



CALIFORNIA SCIENCE & ENGINEERING FAIR 2018 PROJECT SUMMARY

Name(s) Mariah G. Cox	Project Number 38038
Project Title A Plentiful and Inexpensive Fertilizer Alternative: Human Urine	
Objectives/Goals I would like to replace chemical and organic fertilizers with an inexpensive and readily available fertilizer by using healthy human urine. In the poverty-stricken countries, farmers may not be able to afford the costly fertilizers but everyone produces human urine, so you will never run low. Abstract I used 4 different types of plants (Beans, Peas, Zucchini, and Spinach). For the control I planted 12 of each type of plant and used only bottled spring water. For the fertilizer I planted 12 of each type of plant and used Dr. Earth 4-4-4 fertilizer every 12th day and watered with bottle spring water every 4th and 8th day, so the plants weren't over fertilized. For beans, peas, zucchini, and spinach I planted 12 of each type for every urine dilution: undiluted, 1 part urine: 1 part bottled spring water, 1 part urine: 5 parts bottled spring water, and 1 part urine: 10 parts bottled spring water. Gave designated dilution every 12th day and watered with bottled spring water every 4th and 8th day, so the plants weren't over fertilized. I measured and recorded growth weekly and made note of any observations. Methods/Materials I used 4 different types of plants (Beans, Peas, Zucchini, and Spinach). For the control I planted 12 of each type of plant and used only bottled spring water. For the fertilizer I planted 12 of each type of plant and used Dr. Earth 4-4-4 fertilizer every 12th day and watered with bottle spring water every 4th and 8th day, so the plants weren't over fertilized. For beans, peas, zucchini, and spinach I planted 12 of each type for every urine dilution: undiluted, 1 part urine: 1 part bottled spring water, 1 part urine: 5 parts bottled spring water, and 1 part urine: 10 parts bottled spring water. Gave designated dilution every 12th day and watered with bottled spring water every 4th and 8th day, so the plants weren't over fertilized. I measured and recorded growth weekly and made note of any observations. Results After two weeks I put my plants out for a day in the sun to kill the mold that was present on the soil. The temperature outside was only 70°F (21.1°C). Not even a week later my spinach were all dead including the ones in my control and fertilizer. My zucchinis and other plants that were still alive were getting top heavy and tipping over, so I tied them up. Not even a week after tying them up my zucchini almost all died in my urine dilutions because I may have strangled them by tying them to tightly around the stems. My peas were spindly and did not grow very tall but the 1:10 dilution did just as well as the fertilizer, but the control did a little bit better than both. My beans grew very tall and were a little spindly. The 1:10 did just as well as the fertilizer. Conclusions/Discussion I found that healthy human urine can be used as an effective fertilizer if it is diluted to at least 1:10. After the spinach and zucchini were dead I performed soil tests to see the levels of nitrogen, potassium, and phosphorus. In most of the soil samples the nitrogen levels were medium to high. Potassium and phosphorus were medium to depleted. I am currently gathering data on 1:15 and 1:20 dilutions. My results for 1:15 and 1:20 dilutions will be finished by the state competition.	
Summary Statement I am trying to replace expensive chemical and organic fertilizers with an inexpensive, readily available alternative: healthy human urine.	
Help Received I went to Frank R. Howard Memorial Hospital in Willits, Ca and got in contact with their lab director, Arpad Peter. He taught me basic laboratory safety, gave me access to their urinalysis machine, and taught me how to use it. I performed a urinalysis, testing the levels of NPP in each dilution	