

3.2.2 Mbwaga, Zabron. (2007). Quality and yield stability of orange fleshed sweet potato (*Ipomoea batatas* (L.) Lam.) varieties in different agro-ecological regions. (Supervisors: Dr. M. Mataa and Dr. Msabaha).

Orange fleshed sweet potatoes *Ipomoea batatas* (L.) Lam) have high β -carotene content which is useful in preventing vitamin A deficiency. Unfortunately suitable varieties of orange fleshed sweet potatoes are absent. The results from a Participatory Rural Appraisal (PRA) conducted in three villages of southern highlands of Tanzania revealed that, most varieties grown are white and cream fleshed. Yields mentioned were very low ranging from 4.5 to 7.0tha⁻¹. A gap difference of 15.5tha⁻¹ from potential yield mean was estimated. Based on the above findings, a study was conducted to determine the adaptability of orange fleshed sweet potato varieties in different agro-ecologies, so as to identify varieties which suit the wider environments. Specifically, the objective was to determine beta-carotene and yield stability across different environments. Multi-locational field trials involving 12 yellow/orange-fleshed sweet potato varieties were conducted at six different locations (altitude range from 495 and 1,798 meters above sea level) in the southern highlands of Tanzania. A Randomized Complete Block Design was employed. Tuber yield and β -carotene content of the roots were determined at maturity. β -carotene concentration of the roots was analyzed by high performance liquid chromatography method. Results showed that genotype and environment influenced β - carotene concentration of sweet potato roots. Varieties 199024.1, SPK004, 101055 and Resisto produced high concentrations of β - Carotene. These were 28.74, 28.30, 27.8 and 27.71g/100g respectively. Out of these, varieties 199004.2 (b=0.89) and 101055 (b=0.78) were considered to have stable performance in terms of β - carotene content across sites. Variety 101055 with both high β -Carotene and stable performance suggested wider adaptation. The β - carotene content in sweet potato roots showed no clear trends with increasing or decreasing altitude for most of the varieties tested. Yields were significantly different ($P \leq 0.05$) among varieties and across sites. Varieties, Resisto 440443, SPNO, 102020.2, 199024.1 and Carot-Dar displaced near the center of AMMI biplot. These were considered stable in terms of yield performance, according to Additive Main effect and Multiplicative Interaction (AMMI) biplot. Out of these varieties, 440443 and 199024.1 had high yield and stability. These varieties were considered to have wider adaptation. Storage root yield and β -carotene showed low significant negative correlation ($r = -0.1092$, $P \leq 0.05$), while yield and dry matter, β -carotene and dry matter content were none significantly correlated. This effect signified possibility of getting varieties that can combine these traits at high levels through conventional breeding.