Evaluation of Variations in Water and NPK-Use Efficiency of Selected Three Hybrid Capsicum Varieties When Grown in Three Different Media Compositions under a Controlled Environmental Conditions

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Selection of a conducive growth medium is indispensable for facilitating the optimal utilization of nutrients and water for capsicum plant growth and development in grow bag culture. This pot experiment had three hybrid capsicum varieties namely, "Muria (V1)", "Parthana (V2)", and "CH-19 (V3)" established in three different media compositions (MC); MC1 (Top Soil: Half Burned Paddy Husk (HBPH): Sand =2:1:1/2), MC2 (HBPH: Compost: Sand=1:1:1/2), and MC3 (Coconut husk pieces: Compost: HBPH= 1/2:1:1) from the seedling stage to maximum flowering under optimum growth conditions. Measurements and analyses included plant height (PH), leaf area index (LAI), number of flowers and pods (NF and NP, respectively), average pod weight (APW), plant dry weight (DM), plant nitrogen (Np), phosphorus (Pp), potassium (Kp), soil nitrogen (Ns), phosphorus (Ps), potassium (Ks) and NPK and water-use efficiency (N*UE and WUE, respectively). Results from the statistical data analysis revealed that the treatment combination effect was significant only for Np ($p<0.05$), Pp ($p<0.0001$), and Kp ($p<0.05$) amongst all measurements taken. The highest plant NPK were recorded for V1MC2, V2MC3, V3MC2 (Np), V2MC3 (Pp), and V3MC2, V3MC3 (Kp), respectively. DM of different plant parts were not significantly different between the MCs or varieties ($p>0.05$), except for DM of roots ($p<0.05$) where MC2 showed the highest amongst all. However, PH, LAI, FN, PN, APW, DM partitioning and Ns, Ps, and Ks economy showed complex treatment combination effects. Results concluded that WUE of plant vegetative plant parts, PN, and nitrogen use efficiency were the highest in MC2 and then in MC3 (soil less MCs) for all three varieties. When the cost of production and handling feasibility are also considered, MC3 was selected as the best MC for V1, V2, and V3 under the conditions tested.

Keywords: Capsicum, Cost of production, Media composition, Nutrient use efficiency, Water-use efficiency

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