Morpho-physiological Characterization of Three Selected Potato Varieties for Drought Tolerance between Tuber Initiation and Tuber Bulking Phase

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Productivity of most potato (*Solanum tuberosum* L.) varieties are compromised in drought resulting the research need for investigating the drought tolerance properties of potential varieties in order to expand the cultivation extent in future. A pot experiment was conducted to evaluate the morpho-physiological responses of the most popular local potato variety against the 2 imported drought-resistant varieties during the early tuber bulking stage in both the optimum and imposed drought conditions. Sprouted seed potatoes of 3 varieties (Granola; V1, Prada; V2, Royal; V3) were established in UV treated polythene bags filled with soil less media (Compost: Half-burnt paddy husk: sand=1:1:1/2) and arranged in a completely randomized design with 3 replicates in a polytunnel. Water treatments were started at the fourth week or at the peak stolon initiation stage (Control; T1; 40%-60% field capacity; FC and Drought; T2; 20-40% FC). Morphological (i.e. plant height; PH, leaf area; LA), physiological (i.e. gas exchange; GE, leaf relative water content; RWC, chlorophyll content; Ch, chlorophyll fluorescence; CF), and agronomic (i.e. plant dry weight; DM, water-use efficiency; WUE, Stolon and tuber number; STN and TN, respectively) data were recorded and statistically analyzed. In results, V2 and V1 had the highest PH, LA, GE, RWC, DM, WUE, STN, and TN in T1 and T2, respectively, at $p<0.05$. For all the measurements taken, V3 exhibited a moderate level of responses to that of V1 and V2 in both T1 and T2. For Ch, and CF, all 3 varieties responded equally in both T1 and T2 ($p>0.05$). V1 had the lowest percentage reduction for tuber and stolon DM and the highest increase for WUE at T2 compared to that at T1. Results concluded that V1 is a promising drought-tolerant potato variety compared to that of the designated drought-resistant varieties; V2 and V3.

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

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