EFFECTS OF DIFFERENT PORTIONS AND LENGTH OF STORAGE OF CUTTINGS ON THE GROWTH AND YIELD OF SWEET POTATO

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ABSTRACT

Storing cuttings of BNAS-51 variety of sweet potato for 15 days caused significant decrease in leaf area index (LAI) during the first two months after planting. However, there were no significant variations in LAI and fresh herbage at harvest. Generally, plants that originated from the unstored cuttings produced significantly higher marketable tubers, total yield and harvest index compared to those which developed from stored cuttings. Yield of non-marketable tubers was not significantly affected. As far as source of cutting is concerned, plants that developed from unstored apical cuttings produced significantly higher LAI, marketable tuber, and total yield compared to middle and basal cuttings, except in weight of fresh herbage. Nevertheless, plants from stored apical, middle and basal cuttings assumed similar LAI during the entire growth of the crop and produced the same yield and yield components.

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KEY WORDS: Sweet potato. Growth and yield. Length of storage. Leaf area index. Harvest index.

INTRODUCTION

Sweet potato *(Ipomoea batatas* Lam.) is one of the popular root crops which plays a significant role in counter-balancing the adverse effects of staple food crisis in underdeveloped and developing countries.

Essentially, appropriate crop management and sound cultural practices such as selecting the right sources and proper storage of

planting materials are among the factors which contribute to optimum yield of sweet potato. Usually, apical cuttings are commonly used by farmers. However, in case of scarcity of planting materials, proper selection of cuttings is overlooked and other portions of vines, such as middle and basal cuttings, are also utilized.

Sweet potato cuttings when exposed to improper and longer periods of storage decreased their germination ability, growth and eventually the yield of the crop (Salvadico and Marasigan, 1970). However, storage of cuttings for a certain period cannot be avoided due to the unforeseen events in farming practices such as delay in land preparation, bad weather conditions, labor shortage during planting time and scarcity of planting materials.

This study presents the effects of different portions and length of storage of cuttings on the growth and yield of sweet potato.

MATERIALS AND METHODS

Preparation and Storing of Sweet Potato Cuttings. — Cuttings of BNAS-51 measuring approximately 30 cm long were used. The apical cuttings were obtained from the tip portions of vines, while the basal cuttings were taken 25 cm from the base of the vines. The middle cuttings were obtained from the center of the remaining parts. The gathered sweet potato cuttings intended for storage were stored in a shed house 16 days before planting. They were sprinkled with water from time to time to prevent dehydration.

Field Layout and Experimental Design. — An area of 684 sq m was plowed and harrowed two times with animal-drawn implements. These operations were done at weekly interval to allow thorough decomposition of weeds and stubbles. Ridges were cut at a distance of 1 m apart.

A split-plot arranged in randomized complete block design with 3 replications was used. The period of storage of cuttings served as the mainplot and portions of the cuttings used as planting material as the subplot.

The treatments were as follows:

Mainplot

T_0 = zero storage
T_1 = 15 days storage

Subplot

A = apical cuttings
M = middle cuttings
B = basal cuttings

Planting. — Planting of different storage treatments was done on ridges at the same time at a distance of 100 cm between rows and 25 cm between hills. This was done by burying 2 nodes on the ground.

Cultural Management. — Hand weeding was done in all treatments 3 weeks after planting. Hilling-up was performed right after hand weeding to prevent the growth of

germinating weed seeds and to have time to repair the collapsing ridges.

Spraying of Azodrin at the rate of 2-3 tbsp/gal of water was done regularly at a 3-week interval starting from one month after planting up to harvest to prevent insect pest infestation. The crop was applied with complete fertilizer (14-14-14) at the rate of 60-60-60 kg/ha. The full amount was applied in band application.

Harvesting of Tubers. — Four months after planting, all the plants in the middle four rows in each plot, excluding one plant at every end of the rows, were harvested at the same time. Harvesting was done by cutting the main vines 10 cm above the ground surface. Then, the tubers were dug, washed, air-dried, sorted out and weighed.

RESULTS AND DISCUSSION

Leaf Area Index (LAI).

Plants from unstored cuttings developed the highest and attained earliest maximum LAI compared to the other treatments (Table 1). However, significant variations in LAI values as influenced by the sources and storage of cuttings were noted during the first two months after planting. No further significant differences were noted beyond this period.

Statistical analysis showed that 15 days of storing planting materials (T_1) significantly reduced the LAI of

Table 1. Monthly LAI, fresh and dry weights of vines as affected by the sources of sweet potato cuttings subjected to different storage periods before planting.

Treatment		Leaf Area Index (LAI) month 1st	2nd	3rd	4th	Weight of herbage Fresh t/ha
T_0 (zero storage)	Apical	2.91a	4.56a	3.89	3.49	39.57
	Middle	2.16b	3.30b	3.82	3.45	37.67
	Basal	1.92b	3.12b	3.60	3.45	36.57
Mean		2.33	3.66	3.77	3.46	37.93
T_1 (15 days storage)	Apical	1.86	2.74	3.74	3.29	37.50
	Middle	1.49	2.70	3.68	3.24	36.43
	Basal	1.50	2.60	3.27	3.18	33.00
Mean		1.61	2.56	3.56	3.46	35.64
Grand Mean		1.97	3.11	3.66	3.35	36.67
C.V. (a) %		5.60	16.66	6.25	10.37	13.89
C.V. (b) %		16.23	11.58	9.28	10.50	15.78

Treatment means having letters in common are not significantly different from each other at 5% level, DMRT.

sweet potato plants that originated from those planting materials at their early stage of growth (Table 1). This reduction in LAI values could be due to the complete defoliation of leaves and marked moisture loss of cuttings after storage which might have adversely affected leaf development at the early stage of plant growth.

