



# CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

<b>Name(s)</b> <b>William S. Lyons</b>	<b>Project Number</b> <b>J1825</b>
<b>Project Title</b> <b>Zeolite Power: Do Zeolite Minerals Enhance Plant Growth?</b>	
<div><b>Objectives/Goals</b><p>The purpose of this experiment was to test whether zeolites, a group of porous, altered volcanic minerals, can enhance plant growth in combination with chicken manure beyond the effect of chicken manure alone. The effect of zeolites could make it possible to grow bigger, healthier plants, even in pure quartz sand, which has little to no nutrients and does not hold water. Ultimately, the goal is to determine whether zeolites are a good way to grow food crops on barren land. Zeolites and chicken manure both are cheap and relatively easy to find. Together, they might be the next solution for feeding the world.</p></div> <div><b>Abstract</b><p>Four plant growth experiments varied the amount of zeolites and chicken manure in the fertilizer: (a) growing pepper plants in mulch, (b) growing pepper plants in sand, (c) sprouting and growing radishes in mulch, and (d) sprouting and growing radishes in sand. In a 4-foot-by-8-foot garden box divided into 8 runs, runs 1-4 had a base of mulch, and runs 5-7 had a base of pure quartz sand. Run 1 was pure mulch, and run 8 was pure sand; these were the control groups. In runs 2 and 7 the fertilizer was all chicken manure. In runs 3 and 6 the zeolites were ~10% of the fertilizer mixture. In runs 4 and 5, the zeolites were ~33% of the mixture. For both peppers and radishes, plant height and weight of the vegetables at harvest were measured.</p></div> <div><b>Methods/Materials</b><p>Four plant growth experiments varied the amount of zeolites and chicken manure in the fertilizer: (a) growing pepper plants in mulch, (b) growing pepper plants in sand, (c) sprouting and growing radishes in mulch, and (d) sprouting and growing radishes in sand. In a 4-foot-by-8-foot garden box divided into 8 runs, runs 1-4 had a base of mulch, and runs 5-7 had a base of pure quartz sand. Run 1 was pure mulch, and run 8 was pure sand; these were the control groups. In runs 2 and 7 the fertilizer was all chicken manure. In runs 3 and 6 the zeolites were ~10% of the fertilizer mixture. In runs 4 and 5, the zeolites were ~33% of the mixture. For both peppers and radishes, plant height and weight of the vegetables at harvest were measured.</p></div> <div><b>Results</b><p>Judging from the results of Experiment A alone, one might conclude that the best mixture of zeolites and chicken manure is ~10% zeolite and 90% manure. Both plants in the run with this mixture (Run 3) were two of the top three plants showing the most growth in that experiment, and their total pepper weight at harvest was significantly more than any other run. However, the results of Experiment B, C, and D show that a higher proportion of zeolites, ~33%, is much more effective for growing plants, especially in pure quartz sand. In Experiment B, not only did the plants in Run 5 (zeolites ~33%) show significantly more growth than any other plants growing in sand, but Plant 5A actually grew more than any of the pepper plants growing in mulch as well.</p></div> <div><b>Conclusions/Discussion</b><p>These results suggest that zeolites in combination with chicken manure can be used as a powerful and cheap biofertilizer to reclaim desert or contaminated land for growing crops.</p></div>	
<b>Summary Statement</b> <p>The purpose of this experiment was to test whether zeolites, a group of porous volcanic minerals, can enhance plant growth.</p>	
<b>Help Received</b> <p>A gardening organization helped build garden box</p>	