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Evaluation of White-fleshed Sweet Potato Clones for Storage Root Yield and Dry Matter Content

Sweet potato (*Ipomoea batatas* (L.) Lam.) is an important vegetatively propagated crop cultivated for its edible storage roots. It produces the highest energy (194 MJ ha^{-1} day^{-1}) and considerable yield with low inputs even in marginal lands (Woolfe, 1992). The storage roots and young leaves are used as a vegetable. The flesh colour of the storage roots varies from white to different shades of cream and yellow to dark orange depending on the carotene content. However, the white-fleshed sweet potatoes, which have no β-carotene content, are traditionally grown and preferred by the local population all over India. The choice of sweet potato variety is strongly correlated with the dry matter and starch content (Simmone et al., 1993). The present study was undertaken to assess the storage root yield and dry matter content of promising white-fleshed sweet potato clones identified from the poly-cross breeding programme.

The material for the study comprised of 15 white-fleshed clones selected from the preliminary yield trial. An advanced yield trial was conducted at Central Tuber Crops Research Institute (CTCRI), Thiruvananthapuram, Kerala, India, with 15 clones along with the control 'Sree Arun'. The experiment was planted in Randomized Block Design with three replications. Each clone was planted in 10 mounds per replication and in each mound four vine cuttings were planted. The distance within and between the rows were 90 cm. The crop was irrigated and raised by following the recommended package of practices (CTCRI, 2004). The trial was repeated for three seasons (April-July 2010, July-November 2010 and November 2010-February 2011). All the trials were harvested at 90 days after planting. The storage root yield of all the clones were recorded at the time of harvest. The root samples were analyzed in triplicate for dry matter content (AOAC, 2000). The storage root yield was analyzed statistically (Genstat, 2008).

Earlier studies by Vimala and Lakshmi (1991) showed that yield had association only with the size of storage roots and there was no significant association between yield and morphological characters. Hence, the analysis was done only for the marketable storage root yield. The data on storage root yield during different seasons are given in Table 1. It was found that there was significant difference in storage root yield among the clones. Seasonal influence on yield was observed in all the clones. In general, the storage root yield obtained during April-July season was comparatively lower than the other two seasons. During April-July season the yield ranged between 9-21 t ha^{-1} and the clone IGSP-10-22 produced significantly superior storage root yield of 21.24 t ha^{-1}. In the second season (July-November) the storage root yield varied from 11-29 t ha^{-1}. Five clones (IGSP14-6, IGSP10-6, SV3-27-5, IGSP10-24 and IGSP10-22) produced significantly superior yield of 27-29 t ha^{-1} compared to the control, Sree Arun (20 t ha^{-1}). The storage root yield of the third season (November-February) ranged from 11-30 t ha^{-1} and three clones (IGSP10-6, IGSP10-24 and IGSP10-22) produced significantly superior storage root yield of 26-30 t ha^{-1}. The data showed that the storage root yield of the second and third season was greater than the summer season and not much difference in storage root yield was observed in all the clones between these two seasons. This may be due to the prevalence of low night temperature which influenced the storage root bulking. The low storage root yield of certain clones may be due to poor adaptability in certain environments. The mean storage root yield data for the three seasons showed that highest yield was recorded in IGSP10-22 (26.85 t ha^{-1}) followed by IGSP10-24 (23.98 t ha^{-1}) and IGSP10-6 (23.10 t ha^{-1}). The clones SV3-27-5 and IGSP14-6 also produced significantly greater yield (22.44 and 22.21 t ha^{-1} respectively) compared to the control, Sree Arun (18.61 t ha^{-1}). The studies of Haldavankar et al. (2009) showed that some sweet potato cultivars had wider adaptability and produced stable storage root yield at different environmental conditions. Gruneberg et al.

Table 1. Storage root yield and dry matter content of white-fleshed clones in three different seasons

Clones	Storage root yield (t ha^{-1})				Mean dry matter (%)
	April-July 2010	July-November 2010	November 2010-February 2011	Mean yield	
IGSP14-6	18.93	24.24	23.46	22.21	33.10
IGSP14-8	15.06	19.96	21.44	18.82	28.15
IGSP10-6	18.44	24.20	26.67	23.10	32.15
IGSP10-17	12.68	17.45	16.50	15.54	30.10
IGSP10-22	21.24	28.81	30.49	26.85	27.85
IGSP10-24	18.89	26.59	26.47	23.98	32.60
SV3-27-1	16.30	18.81	20.78	18.63	27.60
SV3-27-4	9.18	11.44	11.52	10.71	26.68
SV3-27-5	19.30	24.03	23.99	22.44	28.80
S1-9	17.98	20.54	20.17	19.56	32.60
S1-11	11.73	14.36	13.91	13.33	37.10
CO3-4-8	13.95	20.17	20.78	18.30	32.65
CO3-4-9	7.82	14.40	14.40	12.21	34.71
ST10-11	7.82	15.43	16.67	13.31	27.30
SV280-9	14.20	18.64	22.84	18.56	28.30
Sree Arun	16.50	20.00	19.34	18.61	25.45
CD (0.05)	3.09	3.95	4.28		

(2005) reported that some high yielding genotypes had wider adaptability, while some genotypes had specific adaptation for medium to high yielding environments and low yielding environments.

The dry matter content was positively correlated with the starch content of the storage root. Juritz (1921) pointed out that dry matter was also used as an indicator of starch content. The dry matter content (Table 1) of the 16 clones varied from 25-37%. The data indicated that eight clones possessed >30% dry matter. The highest dry matter content of 37% was recorded in the clone S1-11 followed by CO3-4-9 (35%). However, both the clones produced low mean storage root yield of 12-13 t ha^{-1}. In seven clones, the dry matter content was 27-29%. The highest storage root yield of 21-30 t ha^{-1} was recorded in the clone IGSP10-22, with a dry matter content of 28%. All the clones possessed high dry matter content than the control, Sree Arun (25%). Bradbury and Holloway (1988) reported that the average dry matter content in sweet potato was approximately 30% and it varied widely depending on factors such as cultivar, location, climate, day length, soil type, incidence of pests and diseases and cultivation practices. In the present study, it was observed that it varied from 25-37%. Anon (1981) and Cereda et al. (1982) suggested that the dry matter content of Taiwanian and Brazilian lines of sweet potato ranged up to 35.1% and 48.2%, respectively. Storage roots with high dry matter content were found to be more suitable for secondary processed foods as they dried fast when processed and remained firm (Rees et al., 2003; Gasura et al., 2008). Evaluation of the promising clones at different seasons has enabled the identification of sweet potato clone, IGSP10-22, having high yield with medium dry matter content and IGSP14-6, IGSP10-6 and IGSP10-24 possessing high yield and high dry matter content.

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