

## Evaluation of Twenty Five Sweet Potato Genotype

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### ABSTRACT

An experiment was carried out with twenty five sweet potato genotypes namely SP52, SP53, SP54, SP55, SP56, SP57, SP58, SP59, SP60, SP61, SP62, SP63, SP64, SP65, SP66, SP67, SP68, SP69, SP70, SP71, SP72, SP73, SP74, SP75 and SP76 at the Horticulture Farm, Bangladesh Agricultural University, Mymensingh, to evaluate their yield and yield contributing characters. Each genotype was grown on the unit plot (3.0 m × 2.4 m) with spacing of 60 cm × 30 cm. The genotype SP57 produced maximum vine length (299.0 cm) followed by SP63 (289.2 cm) while the minimum length of vine was recorded from SP72 (59.9 cm). The highest weight of vine (600.0 g) per plant was recorded in the genotype SP52 and SP55, while lowest weight of vine (95.0 g) was produced by SP65. The highest average tuber weight (351.7 g), average length of tuber (14.5 cm) and average diameter of tuber (8.1 cm), weight of tuber per plant (1055.0 g), yield (58.61 t ha<sup>-1</sup>) were found in SP52. The genotype SP76 gave the highest dry matter percentage (38.1) while the lowest dry matter percentage (20.1) was recorded in SP53. Considering tuber length, diameter, average weight of tuber, tuber yield and characteristics the genotype SP52 can be recommended for inclusion in the breeding program and release as new variety in the Mymensingh district of Bangladesh.

## Introduction

Sweet potato (*Ipomoea batatas* Poir.) is an important root crop in Bangladesh and commonly known as "Misti Alu". It belongs to the family Convolvulaceae. The crop is believed to be originated in central America from there it was disseminated first to tropical islands of the Pacific and later to tropical Asia and Africa by the Spanish and Portuguese explorers or traders after Columbus (Thompson & Kelly, 1957). Rashid et al. (1982) reported that sweet potato was introduced into the area now constituting Bangladesh during the second half of the 19<sup>th</sup> century. It occupies an area of 61,000 acres of land with an annual production of 253,000 metric tons (BBS, 2012). Sweet potato is a high calorie producing crop. Its yield per hectare is higher than any cereal. Roots of sweet potato are rich in starch. Leaves and stem tips of its vine are used as green vegetable, salad and cattle feed (AVRDC, 1976). Diversified products can be prepared from sweet potato (Soenarzo, 1989). The average yield of sweet potato in Bangladesh is lower than the world average yield. There are a lot of sweet potato genotypes in Bangladesh. Some of them representing broader genetic base, better characteristics and suitable for specific agro ecological condition. Information on yield contributing characters and yield potential of different sweet potato genotypes growing under different regions of Bangladesh is scanty. Therefore, the study was undertaken to identify the most suitable sweet potato genotype as well as to record detailed information on yield contributing characters and yield of some sweet potato

genotypes grown at Mymensingh district of Bangladesh.

## Materials and Methods

### Experimental site

A field trial was conducted at the Horticulture Farm, Bangladesh Agricultural University, Mymensingh. The experimental site is located at 24.6°N latitude and 90.5°E longitude. The selected land was medium high with adequate irrigation and drainage facilities. The soil belongs to the Brahmaputra Alluvial Tract, sandy loam in texture having pH 6.6 (Edris et al., 1979). The study area is generally characterized by a moderate weather condition (Fig. 1). During the culture period the mean air temperatures were ranges from 18.16-28.56 °C and relative humidity ranges from 72-87.2%.

