

PERFORMANCE OF SWEET POTATO VARIETIES IN HILLY AREA

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Abstract

The experiment was conducted at the research field of Hill Tract Agricultural Research Station, Ramgarh, Khagrachari during *Rabi* season of 2012-2013 and 2013-14. Five different sweet potato varieties (BARI Sweetpotato-6, BARI Sweetpotato-7, BARI Sweetpotato-8, BARI Sweetpotato-9 and local cultivar) were included as treatment variables in the experiment. BARI Sweetpotato-7 had significantly more number of vines (8.30) as compared to local cultivar and other new varieties such as BARI Sweetpotato-6, BARI Sweetpotato-8 and BARI Sweetpotato-9. Maximum number of tuber plant⁻¹ (5.4 and 5.3), tuber length (15.30 and 15.80 cm), tuber diameter (5.10 and 5.20 cm), individual tuber weight (368.35 and 377.69 g) and tuber yield (19.89 and 20.13 t ha⁻¹) was recorded from BARI Sweetpotato-9 during 2012-13 and 2013-14, respectively whereas local cultivar gave minimum values. The variety BARI Sweetpotato-9 out yielded local cultivar by 108.93 and 103.13 % during two consecutive years but highest net income (3,10,818 and 3,15,617 Tk. ha⁻¹) from BARI Sweetpotato-7.

Introduction

Sweet potato (*Ipomea batatas* L.) is a cheap source of calories (Adam, 2005) belonging to the family Convolvulaceae, order Polemoniales (Burden, 2005) and is ranked third most important tuber crops after potato (*Solanum tuberosum*) and cassava (*Manihot esculentum*) (FAO, 2003). Orange flesh sweet potatoes are rich in β -carotene. The crop can adapt to a wide range of environmental conditions and grow on marginal areas with poor soils of limited fertility and inadequate moisture (BNC, 2004) with low inputs. It plays a vital role in the daily diet poor men food in Bangladesh. The average yield of sweet potato in Bangladesh is only 9.27 tons per hectare (BBS, 2001), compared to the average world yield of 14.9 tons per hectare (FAO, 2001). The area and total production of sweet potato in Bangladesh are decreasing day by day due to lack of good varieties, relatively long crop duration, post-harvest losses, increasing irrigation facilities turned the growers to grow other cash crops (rice, wheat, potato, maize etc.) Plant characters and yield of sweet potato varied widely among the varieties (Yadav *et al.*, 1996; Anonymous, 1992). The Bangladesh Agricultural Research Institute (BARI) has recently developed several new varieties of sweet potato with yield potential of 25-30 t/ha, but these varieties are not yet available for farmers of the Chattagong Hill Tracts. The total area of Chattagong Hill Tracts is estimated around 13,237 ha which is about 10% of total land area of the country. After harvest of T.aman there is wide scope to grow high yielding sweet potato varieties because farmers of this area cultivate local cultivars of sweet potato which is poor yielder. Thus, high yielding sweet potato can supplement as a good source of food for mainly marginal farmer of hilly region. With this view, the present study was conducted to find out the performance of recently developed high yielding varieties of sweet potato in the hilly region.

Materials and Methods

The experiment was conducted at research field of Hill Tract Agricultural Research Station, Ramgarh, Khagrachari during *Rabi* season of 2012-13 and 2013-14. The soil of this hill area belongs to AEZ 29 and acidic in nature. Five different sweet potato varieties (BARI Sweetpotato-6, BARI Sweetpotato-7, BARI Sweetpotato-8, BARI Sweetpotato-9 and local cultivar) were included as treatment variables. The trial was laid out in a randomized complete block design with four replications. Vine of sweet potatoes 30 cm long cuttings with 3 - 4 nodes were planted on 16 November, 2012 and 20 November, 2013 maintaining spacing of 60 cm x 30 cm. Fertilizers at the rate of 160-150-180 kg ha⁻¹ of N P K in the form of urea, triple super phosphate (TSP) and muriate of potash (MoP), respectively along with cowdung 10 ton/ha and lime 3 ton/ha. The full amount of lime, cowdung, TSP, MoP, and 1/2 Urea were applied as basal during final land preparation. The remaining of urea and MoP was side dressed at 60 days after planting (DAP). Irrigation, weeding, earthingup and insecticides were applied as when required. It was harvested after 150 DAP when the vines were turned to dry as brown color. Different varietal characteristics and yield contributing characters were recorded. The collected data were analyzed statistically and means were separated using LSD test at 5% level of significance.

