



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

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| Name(s) <p align="center">Rami J. Harb</p> | Project Number <p align="center">J1620</p> |
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Project Title
Chill Out: Investigating Seed Tolerance for Freezing Temperatures

Abstract

Objectives/Goals
 To investigate seed tolerance for freezing by measuring the germination rate after being frozen for various intervals. I predict seeds frozen will have germination rates lower than non-frozen seeds, and seeds frozen longest will have lowest germination rates.

Methods/Materials
 Materials: Ralphy's 16oz bag of Lima beans, Garbanzo beans, Small Red beans, Blackeye peas, and Black Beans, Jolly Time 32oz bag of Popcorn seeds
 Methods: 1. Arrange 10 piles of 30 seeds for each seed. Place each pile into a plastic bag. Label bags control 1 and control 2, A1 and A2, B1 and B2, C1 and C2, and D1 and D2.
 2. Place A#s in the freezer for 8 hours, B#s for 16 hours, C#s for 24 hours, and D#s for 32 hours.
 3. Fill the controls with water.
 4. After appropriate freezing time, remove group from the freezer and fill each bag full with water. Place the bags somewhere dry and allow seeds to soak for 24 hours.
 5. After 24 hours of soaking, take all bags in the group and empty the water. Wet a paper towel and place it inside the bag. Lay the seeds in the bag on the paper towel. Close the bag and place it in a dry area. Complete this for every bag in the group.
 6. Observe the seeds and inspect them for germination.

Results

| Lima beans | Blackeye | Garbanzo | Black | Small Red | Popcorn |
|------------|----------|-------------|-------|-----------|---------|
| Group | Percent | Germination | | | |
| Control | 22 | 98 | 90 | 97 | 95 |
| A | 14 | 77 | 73 | 85 | 97 |
| B | 24 | 77 | 82 | 95 | 94 |
| C | 57 | 98 | 83 | 92 | 88 |
| D | 10 | 89 | 85 | 96 | 97 |

Conclusions/Discussion
 Since many of the beans germination percentages were similar if not equal to the control group's germination rate, my prediction was incorrect. It appears that freezing does not affect the germination of the beans I chose. This is important since if seeds can survive frozen, then we could save them for in case of a natural disaster. Also, if we can find out how long seeds can survive on storage shelves, we could save them for times of food shortage.

Summary Statement
 The ability of assorted beans and other seeds to germinate after being frozen for different lengths of time.

Help Received
 My science teacher was involved in editing of my report and helping me understand the significance of my results.