



CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s) Ryan M. Traynor	Project Number 31337
Project Title The Effect of Acid Rain on Marigold Plants	
Objectives/Goals The objective was to determine the effect increased acidity in watering solutions would have on the growth, flowers and sprouts, and health of marigold plants so that inferences could be made about the effect acid rain is having on our environment. Research led to my hypothesis that the change in height of the plant would decrease by 25% from the control for each 1pH level, the flowers and sprouts growth would decrease by 10% for each 1pH change and the observed health of the plant would decline. Methods/Materials Six acidic watering solutions were made by adding vinegar to distilled water, with differing levels of acidity ranging from pH3.2 to pH6.0. The solutions were used to water 29 similar marigold plants (replanted to create identical conditions) in groups of 5 for 10 days. Each day, the plants' heights were measured, the number of flowers and sprouts were counted and general observations of the plants' health were completed. Results Growth rate declined from the control (pH6), beginning at an 8.3% decline at pH5.5 and ending in 1252.8% at pH3.2. The change in number of flowers increased, then declined at below pH 3.75 leading to a decrease from pH6 in flower growth by 31.37% at pH5.2. The change in number of buds or sprouts compared to pH6 dropped by 26.7% at pH 5.5 to a decline of 475% at pH3.2. Combining the increase in buds/sprouts and flowers, there was a decline in growth compared to pH6 at lower than pH 5.5. The counts declined by 66.7% at pH4.3 to 298% at pH3.2. The higher acidity levels led to the unhealthy appearance of plants beginning on day 10 with pH 4.3 and earlier with more acidity, resulting in day 4 with pH 3.2. Increased acidity had a negative effect on the health and growth of plants. The growth rate and rate of flower and sprout growth combined declined. The observed health of the plants declined immediately. Conclusions/Discussion Increased acidity had a negative effect on the health and growth of plants. The growth rate, the rate of flower and sprout growth combined, and the observed health of the plants all declined with the addition of acid solutions. The effect of acid rain on plants needs to be communicated to the public immediately so that we can implement solutions or curb behaviors that will save our Earth!	
Summary Statement To replicate the detrimental effects on plant health by acid rain, I duplicated various region's acidic watering solutions and added them to plants causing the growth rate and health of plants to decline with increased acidity levels.	
Help Received My mother taught me how to use the graphing feature in Excel, but I did all the input, formatting and analysis.	