### Planting materials and cultivation procedure

Twenty sweet potato genotypes namely SP52, SP53, SP54, SP55, SP56, SP57, SP58, SP59, SP60, SP61, SP62, SP63, SP64, SP65, SP66, SP67, SP68, SP69, SP70, SP71, SP72, SP73, SP74, SP75 and SP76 were collected from various regions of Bangladesh and used in the study. These potato genotypes were considered as the experimental treatments. The unit plot size was 3.0 m × 2.4 m. Spacing was 60 cm × 30 cm. The crop was manured and fertilized as per schedule described by Hossain and Siddique (1985). Vine cutting (30 cm in length with at least 6-7 nodes) were used as the planting materials. All other

intercultural operations were done as and when necessary. Harvesting was done by cutting off the basal portion of vine with the help of sickle and digging out the tuberous roots with spade and stored in thatched house condition at Horticulture Farm, Bangladesh Agricultural University, Mymensingh.

**Date collection and statistical analysis**

For collection of data ten plants were selected at random from each line and data on maximum

length of vine, average number of main stem per plant, weight of vine per plant, number of tuber per plant, average weight of tuber, average length of tuber, average diameter of tuber, dry matter percentage, weight of tuber per plant and yield of tuber per hectare were recorded. Measurement was made with the help of measuring scale and balance. The compiled data were analyzed for measuring range, mean, standard error of mean and coefficient of variance using Microsoft Office Excel package.

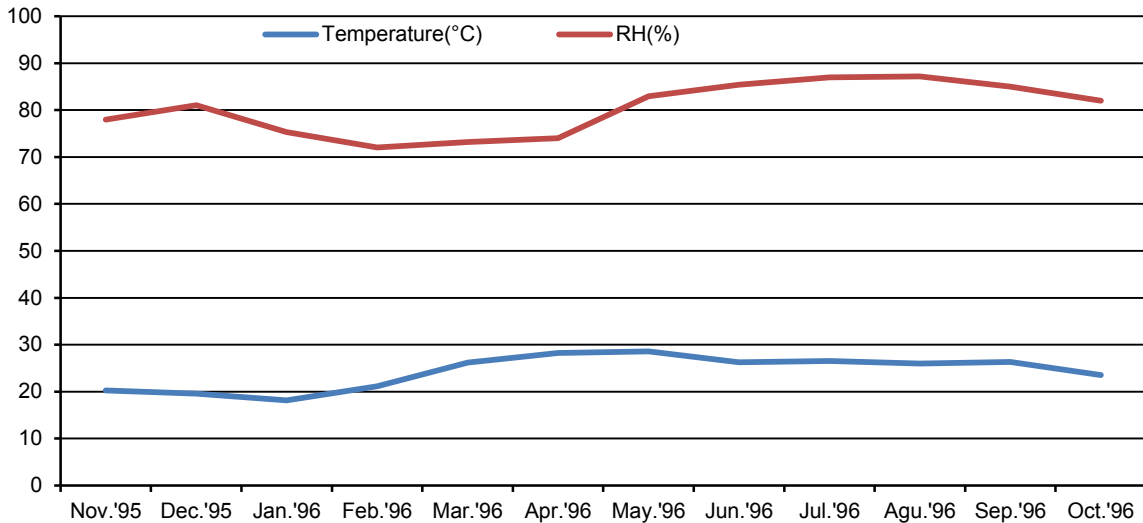


Fig. 1. Monthly mean air temperature and relative humidity during the crop growing period at the Horticulture Farm, Bangladesh Agricultural University, Mymensingh.

**Results and Discussion**

**Maximum length of vine**

There was wide variation among the genotypes in respect of maximum length (Table 1). The genotype SP57 produced maximum vine length (299.0 cm) followed by SP63 (289.2 cm) while the minimum length of vine was recorded in the genotype SP72 (59.9 cm). The genotypes SP52, SP54, SP55, SP65, SP67, SP68, SP70 SP72 and SP73 produced vine length less than 125.0 cm while greater than 200.0 cm vine length was recorded in the genotypes SP53, SP57, SP58, SP63, and SP69. Rest of the genotypes produced vine length between 125.0 and 200.0 cm.

