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Short Communication

Performance of sweet potato germplasm in arid region of north western Rajasthan

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The tuber crops are among oldest on earth. In many areas, especially in the wet tropics, they were the only staples and fed extensive populations before the introduction of cereals. Today, they represent the second most important set of food crops in developing countries, closely followed the cereals (Rathore, 2016). They are produced with low inputs but are an important source of income and employment in marginal areas. These crop are mostly consumed by the poorest, they contribute greatly to food security and are held in high esteem culturally (Lebot, 2009). Sweet potato [*Ipomoea batatas (L). Lam.*] belonging to the family *convolvulaceae* is an important tuberous root crop having tremendous potential for utilization in food, feed and industrial sectors, especially for the production of starch, flour, glucose and alcohol. They are good sources of vitamin A, C, B2, B6 and E as well as dietary fibre, K, Cu, Mn and Fe. The high nutrient content coupled with its anticarcinogenic and cardio-vascular disease preventing properties has gained recognition for the crop as a health food (John, 2011). They are widely grown in the tropics and warm temperate regions of the world. In developing countries, it is ranked fifth in economic value, sixth in dry matter production, seventh in energy production and ninth in protein production (Lobenstein, 2009). In India, it is the third most important tuber crop after potato and cassava. Globally, India occupies twelfth, eighth and fifth rank in area, production and productivity respectively. It is cultivated predominantly as a rainfed crop in Eastern India, especially in Orissa, West Bengal, Uttar Pradesh, Bihar and Jharkhand, accounting for 77% of area and 82% of production (Edison et al., 2009). Sweet potato can be grown in a wide range of soils and climate. Sweet potato can be grown on a wide range of soil types but sandy or sandy loam soils having good porosity and aeration with reasonably high organic matter content and permeable sub soil are ideal (Jansson and Ramon, 1991, Bouwkamp (1985).

Sweet potato is not a new crop for the state of Rajasthan but mostly confined to the areas with better soil and good rainfall conditions like; Ajmer, Barmer, Bundi, Dholpur, Jodhpur, Jalor, Jhalawar, Nagaur, Sikar, Udaipur. In Rajasthan, sweet potato is grown in 693 ha with a production of 2629 t. (Directorate of Horticulture, 2014). Rajasthan being the largest state of India and blessed with various ecological zones but maximum area (49.61%) is under hot arid zone. The twelve district of north-western Rajasthan (Barmer, Bikaner, Churu, Sri Ganganagar, Hanumangarh, Jaisalmer, Jalore, Jhunjhunu, Jodhpur, Nagaur, Pali and Sikar) accounts for 63.4% area of the hot arid realm of the country (Saroj *et al.* 2004), where very negligible area is under sweet potato cultivation. The main reasons of non-adoption of sweet potato in hot arid region are; sandy soils with poor fertility and subjected to wind erosion, very low (average of about 213 mm/ annum) and erratic rainfall, extremes of temperature and frost during winter, poor water resource, lack of situation specific knowledge about scientific cultivation of sweet potato *etc.*

Therefore, in order to increase the area under sweet potato, there is need to venture non-traditional areas like hot arid zone under sweet potato cultivation through better scientific management as per edaphoclimatic conditions. Keeping above facts in view, at attempt was made to assess the performance of sweet potato varieties at ICAR-Central Institute for Arid Horticulture, Bikaner (Rajasthan).

An investigation was carried out at Experimental Farm of ICAR-Central Institute for Arid Horticulture, Bikaner (Rajasthan) to assess the performance of sweet potato cultivars under hot arid region during consecutive year 2017. The experiment was laid out in factorial randomized block design and replicated six times. The analysis of variance was done. The rooting cuttings of three sweet potato cultivars *viz. Sree Bhadra, CO 3-4, Sree Arun, Local-1 and Local-2* were procured from AICRP on tuber crop and two strain local-1 and local-2 were collected from farmer's field. Cuttings were planted in the 1nd week of July during the years under with recommended management practices. In this experiment, 1/3rd of N was applied through neem coated urea and DAP in side-band along with a uniform dose of 80 kg P_2O_5 through di-ammonium phosphate and 100 kg/ ha K_2O through muriate of potash during planting time while 1/3rd of N was applied as through neem coated urea at 35 days after planting *i.e.* at the time of earthing up and the remaining 1/3rd N was applied through neem coated urea at 50 days after planting *i.e.* at the time of bulking stage. The vines were cut at 160 days. Irrigation was applied through sprinklers at weekly intervals. The observation on

growth parameters viz., vine length, number of vines/plant and number of leaves/plant at 35 days was recorded. The yield and yield attributing characters of tubers were recorded after harvesting of the sweet potato.

Various growth parameters *viz.*, initiation of buds from cuttings, vine length (cm), number of leaves/plant and number of vines/plant for all the varieties grown has been recorded at different days after planting. Data presented in table 1 and fig no. 1 and 2 data indicated that as days of planting advances in different days, all vegetative growth parameters were increased irrespective of variety. The mean vine length at 60, 70, 80 and 90 days after planting in Sree Bhadra, CO 3-4, Sree Arun, Local-1 and Local-2 were 108, 96, 100, 91, 97 respectively.. Meanwhile, the mean of days to initiation buds, number of leaves at 35 DAP and number of vines/ plant at 35 DAP were 13.4, 63.8, 2.78. Among different sweet potato varieties, maximum mean vine length was 108 cm and recorded in Sree Bhadra followed by Sree Arun (99.75 cm) followed by Local-2 (97.25 cm), while minimum in Local-1 (91.25). However, the number vines and number of leaves/ plant did not follow the same trend, which is obvious that these variations are due to their genetic nature of the variety.

