

Morpho-Physiological Characterization of Three Selected Potato Varieties for Drought Tolerance from Tuber Bulking to Maturity

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Sustainable production of potato (*Solanum tuberosum* L.) is threatened due to the occurrences of frequent drought spells under the consequences of climate change. Therefore, it is a must for potato breeders to look for drought-tolerant varieties for future purposes and that may help potato farmers with expanding the cultivation areas, seasons, and productivity. This pot experiment was conducted to evaluate the promising morpho-physiological responses of the most popular local potato variety (Granola; V1) against that of two imported drought-resistant varieties (Prada; V2, Royal; V3) during the late tuber bulking stage in both the optimum (Control; T1; 40-60% field capacity; FC) and imposed drought (Drought; T2; 20-40% FC) conditions. Sprouted seed potatoes were established in black polythene bags filled with soilless media (Compost: Half-burnt paddy husk: sand=1:1:1/2) at FC and arranged in a completely randomized design with three replicates. Treatments were started at the peak of the stolon initiation stage and morphological (i.e. plant height; PH, leaf area; LA), physiological (i.e. mid-day leaf water potential; LWP, leaf tissue osmolality; OS, leaf relative water content; RWC), and agronomic (i.e. plant dry weight; DM, harvest index; HI, water-use efficiency; WUE, Stolon and tuber number; STN and TN, respectively, volumetric soil moisture content; SMC) data were recorded and statistically analyzed. Results showed that V3 and V1 had the highest PH, LA, DM, WUE, STN, and TN in T1 and T2, respectively ($p < 0.05$). For RWC, LWP, OS, and SMC, all three varieties responded equally in T2 compared to that in T1 ($p > 0.05$). Overall, V1 had the lowest degree of reduction for DM, HI, and growth physiology, and the highest increase for WUE in T2 compared to that in T1. Results concluded that V1 carries better drought tolerance properties compared to that V3 or V2 under the conditions tested.

Keywords: Drought tolerance, Morpho-physiology, Potato, Tuber bulking, Water-use efficiency

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