



CALIFORNIA STATE SCIENCE FAIR  
2016 PROJECT SUMMARY

<b>Name(s)</b> <b>Zinnia M. Hutchinson</b>	<b>Project Number</b> <b>J1809</b>
<b>Project Title</b> <b>How Much Sodium Chloride Can a Cabbage Plant Withstand? The Effects of Salt (NaCl) on Plant Life</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of this project is to determine the concentration of NaCl in water that harms cabbage plants.</p> <p><b>Methods/Materials</b> Shelf, fluorescent light, cabbage plants, salt, starter pots, water jugs. Dad helped screw light to shelf. Calculated percentage of NaCl for test groups saltwater solutions, Group A 0%, B 1.17%, C 2.34%, D 3.5% saltwater. Measured the sodium chloride and poured in jugs of water, then watered each plant with 15 ml of designated solutions and collected data on plant health periodically.</p> <p><b>Results</b> Data on plant color and health was recorded, and it was observed that plants with the highest salt content (equal to seawater, 3.5%) went through stages of salt poisoning. This pattern occurred in all groups being watered with saltwater. The health of the plants varied directly with the amount of salt they were watered with. The plants turned blue and hardened because positive sodium ions replaced the positive potassium ions, causing nutrient deficiency. The NaCl absorbed the plants water and dehydrated them during salt poisoning. Growth was also stunted. A plant cannot withstand NaCl and will be harmed as salt content increases.</p> <p><b>Conclusions/Discussion</b> The amount of saltwater that plants withstand is extremely low to none. When watering plants, water softened with NaCl is harmful. Salt dehydrates plants and poisons them in various ways. The positively charged sodium ions in NaCl replace needed positive potassium ions in the plant, the leaves turn blue from nutrient deprivation. Stunted growth begins when the endodermis in branch roots detects Abscisic acid, a hormone released when the plant detects NaCl, causing a flight response from toxins present in the soil. Plants close the stomata when salt begins to absorb water from their roots. When the stomata is closed the plant cannot uptake water or Carbon Dioxide. Salt will kill cabbage plants.</p>	
<b>Summary Statement</b> NaCl is detrimental to plant health, it dehydrates them and causes a hormone release that activates defense mechanisms that kill the plant.	
<b>Help Received</b> My father helped me assemble the shelf and light, lent me a scale, and gave me directions on plant care. The rest of my project I completed on my own.	