Effect of Camellia sinensis Leaf Extract on Drought Stress and Survival of Phaseolus vulgaris

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Phaseolus vulgaris (common bean) is highly drought-sensitive. Camellia sinensis (green tea) contains polyphenols that may mitigate drought stress. Using 40 P. vulgaris seedlings grown from seed, I tested the hypothesis that a foliar application of green tea leaf extract would lead to greater lifespan and plant health in drought conditions than in plants given a foliar-spray with only distilled water. Four procedures were used: 1. Maximum duration study (MDS), where time was measured to see how long the plants live for in drought conditions; 2. Chlorophyll Extraction Estimated Quantification (CEEQ), where ethanol extraction is used to do spectrophotometric calculations with absorbance to find chlorophyll concentrations; 3. Electrolyte Leakage Assay (ELA), where leaf disks are abaxial-up for a 30 minute period in deionized water, before 8 hour incubation in new deionized water where ion capacity is measured with conductivity meter; 4. Stomatal Aperture Ratio (SAR), where stomatal width and length are measured using measuring software and divided (width/length). For all statistical analyses, n= 10/group. MDS mean was higher for treated by one-tailed t-test (p=0.004785). Slope for linear regression of ELA showed a higher magnitude for control by t-test (p = 3.48 x 10^(-9)). Instantaneous rate of change of CEEQ polynomial regressions had higher magnitude for control - by t-test with Bonferroni's correction - at Days 1, 3, 5, 7, 9 (p = 1.501×10^(-5), 2.795×10^(-5), 0.000098, 0.000195, 0.000998). SAR means were compared by day with one-tailed t-test, showing SAR to be higher for treated for Days 5, 7, 9, 11 (p = 0.02259, 0.002542, 0.00009748, 0.00004398). Ultimately, decaffeinated green tea extract shows promise to be a cheap way to reduce drought stress.

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