



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

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Project Title The Effect of Base Soil Composition on the Usefulness of a Levee

<p style="text-align: center;">Abstract</p> <p>Objectives/Goals How does soil composition affect the amount of time a levee can withstand water?</p> <p>Methods/Materials 1 Iris U.S.A plastic box with these dimensions: 5"L x 6"W x 3"H, 1 bag Earth-Gro topsoil, 1 50 lb bag of Play Sand, water, 1 Sharpie permanent marker, 1 plastic sheet (or something waterproof that fits in the box), 1 timer, duct tape</p> <p>1. Gather materials. 2. Find a flat area to work. 3. Set the box down. 4. Mark a line 2 cm from the bottom of the box for the depth of the "levee" (letter L). 5. Mark a line 5 cm from the bottom of the box for the height of the soil (letter S). 6. Make sure the bottom of the levee matches the "L" on the box and tape it in place, waterproofing the sides. 7. Fill one side of the box with topsoil until the soil reaches the "S". 8. On the other side, fill the soil until it reaches the base of the levee or "L". 7. Pour water until it reaches the rim of the box on the side where the soil is higher. 8. Start the time. 9. When the water level on the side where the soil is shallow reaches the "S", stop the time 10. Record the time taken for the levee to fail. 11. Empty the box. (Rinsing not necessary) 12. Repeat steps 7-11 five more times. (or four, depending on materials available) 13. Repeat steps 7-12 with sand. 14. Repeat steps 7-12 with a mixture of 4 parts soil and 1 part sand. 15. Repeat steps 7-12 with a mixture of 7 parts soil and 1 part sand. 15. Compile the data.</p> <p>Results The average resistance time for the topsoil was 92 seconds. The sand resisted an average of 11.8 seconds. The 4:1 mixture of soil to sand resisted for 33 seconds, and the 7:1 mixture of soil to sand resisted for 54.5 seconds.</p> <p>Conclusions/Discussion My hypothesis was only right for the sand. I think that the reason my hypothesis was so wrong was because of how I wrongly estimated the size and composition of soil particles, not accounting for their springiness and the small spaces between them. I also had wrongly hypothesized about the effect of the sand, as it actually served, I believe, to spread out the particles rather than filling in the spaces between them. The waterproofing on the sides of the levee was also sometimes faulty, and the pouring speed definitely changed the results drastically. The time may also have been stopped inconsistently each time, not exactly when the water reached the mark.</p>

Summary Statement My project's goal was to discover which soil enhanced the performance of a levee to the greatest extent.
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