EFFECTS OF METHOD AND DURATION OF STORING SEEDPIECES ON SHOOT EMERGENCE AND GROWTH OF ABACA

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ABSTRACT

Percentage weight loss of abaca seedpieces placed in jute sacks and stored in a well-aerated nipa hut was higher than those covered with fresh banana leaves and stored in shaded field. These methods did not significantly affect percentage emergence, number of shoots produced per seedpiece, plant height, stem diameter and number of functional leaves per plant of 4-month old abaca. Duration of storage prior to planting significantly affected all the aforementioned parameters. Storing seedpieces for not more than 3 weeks by either method still favored vigorous growth of abaca plants. No significant interaction effects existed between methods and duration of storing abaca seedpieces on shoot emergence and growth.

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KEY WORDS: Abaca. Seedpieces. Method of storage. Duration of storage. Shoot emergence. Growth.

INTRODUCTION

Seedpieces of abaca must be planted right after preparation or at the soonest time to avoid deterioration and minimize losses and replanting. However, unforeseen events in farm operation such as bad weather and scarcity of labor could delay planting activities. Hence, proper storage method must be practised to minimize losses. Batugal and Tabora (1978) mentioned that seedpieces piled under shade covered with banana leaves lasted for 2 weeks with minimal losses.

Information about the effect of storing abaca seedpieces is very limited. However in related crops such as gladiolus and *Freesia hybrida* corms, this aspect is quite well studied (Magda, 1978; Gilbertson et al., 1978). This study presents the effects of the different methods and duration of storage of abaca seedpieces on shoot emergence and vegetative growth of the crop.

MATERIALS AND METHODS

Preparation of Abaca Seedpieces

Abaca (var. Inosa) corms were dug out of the ground and cleaned by cutting the stalks and roots. Planting materials were prepared by dividing the corms into more or less equal sections with two dormant bud eyes per section or seedpiece. Preparation was done at one week succession until all the storage duration treatments (1, 2, 3 and 4 weeks) were covered.

Field Layout and Experimental Design

An area of 504 m^2 was completely underbrushed. Holes large and deep enough to hold the seedpieces were dug at a distance of 1 m x 1 m apart one month ahead to allow soil weathering for easier root penetration.

A split-plot arranged in a randomized complete block design (RCBD) with three replications was used. Methods of storage of seedpieces served as the main plots and storage durations as the subplots. The treatments were as follows:

Main Plots:

M1 - Covered with fresh banana leaves and piled under shade in the field

M2 - Placed inside jute sacks and stored in a well-aerated nipa hut

Subplots:

D0 - Control, planted directly after preparation

D1 - Stored for 1 week before planting

D2 - Stored for 2 weeks before planting

D3 - Stored for 3 weeks before planting

D4 - Stored for 4 weeks before planting.

Stored and unstored (control) seedpieces were simultaneously planted in the holes in a slanting position with the bud eyes facing upward, covered with soil and pressed slightly to eliminate air spaces where water could accumulate.

Cultural Management

Handweeding and cultivation were done when weeds started growing around the plants, and every 2 weeks thereafter until the study was terminated. Japanese snails attacking the plants in the early stages of emergence were controlled by hand picking and proper sanitation of the surrounding area.

RESULTS AND DISCUSSION

Weight Loss of Stored Abaca Seedpieces

Weight loss was directly proportional to storage period. As storage duration was prolonged, percent weight loss also increased regardless of the storage method tested (Table 1). In yam tubers, Passam et al. (1976) attributed weight reduction to water loss and wound respiration. The above factors were also believed to be responsible for weight reduction of stored seedpieces. Seedpieces placed inside jute sacks and stored in a well-aerated nipa hut (M2) showed slightly higher weight reduction than

Table 1. Weight loss of abaca seedpieces under two storage methods and at different durations.

Storage Duration (Weeks)	Weight Loss (%)[1]	
	M1[2]	M2[3]
1	6.4	11.5
2	14.8	17.9
3	17.7	23.4
4	27.8	30.4

[1] Data not statistically analyzed.
[2] Covered with fresh banana leaves and piled under shade in the field.
[3] Placed inside jute sacks and stored in a well-aerated nipa hut.

those stored in the field under shade and covered with fresh banana leaves (M1).

