Novel and Accessible Seed Priming Agent to Enhance Germination and Stress Resilience Under Saline Conditions

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Climate change is triggering soil salinization, which limits crop production, mainly in island communities such as American Samoa. Seed priming is a proven method to boost germination under stresses like saline conditions, but farmers in salt-affected areas lack access to affordable chemical agents. This study investigated the effects of three priming treatments, salicylic acid (SA) at 0.5 mM, turmeric powder extract (Curcuma longa) at 0.1%, and an unprimed control, on two germination parameters, germination percentage (Germination_%) and mean germination time (MGT_days), under two saline conditions (0 mM NaCl and 100 mM NaCl). A two-way factorial ANOVA design was used to analyze the data. Then, post hoc comparisons conducted using Tukey's HSD. Results showed that turmeric 0.1% primed seeds, significantly reduced MGT compared to both SA and unprimed seeds ($p < .001$), regardless of the salinity level (no significant interaction, $p = .669$). A significant interaction between priming type and salinity was observed, ($p = .003$) driven by a marked decline in SA primed seeds under salt stress (~62%), while turmeric primed and unprimed seeds maintained high germination (~95%) in germination percentage. A significant negative correlation between germination percentage and MGT ($r = -0.453$, $p = .026$; BF?0 = 5.142) confirmed that faster germinating seeds also achieved higher germination. These findings suggest that the seeds primed with turmeric offer a promising, low-cost alternative for improving seed germination performance, particularly under saline conditions.

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