Regardless of storage periods used, LAI values declined from the apical down to basal portions of the vines. This indicates that the leaf proliferation of sweet potato was affected by the sources of cuttings. Generally, there was a gradual decrease of LAI values after their maximum values had been attained. This was inferred to be due to cessation of leaf proliferation at the onset of tuber initiation and enlargement (Leopold and Kriedemann, 1975). Significant interactions of the treatments involved were noted during the second month after planting.

Fresh Weight of Vines (t/ha).

There were no significant variations on the fresh weight of vines as affected by storage treatments and sources of cuttings used (Table 1). This could be partly explained by the absence of significant differences in LAI at harvest.

Plants from unstored cuttings (T_0) had an average fresh vine weight of 37.93 t/ha which was slightly higher compared to plants from stored cuttings (T_1) which yielded 35.93 t/ha. Plants from stored and unstored apical, middle and basal portions had an average fresh herbage weights of 38.54, 37.05 and 34.79 t/ha, respectively.

Yields of Marketable and Non-marketable Tubers (t/ha).

Statistical analysis revealed no significant reduction in marketable tuber yield when planting materials were subjected to 15 days of storage regardless of sources of cuttings (Table 2). Plants that developed from unstored cuttings produced an average yield of 8.75 t/ha compared to those from stored cuttings (4.49 t/ha). This result suggests that subjecting the cuttings to longer periods of storage resulted in retardation of tuber initiation and enlargement which consequently affected the yield.

The marketable tuber yield of plants which originated from the stored 3 sources of cuttings did not differ significantly from each other. On the other hand, in the unstored treatment (T_0), plants from apical cuttings yielded significantly compared to those from other types of cuttings (Table 2). Regardless of storage treatments, the yield of plants from middle and basal cuttings were statistically similar. No interaction effect was noted between storage treatment and sources of planting material.

Table 2 shows no significant differences in non-marketable tuber yield as influenced by storage duration and sources of cuttings. However, plants from unstored cuttings (T_0) produced slightly higher non-marketable tuber (1.74

Table 2. Mean yield and yield components of sweet potato as affected by three portions of sweet potato cuttings subjected to different storage periods before planting.

Treatment		Weight of tubers: Marketable t/ha	Weight of tubers: Non-marketable t/ha	Total yield t/ha	Harvest Index
T_0 (zero storage)	Apical	10.79a	1.94	12.74a	0.246
	Middle	8.03b	1.88	9.90b	0.210
	Basal	7.44b	1.40	8.84b	0.198
Mean		8.75	1.74	10.49	0.218
T_1 (15 days storage)	Apical	4.83	1.38	6.21	0.145
	Middle	4.46	1.35	5.81	0.141
	Basal	4.19	1.35	5.48	0.139
Mean		4.49	1.36	5.83	0.142
Grand Mean		6.62	1.55	8.16	0.180
C.V. (a) %		11.81	35.50	16.24	8.13
C.V. (b) %		13.56	28.30	12.76	15.33

Treatment means having letters in common are not significantly different from each other at 5% level, DMRT.

t/ha) compared to plants from stored cuttings (T_1) (1.34 t/ha). The average non-marketable tuber yield of plants that developed from apical, middle and basal cuttings under both storage treatments were 1.66, 1.62 and 1.37 t/ha, respectively. No interaction effects were observed.

Total Yield (t/ha).

Plants from unstored cuttings (T_0) produced an average yield of 10.49 t/ha which was significantly higher compared to those from plants that developed from stored cuttings (5.83 t/ha). Higher total yield of the former was attributed to slightly higher marketable and fewer non-marketable tubers.

The results suggest that tuber production of sweet potato was adversely affected when cuttings were stored for 15 days as shown by slow and retarded growth and development of plants at the initial growth period. These results confirmed the findings of Sanico (1980), Wallace (1971), and Salvadico and Marasigan (1970) who found that storage of cuttings for a longer period of time resulted in significant reduction of tuber yield.

Generally, when planting materials coming from the three sources of

cuttings were stored, no significant differences in total yield were observed (Table 1). This was due to slight differences in their marketable and non-marketable tubers. In contrast, in unstored treatment (T_0), plants from apical cuttings significantly produced higher tuber yield (12.74 t/ha) compared to plants from the middle (9.19 t/ha) and basal (8.84 t/ha) cuttings. Total yields of plants from the two latter cuttings were statistically similar.

The results of this experiment agree with the previous study of Sanico (1980) and Trabujada (1971) who found that if fresh cuttings were used, plants which developed from apical portions yielded significantly higher than plants that originated from other portions.

Harvest Index (HI).

The results revealed that storing the cuttings for 15 days resulted in a significant decrease in HI. The average HI of plants from the unstored (T_0) and stored (T_1) treatments were 0.218 and 0.142, respectively.

Harvest index of sweet potato was not significantly affected by the sources of cuttings. The average HI of plants under both storage duration was 0.180. Nevertheless, regardless of storage duration used, HI values decline from apical down to basal portions. These changes were primarily attributed to their differences in total yields rather than to their herbage yields. The results suggest that productivity of sweet potato was only slightly affected by sources of cuttings but was significantly affected by storing the planting materials.

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