



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

<b>Name(s)</b> Nicholas E. Forsburg	<b>Project Number</b>  23235
<b>Project Title</b> The Trickle Down Theory: Hydraulic Properties of Soil	
<b>Objectives/Goals</b> My project was to determine the hydraulic conductivity (Ksat) of four soil textures, clay, loam, silt, and sand. My hypothesis was that a sandy textured soil would have the highest rate of hydraulic conductivity because of its large particle size and low bulk density. <b>Abstract</b> <b>Methods/Materials</b> Four soils with different textures were identified in a local agricultural soil survey. Each of these soils was located and then sampled in the field. The soils were then spread out on drying trays and allowed to air dry for two weeks. Any roots or rocks were removed from the samples. In the mean time, an apparatus was constructed to aid in the measurement of the hydraulic conductivity. Mr. Hooper, a soil scientist with the Natural Resources Conservation Service, provided a diagram for this apparatus. The dry soil samples were then compacted and pre-saturated. Next a hydraulic head was placed over each sample. The time it took for 125 cc of water to move through the soil was measured. The rate of water flux was calculated for each of the samples. Also, samples of each soil were weighed in order to calculate their bulk density. <b>Results</b> As expected, the sandy textured soil had the highest rate of water permeability. One unexpected result was that the clay-textured soil did not have the lowest rate of permeability. The silt-textured soil was found to have the lowest hydraulic conductivity. The results from a soil particle size analysis done for me by Mr. Hooper showed that the sand textured soil had the largest soil particles of the four soil textures. But is also showed that the silt-textured soil had the smallest soil particles, not the clay, which was why the silt-textured soil had the lowest rate of water flux. <b>Conclusions/Discussion</b> After completing this experiment I have found that soil texture, particle size and bulk density are the biggest factors influencing the hydraulic conductivity of a soil. My hypothesis was partially correct, however, if the soil samples had a larger difference in particle sizes, the bulk density and hydraulic conductivity of the soils would have had a greater variation.	
<b>Summary Statement</b> My project is about investigating the hydraulic properties of soil.	
<b>Help Received</b> Mr. J. Hooper, Soil Scientist, USDA-NRCS was an advisor; father helped with soil collection and apparatus construction; mother typed log book.	