Higher weight loss in M2 seedpieces was due to higher temperature (25°C at 8:00 a.m. and 32°C at 2:00 p.m.) and lower relative humidity (86% in the morning and 70% in the afternoon) of the storage area. Mean temperature and relative humidity readings of the area in M1 were 24.2°C in the morning and 26.9°C in the afternoon, and 88% in the morning and 71.5% in the afternoon, respectively. This corroborates with the findings of Passam et al. (1976) that stored yam tubers lose more weight at 35°C than at 25°C and 17°C indicating a more rapid drying up of tissues at higher temperatures. Also, the fresh banana leaves used as cover might have served as mulch preventing exposure of seedpieces to free moving air, hence minimizing moisture evaporation from the cut surface.

Duration from Planting to 50% Emergence, Emergence Percentage and Number of Shoots Produced per Seedpiece/Hill at 9 Weeks After Planting

Although the differences among treatments were not significant, stored seedpieces emerged earlier than the control (Table 2). Similar results (i.e. the degree of tuber dormancy decreased with time of storage) were observed by Onwueme (1978) in yam and by Bonner and Galston (1952) in potato.

Emergence at 9 weeks after planting significantly varied with different storage durations (Table 2). However, storage method did not significantly affect this parameter. Regardless of the storage method, percentage emergence decreased with time of storage. Abaca seedpieces planted directly after preparation (control) gave maximum percentage emergence which significantly differed from those stored for 2, 3 and 4 weeks. Seedpieces stored for 4 weeks gave the least emergence although statistically similar to those stored for 2 and 3 weeks. The adverse effect of storage on percentage emergence could be attributed to either physiological or microbial deterioration of some seedpieces making them non-viable. On-

Table 2. Duration from planting to 50% emergence, emergence percentage and number of shoots produced/seedpiece/hill at 9 weeks after planting as affected by the method and duration of storage of abaca seedpieces.[1]

Treatment	Storage Duration (Weeks)	Number of Weeks from Planting to 50% Emergence	Emergence (%) 9 Weeks after Planting	Number of Shoots Produced/Seedpiece at 9 Weeks after Planting
Storage Method				
M1 - Banana	0 (Control)	7.3	93.3	1.4
leaf cover;	1	6.0	80.0	1.2
shaded field	2	6.0	75.6	1.2
	3	6.0	71.1	1.1
	4	6.3	68.9	1.0
	Mean	6.3	77.8	1.2
M2 - Jute	0 (Control)	6.7	86.7	1.4
sack; well-	1	6.7	83.4	1.3
aerated	2	6.3	77.8	1.2
nipa hut	3	6.0	71.1	1.1
	4	6.7	66.7	1.1
	Mean	6.5	77.1	1.2
Duration of Storage Means				
	0 (Control)	7.0	90.0a	1.4a
	1	6.3	81.7ab	1.3b
	2	6.2	76.8bc	1.2bc
	3	6.2	71.1bc	1.1cd
	4	6.3	68.8c	1.0d
C.V.(a)(%)		9.0	7.7	3.0
C.V.(b)(%)		10.5	11.0	7.2

[1]Means followed by a common letter are not significantly different at 5% level, DMRT.

wueme (1978) mentioned that dehydrated yam tubers may lose viability. Dehydration as manisfested by higher weight loss with longer storage (Table 1) might have caused germination failure in some stored seedpieces. In stored sugar cane cuttings, Hermoso (1975) claimed that reduction in emergence was possibly due to attack by microorganisms causing death of bud eyes either because of nutrient deprivation or toxic secretions.

Storing seedpieces significantly reduced the number of shoots produced per seedpiece (Table 2). Seedpieces planted directly after preparation produced the highest number of shoots whereas those stored for 4 weeks produced the lowest. In both storage methods, the number of shoots produced per seedpiece decreased with storage time. This could be attributed to the deterioration of the seedpieces or damage of bud eyes as mentioned earlier.