**Average number of main stem per plant**

Average number of main stem per plant among the genotypes ranged from 1.3 to 5.3 (Table 1). The highest number of main stem per plant (5.3) was recorded in the genotype SP55 followed by SP72 (4.6) and SP73 (4.4). The genotype SP76 produced the lowest number (1.25) of main stem per plant. Nine genotype namely, SP53, SP58, SP62, SP63, SP66, SP67, SP71, SP74, and SP76 produced on an average less than 2.5 main stem per plant while SP55 and SP72 had more than 4.5. The rest of the genotypes had the main stem in between 2.5 and 4.5.

**Weight of vine per plant**

The genotypes of sweet potato were significantly different in respect of weight of vines per plant (Table 1). The highest weight of vine (600.0 g) per plant was recorded in the genotype SP52 and SP55, while lowest weighty of vine (95.0 g) was produced by the genotype SP65. Vine weight less than 250.0 g per plant was found in the genotypes SP54, SP59, SP62, SP65, SP66, SP67, SP68, SP72, and SP74. On the other hand vine weight greater than 550.0 g per plant was found in the genotypes SP52, SP55, SP57 and SP75. Rest of the genotypes produced average vine weight in between 250.0 and 550.0 g.

**Number of tuber per plant**

The genotypes showed wide variation in the number of tubers per plant (Table 1). The highest number of tuber per plant was observed in the genotype SP70 (5.1) and the lowest in, SP54 (1.5). Number of tuber per plant less than 3.0 was observed in the genotypes SP54, SP64, SP65, SP69 SP72 and SP76. On the other hand genotypes SP66, SP67, SP70 and SP73 produced more than 4.5 tuber per plant. Rest of the genotypes produced average vine weight in between 3.0 and 4.5.

### Average diameter of tuber

The average diameter of tuber varied markedly among the genotypes under study (Table 1). The maximum diameter (8.1 cm) was recorded in SP52

and the lowest average diameter of tuber was observed in the genotype SP76 (3.3 cm). Tuber diameter in between 3.4 cm and 7.7 cm was observed from the rest of the genotypes.

**Table 1.** Maximum length of vine, average number of main stem per plant, weight of vine per plant, number of tuber per plant and average diameter of tuber of 25 sweet potato genotypes at harvest.

Genotype	Maximum length of vine(cm)	Average number of main stem <sup>plant</sup> <sup>-1</sup>	Weight of vine plant <sup>-1</sup> (g)	Number of tuber plant <sup>-1</sup>	Average diameter of tuber (cm)
SP52	101.0	4.2	600.0	3.0	8.1
SP53	297.9	2.3	470.0	4.1	5.2
SP54	83.0	2.8	190.0	1.5	4.6
SP55	124.4	5.3	600.0	4.0	4.4
SP56	154.8	4.1	550.0	3.1	5.0
SP57	299.0	2.8	580.0	3.3	7.7
SP58	243.5	2.4	325.0	3.9	4.8
SP59	192.5	2.5	200.0	3.5	4.6
SP60	163.1	3.1	290.0	4.2	4.1
SP61	152.6	3.1	320.0	3.2	4.1
SP62	170.8	1.5	150.0	4.0	3.4
SP63	289.2	1.3	550.0	3.5	5.1
SP64	183.8	3.5	250.0	2.4	5.6
SP65	97.0	3.1	95.0	2.7	5.3
SP66	177.9	1.8	200.0	4.6	5.7
SP67	116.0	1.9	180.0	4.6	4.1
SP68	75.8	4.2	200.0	3.1	4.3
SP69	237.0	3.4	360.0	1.8	6.1
SP70	83.0	3.8	250.0	5.1	4.0
SP71	195.4	1.8	420.0	4.0	5.8
SP72	59.9	4.6	120.0	2.6	4.8
SP73	88.6	4.4	380.0	5.0	5.1
SP74	172.4	2.0	240.0	3.4	4.7
SP75	136.4	2.8	580.0	4.2	6.3
SP76	198.8	1.3	275.0	2.5	3.3
Mean	163.8	2.96	335.0	3.5	5.0
Range	59.9-299.0	1.3-5.3	95.0-600.0	1.5-5.1	3.3-8.1
SE	70.1	1.1	164.3	0.93	1.1
CV%	42.8	37.5	49	26.6	22.7

