



CALIFORNIA STATE SCIENCE FAIR 2011 PROJECT SUMMARY

Name(s) Marc J. Matossian	Project Number 31857
Project Title The Effects of Plasma Treatment on the Growth Behavior of Plant Seeds	
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.	
Abstract 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/N ₂ , and carbon dioxide/CO ₂). 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.	
Results 1. Bush Bean seeds showed increased growth for all plasma treatments a. 1 minute Air plasma treatment: 90% increased plant height b. 5 minute N ₂ plasma treatment: 80% increased plant height c. 5 minute CO ₂ plasma treatment: 40% increased plant height 2. Soy Bean seeds showed reduced growth for all plasma treatments a. 50 minute Air plasma treatment: 35% reduced plant height b. 50 minute N ₂ plasma treatment: 65% reduced plant height c. 50 minute CO ₂ plasma treatment: 50% reduced plant height	
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.	
Summary Statement Plant seeds exposed to an atmospheric-pressure plasma can result in enhanced growth behavior	
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