Horticultural Characteristics of Abaca Plants at 4 Months after Planting

Plant height was significantly affected by duration but not by method of storage. Plants from seedpieces stored for 2 and 3 weeks were significantly taller than those from seedpieces stored for 4 weeks and the control (Table 3). The shortest plants were from seedpieces stored for 4 weeks. Jabines (1977) observed that cassava plants from cuttings stored for 6 days before planting were taller than those from cuttings stored for 2, 3, 4 and 8 days. In vanilla, Sangatanan (1955) noted that shoot and aerial growth was faster in cuttings stored longer than those stored for shorter periods. However, no explanation was given to support their observations. In this experiment, taller plants from seedpieces stored for 2 and 3 weeks were attributed to early emergence (Table 3). Although the differences in period of emergence were not statistically significant, this was possibly sufficient to cause variation in plant height. It can also be attributed to the decrease in number of shoots produced per stored seedpiece (Table 2) which minimized plant competition for light, moisture and nutrients; and consequently allowed vigorous plant growth. Furthermore, it is suspected that the endogenous growth promoter and inhibitor balance of the corm was possibly altered by storage. A decrease in growth inhibitor (particularly ABA) level with duration of storage was observed by Wang (1969 as cited by Rees, 1972) in *Lilium longiflorum* and by Gilbertson et al. (1978) in *Freesia hybrida* corms. In stored abaca seedpieces, the level of growth substances favorable for growth was possibly attained in those stored for not more than 3 weeks. On the other hand, the adverse effect of longer storage period on growth of plants from 4-week stored seedpieces was due to nutrient loss caused by dessication and rotting. This deprived the developing eyes of nutrients critically needed during the early growth stage.

Results further showed that storing seedpieces for not more than 3 weeks enhanced stem elongation which is closely associated with

Table 3. Plant height, stem diameter and number of functional leaves of abaca as affected by the method and duration of storage of seedpieces at 4 months after planting [1]

Treatment	Storage Duration (Weeks)	Plant Height (cm)	Stem Diameter (cm)	Number of Functional Leaves
Storage Method				
M1 - Banana leaf cover; shaded field	0 (Control)	61.8	2.8	6.2
	1	64.5	2.8	7.1
	2	68.9	3.2	7.2
	3	77.2	3.2	7.5
	4	59.2	2.8	6.2
	Mean	66.3	3.0	6.9
M2 - Jute sack; well-aerated nipa hut	0 (Control)	64.9	2.9	7.0
	1	69.5	2.9	7.2
	2	76.4	3.2	7.7
	3	79.6	3.3	7.8
	4	59.0	2.8	6.9
	Mean	69.9	3.0	7.3
Duration of Storage Means				
	0(Control)	63.3c	3.2bc	6.2bc
	1	67.0bc	3.3bc	7.2abc
	2	72.6ab	3.6ab	7.5ab
	3	78.5a	3.7a	7.9a
	4	59.1c	3.1c	6.6c
C.V.(a)(%)		10.0	1.2	10.5
C.V.(b)(%)		10.5	5.1	7.3

[1]Means followed by a common letter are not significantly different at 5% level, DMRT.

fiber quality, i.e. the taller the plants, the longer are the extractable fibers.

Stem diameter of abaca was also affected by duration of storage of the seedpieces. Plants from seedpieces stored for 2 and 3 weeks had bigger stems at 4 months after planting than the other treatments (Table 3). Likewise, early emergence and fewer shoots produced from stored seedpieces and a possible effect of growth substances as mentioned earlier might have caused such effect.

Functional leaves of plants from seedpieces stored for 2 to 3 weeks were significantly higher than the control and those stored for 4 weeks. Plants from seedpieces stored for 3 weeks produced the highest number of functional leaves 4 months after planting.

The control plants produced the lowest number of functional leaves.

In cases of delayed planting, abaca seedpieces can be successfully stored for 3 weeks either by piling them in a shaded field and covering them with fresh banana leaves or placing them in jute sacks and storing them in a well-aerated nipa hut. To overcome undesirable effects of storage on percentage emergence, deteriorating seedpieces should be eliminated and only seedpieces with activated bud eyes or those that reached pre-sprouting stage must be planted.

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