### Average weight of tuber

There was remarkable variation among the 25 sweet potato genotypes under investigation in respect of average weight of tubers (Table 2). The average weight of tubers varied from 67.4 to 351.7 g. The lowest average weight per tuber was recorded in SP67 (67.4 g.) while the highest average weight per tuber was found in SP52 (351.7 g). The average weight per tuber of the genotype SP54, SP55, SP56, SP58, SP59, SP60, SP61, SP62, SP63, SP65, SP66, SP68, SP70, SP72, SP73, SP74 and SP76 were in between 70.0 and 190.0 g. Rest of the genotypes produced average weight of tuber in between 191.0 to 310.0 g.

There was wide variation in per cent dry matter content of tuberous roots among the genotypes (Table 2). The dry matter percentage of sweet potato ranged between 20.1% (SP53) and 38.1% (SP76). The highest dry matter percentage was found in the genotype SP76 (38.1%) followed by SP73 (35.1%), SP56 (34.8%), SP72 (34.5%) and SP68 (34.2%). The lowest dry matter percentage was recorded in the genotype SP53 (20.1%). Three genotypes namely, SP53, SP57 and SP75 contained less than 23.0% dry matter. SP54, SP56, SP62, SP68, SP69, SP70, SP71, SP72, SP73, and SP76 contained more than 30.0% dry matter while rest contained dry matter in the range of 23.0-30.0%.

### Average length of tuber

A wide variation was observed in average length of tuber among 25 sweet potato genotypes. The average length of tuber ranged from 9.4 cm to 14.9 cm (Table 2). The genotype SP67 produced minimum average length of tuber (9.4 cm) while the maximum average length of tuber recorded from SP55 (14.9 cm). Rest of the genotypes had the tuber length in between 9.5 cm and 14.5 cm.

### Weight of tuber per plant

The results revealed that the weight of tubers per plant varied widely among the genotypes (Table 2). The highest weight of tubers per plant was recorded in SP52 (1055.0 g) where as the lowest weight of tubers per plant (175.0 g) was recorded in the genotypes SP76. Seven Genotypes SP54, SP62, SP67, SP68, SP72, SP74 and SP76 had the tuber weight per plant less than 400.0 g while SP52, SP53, SP57, SP71 and SP75 had tuber weight per plant higher than 800.0 g. Rest of the genotypes

### Percent dry matter content of tuber

produced tuber weight per plant in between 400.0 to 800.0 g.

### Yield of tuber per hectare

The yield of tuber per hectare varied markedly among 25 sweet potato genotypes under study (Table 2). The genotype SP52 was found to be superior to the rest of the genotypes and it

produced 58.6 t of sweet potato per hectare followed by SP71 (50 t ha<sup>-1</sup>) and SP75 (50 t ha<sup>-1</sup>), respectively. The lowest yield was found in the genotype SP76 (9.7 t ha<sup>-1</sup>) followed by SP54 (11.1 t ha<sup>-1</sup>). Six genotypes gave the yield in between 11.1 and 18.9 t ha<sup>-1</sup>. Fourteen genotypes gave the yield between 23.3 to 45.0 t ha<sup>-1</sup> and the rest of the genotypes gave the yield between 47.8 and 50.0 t ha<sup>-1</sup>.

**Table 2.** Average weight of tuber, average length of tuber, dry matter, weight tuber per plant, and yield of tuber per ha of 25 sweet potato genotypes at harvest.

