



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

|  |                                       |
|--|---------------------------------------|
| <b>Name(s)</b><br><b>April N. Duchanin</b>   | <b>Project Number</b><br><b>J1609</b> |
| <b>Project Title</b><br><b>Cryogenics: How Low Can You Go?</b>   |                                       |
| <p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b><br/>Cryogenics is the new generation of cold storage. The theme of the following tests completed was to observe the characteristics and outcomes of cryogenically frozen seedlings over various time periods. This study specifically addressed the cause and effect of the seedling germination rate process. The purpose of these tests was to find out if the artificial freezing of plant tissues would be beneficial to farming and medical industries.</p> <p><b>Methods/Materials</b><br/>All four experiments (hypothesis) were conducted in basically the same way. Corn and bean seeds were suspended in liquid nitrogen for different amounts of time (depending on the experiment being tested) over a period of one to four days. Once these seedlings were removed from the liquid nitrogen, they were placed in petry dishes with cotton, saturated with water, and placed in the oven at about 70 to 80 degrees. The germination rate process was then measured and recorded every 24 hours until they were ready for planting.</p> <p><b>Results</b><br/>Corn seeds did extremely well with the cryogenic suspension process, however, the bea seeds had the tendency to pop and break, which caused the stressed scientist to redo that part of testing. Three day time period freezing seemed to germinate almost in the first 24 hour period and further more, corn seeds seemed to really benefit from the cryogenic freezing and it stimulated their germination rate process.</p> <p><b>Conclusions/Discussion</b><br/>A conclusion that has been drawn is that corn seeds, or monocot seeds, can withstand the intensity of cryogenic freezing in liquid nitrogen and has perhaps even benefited from this cooling process. This would be something the agricultural studies might want to investigate further. Diocot seeds, or bean seeds, on the other hand were more sensitive to liquid nitrogen and would not be a good choice for freezing due to the high rate of failure. Another conclusion that has been observed is the overall germination rate of the cryogenically frozen seeds. Their germination rate is much higher than the non-frozen seedlings.</p> |                                       |
| <b>Summary Statement</b><br>The study of this test is to cryogenically freeze monocot and diocot seeds(corn and bean seeds) in liquid nitrogen, measure their germination rate, and observe the effects of cryogenic freezing.   |                                       |
| <b>Help Received</b><br>Mother helped supervise experiment, sister took photographs, pete at So Cal Air Gas helped to get liquid nitrogen and how to use it, Morely(Mr.) Cohen my science teacher gave me helpful suggestions  |                                       |