



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Vincent A. Chen	Project Number J1998
Project Title The Effect of Water Priming on Salt Tolerance in Barley Seeds (Hordeum vulgare)	
Abstract Objectives/Goals My objective was to examine the effects of water priming on the salt tolerance of barley seeds. My hypothesis was that water priming would increase salt tolerance in both germination and seedling growth. Methods/Materials Barley seeds were sterilized in 1% bleach for 5 min, dried, and primed in distilled water for 30 hours in the dark. They were germinated in a dual growth chamber constructed for this purpose with a Light/Dark cycle of 14/10. My experimental design was: Two seed types (primed and non-primed) examined under three germination conditions (with Water, 75 mM NaCl, and 150 mM NaCl). At 48, 72, and 96 hours I counted the number of seeds that germinated, the number of seeds that grew a coleoptile (stem-sheath), the length of the epicotyl (stem) emerging from the coleoptile, and the length of the roots. Results When seeds were grown in Water, or 75 mM saline, more water-primed seeds germinated than the non-primed seeds. In 150 mM NaCl, more primed seeds germinated than non-primed seeds in 2 of the 3 experiments. Results for seedling growth in 75 mM NaCl, indicated that priming resulted in: A. An Increase in the number of stems; B. An Increase in stem length; C. An Increase in the number of stems with epicotyls; and D. An increase in the length of the epicotyls. No seeds grown in 150 mM NaCl grew epicotyls. Conclusions/Discussion Discussion: My results indicated barley seeds primed with water showed a greater tolerance to salt than non-primed seeds. Therefore, I have accepted my hypothesis as true. This can be seen by a greater number of seeds germinating under all growing conditions (Water, 75 mM, and 150 mM saline), except in one experiment, in which more seeds germinated from the non-primed group grown in 150mM NaCl. However, in this group less than 10% of the germinated seeds grew stems compared to 40% of the seeds from the primed group. Salt tolerance was also shown by the fact that primed seeds in 75 mM NaCl grew more coleoptiles, more epicotyls emerged from the coleoptiles, and the length of the coleoptile (plus epicotyl) was longer, compared to the non-primed group. Conclusion: Water priming of cereal crop seeds could be important in the future when the population of the world is expected to be over 9 billion people.	
Summary Statement My project is about water priming of barley seeds and the development of salt tolerance during subsequent germination and growth.	
Help Received I received help from my grandfather in photography, development of the tables and histograms, and in discussions of the results.	