



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Marc J. Matossian	Project Number S1907
Project Title The Effects of Plasma Treatment on the Growth Behavior of Plant Seeds	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my science project was to compare the growth characteristics of plasma-treated plant seeds. A plasma is an ionized gas that consists of ions (positive or negative), radicals (excited neutral species), electrons, and radiation (UV/VIS/IR). My hypothesis was that the reactive ion and atom species of a plasma could affect the outer shell of plant seeds, causing enhanced plant-growth characteristics, but this effect would probably depend on seed type and plasma type.</p> <p>Methods/Materials Two types of plant seeds (Bush Bean seeds and Soy Bean seeds) were exposed to three types of atmospheric-pressure plasmas (air, nitrogen/N₂, and carbon dioxide/CO₂). Each atmospheric-pressure plasma was created by filling a glass-TEE with gas and a high voltage was applied across two sharp metal electrodes to ionize the gas and create an arc discharge. Three plasma exposure times were studied; (1 minute, 5 minutes, and 50 minutes), and seed temperature was kept below 60 C to prevent seed deterioration. Plant height was used to compare growth characteristics of plasma-treated seeds and un-exposed control seeds.</p> <p>Results</p> <ol style="list-style-type: none">1. Bush Bean seeds showed increased growth for all plasma treatments<ol style="list-style-type: none">a. 1 minute Air plasma treatment: 90% increased plant heightb. 5 minute N₂ plasma treatment: 80% increased plant heightc. 5 minute CO₂ plasma treatment: 40% increased plant height 2. Soy Bean seeds showed reduced growth for all plasma treatments<ol style="list-style-type: none">a. 50 minute Air plasma treatment: 35% reduced plant heightb. 50 minute N₂ plasma treatment: 65% reduced plant heightc. 50 minute CO₂ plasma treatment: 50% reduced plant height <p>Conclusions/Discussion Plasma treated plant seeds can have increased plant growth vs. un-treated control seeds, but the results depend on seed type, plasma type, and treatment time. The results could have important implications to improve plant growth for farmers.</p>	
Summary Statement Plant seeds exposed to an atmospheric-pressure plasma can result in enhanced growth behavior	
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