



**CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY**

Name(s) Ben D. Hampton	Project Number S1605
Project Title Anemia and Chlorosis, Blight of the Third World: The Absorption of Iron in Spinach	
Abstract Objectives/Goals Anemia, a common disease among third world countries is responsible for many cases of fatigue, mental retardation, stunted growth, and complicated pregnancies. One cause of this disease is chlorosis, which occurs in plants and is traced to a lack of iron. Many solutions are available such as the employment of chelating compounds, sulfur oxidizing bacteria, and biofortification. All of these are effective means of combating chlorosis, yet extremely expensive. This experiment investigated another solution using inexpensive materials. Methods/Materials Spinach seeds were planted in varying amounts of steel wool and silica sand. After 9 weeks the spinach was analyzed for iron. Samples of spinach were burned to an ash. Hydrochloric acid was added to each to extract the iron then bonded to potassium thiocyanate. The Fe ³⁺ ion and the thiocyanate ion react to yield a reddish brown complex ion. $\text{Fe}^{3+}(\text{aq}) + 6 \text{SCN}^{-}(\text{aq}) \rightarrow (\text{Fe}(\text{SCN})_6)^{3-}(\text{aq})$ Solutions of known concentrations were analyzed with a spectrophotometer at a wavelength of 480nm. Standards of known concentrations were also made and run through a spectrophotometer. A graph on concentration and absorption was made for the standards. Results Comparing the absorption of each cultivar to the graph showed a significant increase between the control (no additives in the soil) and the iron-fortified plants. Conclusions/Discussion The results of this experiment affect several aspects of society, one of the most critical being anemia. Anemia is an iron deficiency disease that comes from a lack of iron in the blood. It can lead to mental retardation and impair physical growth in children as well as complicate pregnancies and reduce the capability for physical labor. This project has uncovered a possible solution to this disease. The results of this experiment implicate the plausibility of this affordable answer to the dilemma of chlorosis and anemia in third world countries.	
Summary Statement My project attempts to find an inexpensive cure for anemia and chlorosis using steel wool as an iron source in soil.	
Help Received My dad helped me create my display board and my mom helped me gain access to a laboratory to conduct my experiment.	