



# CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

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| <b>Name(s)</b><br>Mira Chiruvolu; Molly Dillon   | <b>Project Number</b><br><br>35735 |
| <b>Project Title</b><br>Soil Matters: A Study of Soil Components that Produce Nutrient Dense Plants for Our Health   |                                    |
| <b>Objectives/Goals</b><br>Modern farming has allowed us to produce enough food to supply the world's population. But at what cost? The nutrient value of the food we eat is being degraded due to soil erosion and poor soil management. Our goal was to understand the components of soil that contribute to the growth of nutrient dense plants. Our hypothesis is that soils with the right amount of nutrients and with more and diverse microorganisms will result in nutrient dense plants. We believe that 1) the soil mix that includes topsoil plus manure and rock dust and 2) soil from the forest will have the most nutrients and microorganisms and produce the more nutritious plants.<br><b>Abstract</b><br>Modern farming has allowed us to produce enough food to supply the world's population. But at what cost? The nutrient value of the food we eat is being degraded due to soil erosion and poor soil management. Our goal was to understand the components of soil that contribute to the growth of nutrient dense plants. Our hypothesis is that soils with the right amount of nutrients and with more and diverse microorganisms will result in nutrient dense plants. We believe that 1) the soil mix that includes topsoil plus manure and rock dust and 2) soil from the forest will have the most nutrients and microorganisms and produce the more nutritious plants.<br><b>Methods/Materials</b><br>We grew swiss chard in 12 combinations of soil mixes. We used a LaMotte Soil Test kit to test soils for pH, macronutrients N, P, K, and planned to do plant tests for macro- and micronutrients. We used the Case Protocol for growing and counting soil bacterial colonies.<br><b>Results</b><br>From our LaMotte Soil Testing, we observed that plants in the topsoil plus compost plus chicken manure were taller and looked healthier and the soil was high in nutrients and microorganisms. Our Case Protocol testing showed little relationship between the number of bacterial colonies and any of the nutrients. Our plant material did not grow sufficient enough to be able to test for plant nutrients.<br><b>Conclusions/Discussion</b><br>We set out to find whether high macronutrients and microorganism counts in the soil produced the most nutritious plants. Our results were inconclusive. Limitations included: (1) Our plants did not grow well enough to test. What we could do was compare soil nutrients between different soils. This was also inconclusive. (2) The testing was challenging. When we compared soils, the LaMotte Test Kit produced very few results for nitrogen even though the plants were green. Plus, sometimes it was hard to tell if we had medium potassium or high potassium. (3) The test kits we used provided data for high yield farming not nutrient dense plants. Future research would involve developing a new kind of test kit incorporating important elements of the soil food web, including minerals, fungi, protozoa, anthropods and nematodes available. |                                    |
| <b>Summary Statement</b><br>Our project studies how different combinations of organic matter, minerals, and microorganisms lead to the production of nutrient dense plants.  |                                    |
| <b>Help Received</b><br>Daniel Chiemlewski of Hidden Villa provided us with information about building healthy soils and provided soil samples; Leila Shahidi lent her microscope which let us look at the bacteria more closely; and our parents helped us get supplies and taught us the tests and sterile technique.  |                                    |