Results and Discussion

Average number of vine, length of the vines/ plant and weight of above-ground biomass/plant during 2012-13 and 2013-14 were shown in Table 1. All the varieties were showed identical number of vines. However, BARI Sweetpotato-7 was more number of vines (8.30) which was at par to BARI Sweetpotato-9 as compared to local cultivar. Variation in branching might be due to the varietal characteristics. The results of the experiment are in agreement with the findings of Hossain (1995). The variety BARI Sweetpotato-7 was recorded the highest length of vine (291.40 cm). The other modern varieties (BARI Sweetpotato-6, BARI Sweetpotato-8, BARI Sweetpotato-9) had second highest length of vines ranged between 240 and 244.67 cm while local cultivar gave the lowest length of vine (170.50 cm). The highest weight of above-ground biomass/plant was found from BARI Sweetpotato-7 (0.95 kg plant⁻¹) which was at par with that of BARI Sweetpotato-9 (0.85 kg plant⁻¹) and lowest from local cultivar (0.65 kg plant⁻¹).

Table 1. Average number of vine plant⁻¹, length of the vines and weight of above-ground biomass plant⁻¹ of modern varieties and local cultivar of sweet potato was grown in hilly region in two seasons

Varieties	No. of vines plant ⁻¹	Length (cm) of vine	Wt. (kg) of above-ground biomass plant ⁻¹
BARI Sweetpotato-6	6.55	242.4	0.80
BARI Sweetpotato-7	8.30	291.40	0.95
BARI Sweetpotato-8	7.30	244.67	0.80
BARI Sweetpotato-9	8.00	240.00	0.85
local cultivar	6.00	170.50	0.65
LSD _(0.05)	0.03	3.54	0.10
CV (%)	2.26	7.71	6.42

Plant population, yield and yield contributing characters of sweet potato varieties were presented in the Table-2 & 3. Numerically the maximum number of tuber/plant (5.4 and 5.3) were recorded from BARI Sweetpotato-9 during 2012-13 and 2013-14, respectively while lowest

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number of tuber/plant was recorded from local cultivar (Table 2). Farooque and Husain (1973) also reported that the number of tubers/ plant varied from 4.70 to 11.76 while Siddique (1985) found from 1.73 to 6.03.

Table 2. Number of plants m⁻², tuber plant⁻¹, individual tuber wt. and length of individual tuber of modern varieties and local cultivar of sweet potato was grown in hilly region in two season

Treat	No. of plants m ⁻²	No. of tuber plant ⁻¹		Individual tuber wt. (g)		Length of individual tuber (cm)	
		2012-13	2013-14	2012-13	2013-14	2012-13	2013-14
BARI Sweetpotato-6	4.5	4.7	5.0	272.85	297.27	12.50	13.50
BARI Sweetpotato-7	4.5	5.3	5.2	300.61	329.38	14.50	14.50
BARI Sweetpotato-8	4.4	3.7	4.2	308.5	318.11	13.40	14.60
BARI Sweetpotato-9	4.3	5.4	5.3	368.35	377.69	15.30	15.80
Local Cultivar	4.0	3.8	3.8	250.5	260.78	11.50	12.50
LSD _(0.05)	NS	NS	NS	1.29	1.59	0.90	0.87
CV (%)	3.72	5.46	5.78	4.31	5.45	5.58	7.78