Genotype	Average weight of tuber (g)	Average length of tuber (cm)	Dry matter (%)	Weight of tuber plant <sup>-1</sup> (g)	Yield of tuber (tha <sup>-1</sup> )
SP52	351.7	14.5	26.9	1055.0	58.6
SP53	197.6	11.0	20.1	810.0	45.0
SP54	133.3	11.2	31.9	200.0	11.1
SP55	165.0	14.9	29.0	660.0	36.7
SP56	177.4	10.9	34.8	550.0	30.6
SP57	260.6	10.4	22.9	860.0	47.8
SP58	135.5	10.6	26.1	525.0	28.9
SP59	143.1	9.8	28.4	501.0	27.8
SP60	119.0	12.9	25.7	500.0	27.8
SP61	181.3	10.9	28.5	580.0	32.2
SP62	75.0	10.7	33.1	300.0	16.7
SP63	142.9	12.6	30.0	500.0	27.8
SP64	195.8	12.8	28.7	470.0	26.1
SP65	174.1	11.3	25.1	470.0	26.1
SP66	130.4	11.4	24.7	600.0	33.3
SP67	67.4	9.4	25.7	310.0	17.2
SP68	100.0	11.1	34.2	310.0	17.2
SP69	306.0	11.4	33.8	550.0	30.6
SP70	82.4	10.7	31.4	420.0	23.3
SP71	225.0	14.4	30.8	900.0	50.0
SP72	130.8	12.1	34.5	340.0	18.9
SP73	120.0	12.1	35.1	600.0	33.3
SP74	88.2	9.5	26.4	300.0	16.7
SP75	214.3	12.1	22.6	900.0	50.0
SP76	70.0	10.0	38.1	175.0	9.7
Mean	159.5	11.5	29.1	535.4	29.7
Range	67.4-351.7	9.4-14.9	20.1-38.1	175.0-1055.0	9.7-58.6
SE	72.0	1.5	4.6	229.3	12.7
CV%	45.2	12.9	15.7	42.8	42.8

### Conclusion

Significantly highest tuber yield (58.6 tha<sup>-1</sup>) of sweet potato recorded in SP52 which was positively contributed by the yield contributing parameters such as weight of vine, average tuber diameter, weight of tuber, and weight of tuber per plant. It was evident that significantly lower tuber yield was evident from SP76. The genotype SP52 may be used for hybridization work for development of a new sweet potato variety.

### References

AVRDC (Asian Vegetable Research and Development Centre). (1976). Sweet potato Report for 1975. Asian Vegetable Research and Development Centre, Shanhua, Taiwan, Republic of China. pp. 9-29.

BBS (Bangladesh Bureau of Statistics), (2012). Yearbook of Agricultural Statistics. Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning,

Government of the People's Republic of Bangladesh. p. 143.

Edris, K. M., Islam, A. T. M. T., Chowdhury, M. S., & Huq, A. K. M. M. (1979). Detailed Soil Survey, Bangladesh Agricultural University Farm, Mymensingh. Dept. of Soil Survey, Govt. of the People's Republic of Bangladesh. p. 118.

Hossain, M. M., & Siddique, M. A. (1985). Sweet potato: Production, Use and Improvement (in Bengali), Mrs. Hena Siddique, E-25/3, BAU Campus, Bangladesh Agricultural University, Mymensingh. p. 112.

Rashid, M. M., Mazumdar, A. A., & Molla, S. (1982). Performance of exotic germplasm of sweet potato in Bangladesh. In: Sweet potato. Proc. First Inter. Symp. Asian Vegetable Research and Development Centre. Taiwan. pp. 291-295.

Soenarzo, R. (1989). Indigenous technologies and recent advances in sweet potato production, processing, utilization and marketing in Indonesia. In: Sweet Potato Research and Development for Small farmer Mackay. SEAMEO-SEARCA, College, Languna, Philippines. pp. 313-315.

Thompson, H. C., & Kelly, W. C. (1957). Vegetable Crops. McGraw Hill Book Co. Inc. New York. pp. 405-430.