthquake proof and find a way to limit damage from earthquakes. Because of the Pacific Plate colliding with the North American plate, everyday there are earthquakes in California. This makes it necessary to have the right conditions for homes and buildings. My hypothesis was that different types of soil can affect the condition of a house after an earthquake, and this was supported.</p></div><div>Abstract<p>I tested my hypothesis using clay, gravel, sand, and garden soil (control) as my independent variable. I made twenty graham cracker houses using a glue gun and glued a rectangular plastic bin, used to hold the soil, to the top of a shaking table. Then, I poured clay into the bin, leveled it, and then gently forced the house into the clay. The shaking table, powered by an electric drill, was turned to a medium speed for twenty seconds. I accelerated the pace for the last ten seconds, and after thirty seconds of shaking, I examined the graham cracker house and recorded the results. Five trials were run for each soil.</p></div><div>Methods/Materials<p>I tested my hypothesis using clay, gravel, sand, and garden soil (control) as my independent variable. I made twenty graham cracker houses using a glue gun and glued a rectangular plastic bin, used to hold the soil, to the top of a shaking table. Then, I poured clay into the bin, leveled it, and then gently forced the house into the clay. The shaking table, powered by an electric drill, was turned to a medium speed for twenty seconds. I accelerated the pace for the last ten seconds, and after thirty seconds of shaking, I examined the graham cracker house and recorded the results. Five trials were run for each soil.</p></div><div>Results<p>On all trials, the houses rocked and tilted. With clay and gravel, none of the houses broke or cracked, but houses did turn over frequently. On the garden soil trials, some houses turned over and there were two cracks. Sand limited damage the most, with only one chip and two times that a house turned over. I found that a house will be better protected when sand is its foundation.</p></div><div>Conclusions/Discussion<p>In this experiment, I found that the right soil is vital to limiting damage and can make a difference in a house's condition. Earthquakes have been a big problem to California over the last one hundred years. To add, long term forecasts show, because the separation of the 1972 and 1994 earthquakes is 22 years, another big quake may be expected to hit Southern California around 2016. Therefore, with sand as a building's foundation, it will be better suited to limit damage when an earthquake strikes.</p></div></div>	
Summary Statement <p>Using four different soils with graham cracker houses and a shaking table, this experiment tested if different types of soil affected the condition of a house after an earthquake.</p>	
Help Received <p>Parents helped buy materials and take photos, mother assisted with construction of shaking table (which was not one of my variables), and my teacher reviewed my project at different times.</p>	