



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

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Project Title The Effects of Additives on Soil Stability	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this project was to determine what additives could potentially make saturated soil stronger.</p> <p>Methods/Materials We cut 3-inch diameter PVC pipes into 2-foot long sections and drilled five 7/16-inch holes along the length of each pipe. We filled each PVC pipe with either plain soil or a mixture of soil and an additive. The four additives used in this project were sand, polyester fiberfill, construction paper, and compost. After letting the pipes sit in 5-gallon buckets of water until the contents of the pipes were saturated with water, we inserted 4-inch long wooden dowels through the holes of the pipes, simulated an earthquake by dropping them, and then removed the dowels using a force gauge. A higher force measurement reflected a stronger contact force. A lower force measurement reflected a weaker contact force.</p> <p>Results The mixture of soil and polyester fiberfill was consistently stronger than soil alone. The other mixtures yielded inconsistent results.</p> <p>Conclusions/Discussion The polyester fiberfill appears to have provided cohesion for the saturated soil but it may have also acted as a shock absorber during the agitation. Sand and compost may have caused their mixtures to clump resulting in inconsistent numbers. The paper mixture was more consistent than the sand and compost mixtures but not to the extent of the plain soil and the soil/polyester fiberfill mixture.</p>	
Summary Statement This project is about the stability of soil and soil mixtures when saturated with water and subjected to agitation.	
Help Received Mother helped saw PVC pipes and wooden rods as well as drilling holes into PVC pipes.	