Individual tuber weight (368.35 g and 377.67 g), length of individual tuber (11.50 and 12.50 cm), diameter of individual tuber (3.50 cm and 4.00 cm) and dry matter content of individual tuber (26.09 and 27.00 %) were maximum with BARI Sweetpotato-9 during 2012-13 and 2013-14, respectively. Local variety had lower values in all these parameters; tuber weight (250.5 g and 260.78 g), length of tuber (15.30 and 15.80 cm), diameter of tuber (5.10 cm and 5.20 cm) and dry matter content of tuber (33.30 and 34.00 %) for, respectively. The results of the present study were in agreement with the report of Vasconcellos *et al.* (1986). The other modern varieties; BARI Sweetpotato-7, BARI Sweetpotato-8 and BARI Sweetpotato-6 were superior than local one. The variety BARI Sweetpotato-9 showed the maximum tuber yield (19.89 t ha⁻¹ and 20.13 t ha⁻¹) followed by BARI Sweetpotato-7 (15.93 and 17.13 t ha⁻¹) in both the years (Table 3). Local cultivar showed the lowest yield (9.52 t ha⁻¹ and 9.91 t ha⁻¹). The yield increased over local one was 108.93 and 103.13 %.

Table 3. Diameter of individual tuber, dry matter content of individual tuber, yield of tuber of modern varieties and local cultivar of sweet potato and yield increase over local cultivar tested in hilly region in two seasons

Treatment	Diameter of tuber (cm)		Dry matter content tuber ⁻¹ (%)		Tuber yield (t ha ⁻¹)		Yield increase over local (%)	
	2012-13	2013-14	2012-13	2013-14	2012-13	2013-14	2012-13	2013-14
BARI Sweetpotato-6	4.38	4.40	30.50	31.25	12.69	14.80	33.29	49.39
BARI Sweetpotato-7	4.40	4.50	31.25	32.00	15.93	17.13	67.33	72.84
BARI Sweetpotato-8	4.50	4.70	31.00	31.50	11.41	13.36	19.91	34.82
BARI Sweetpotato-9	5.10	5.20	33.30	34.00	19.89	20.13	108.93	103.13
Local Cultivar	3.50	4.00	26.09	27.00	9.52	9.91	-	-
LSD _(0.05)	0.16	0.25	1.17	1.25	0.05	0.10	-	-
CV (%)	2.05	2.50	2.00	2.75	0.00	1.75	-	-

The other tested varieties had 33.29 – 72.84% more yield over local one. These results were similar to the findings of Jahan and Siddique (2001), Siddique *et al.* (1988), Basuca *et al.*

(1990), Anonymous (1992), Hossain and Mondal (1994) and Bahera and Jha (1995). It is noted that the potential yield of these potato varieties is 40-45 t ha⁻¹ but all the varieties produced lower tuber yield in the hilly region. It might be due to prevailing lower temperature during November to February when average temperature was below 24°C in both the growing season. Sweet potato grows best where average temperature is 24°C (Kay, 1973).

The highest gross and net income from BARI Sweetpotato-9 was highest (Tk. 310818 ha⁻¹ and Tk. 315617 ha⁻¹) during 2012-13 and 13-14, respectively but other modern variety did not perform well but higher return than local cultivar (Tk. 1,03,380 ha⁻¹ and Tk. 1,11,192 ha⁻¹) (Table 4).

Table 4. Estimated net income of modern varieties and local cultivar of sweet potato was cultivated in hilly region in two seasons

Treatments	Tuber yield (t ha ⁻¹)		Gross Income (Tk. ha ⁻¹)		Net Income (Tk. ha ⁻¹)	
	2012-13	2013-14	2012-13	2013-14	2012-13	2013-14
BARI Sweetpotato-6	12.69	14.80	253750	296080	166750	209080
BARI Sweetpotato-7	15.93	17.13	318653	342555	231653	255555
BARI Sweetpotato-8	11.41	13.36	228290	267212	141290	180212
BARI Sweetpotato-9	19.89	20.13	397818	402617	310818	315617
Local Cultivar	9.52	9.91	190380	198192.8	103380	111192

Conclusion

The results of the present study indicated that BARI Sweetpotato-9 and BARI Sweetpotato-7 would be suitable sweet potato varieties for cultivation in hilly region of Bangladesh.

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