Data presented in table 2 regarding yield and yield attributing characters of different sweet potato cultivars revealed that mean number tuber yield/plant was 3.3 irrespective of cvs, thought the tuber yield/plant varied significantly giving highest number tuber/plant in Local-2 (3.9) followed by Local-1 (3.8), CO 3-4 (3.6) while lowest number of tuber yield/plant was recorded in Sree Bhadra (2.2). As far as average tuber weight is concerned more than 100g tubers were obtained in Co-3-4 (126g) and Local-2 (129 g) while minimum average weight of tuber was observed in Sree Bhadra (28g). The mean tuber yield/plant was recorded 317g with highest yield/plant in Local-2 (502g) followed by CO-3-4 (454g) and lowest tuber yield/plant was recorded in Sree Bhadra (62g). The tuber yield/ha also varied significantly among different cultivars. The highest tuber yield was recorded in Local -2 (277 q/ha) followed by Co-3-4 (249 q/ha), Local-1 (175 q/ha) and minimum yield in Sree Bhadra (34 q/ha). These observations suggest that Co-3-4 were high yielder while Sree Bhadra was low yielder under hot arid region.

Sweet potato cultivars differ in their growth and yield potential; hence there is a differential response to agro-climatic conditions and bulking rate even if they belong to same maturity group. Duynisveld *et al.*, (1988) and Sharifi *et al.*, (2007) have also reported that different cultivars of sweet potato behave different in term of yield and bulking rate.

It can be concluded from the present study that yield of sweet potato can be improved markedly by exploiting varietal differences in sweet potato. Sweet potato cultivars showed wide variation in yield in western Rajasthan. Local-2 and CO 3-4 was the highest yielder and agronomically most efficient variety. These variety were more suitable than the other most common varieties of the region and convert, it into yield most economically. Sweet potato has great potential in the state in the arid part of Rajasthan. Presently the major constraint is the availability of quality planting material. As the tuber crops are vegetative propagated, using quality disease free planting material is important to reap good harvest of crops. Besides, tuber crops requires huge amount of mother corms which necessitate huge transpottation cost and logistic facilities. Extremity in weather is another factor responsible for the low productivity of tuber crops. Rajasthan state is having highest rainfall variation in the country. Extreme weather conditions can adversely affect tuber production.

Table1. Sweet potato performance in the non-traditional areas of western Rajasthan

Varities/germplasm	No. of tuber/plant	Avg. weight of tuber (g)	Yield/plant (g)	Yield (q/ha)
Sree Bhadra	2.2	28	62	34
CO-3-4	3.6	126	454	249
Sree Arun	2.8	89	247	136
Local-1	3.8	84	318	175
Local-2	3.9	129	503	277
Mean	3.3	91	317	174

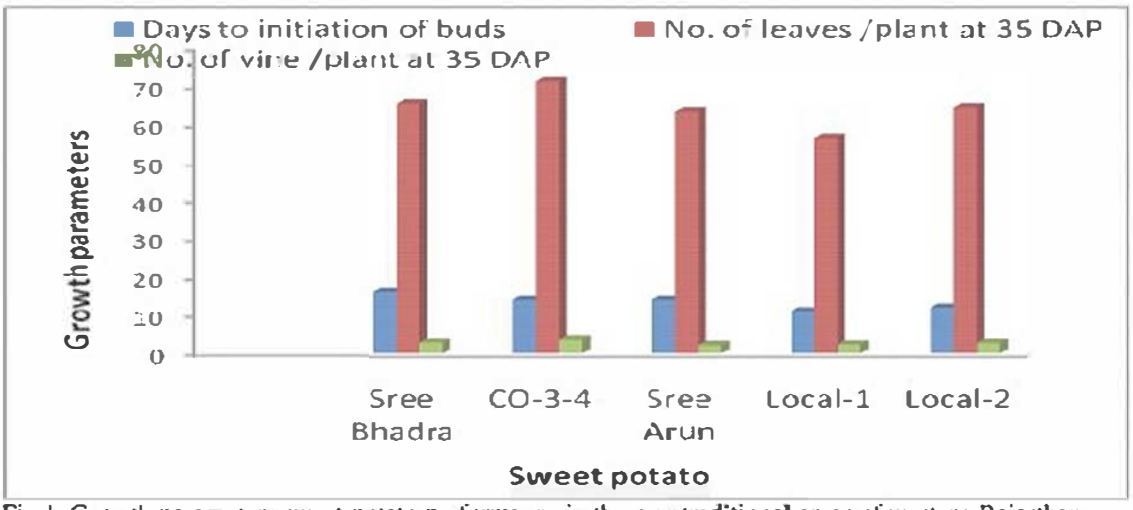

Fig.1: Growth parameters sweet potato performance in the non-traditional areas of western Rajasthan

Fig.2: Vine length sweet potato performance in the non-traditional areas of western Rajasthan

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