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STORAGE OF FRESH CASSAVA ROOTS IN MOIST COIR DUST

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INTRODUCTION

Fresh cassava roots begin to deteriorate within 3 days after lifting if stored at normal tropical ambient conditions; the primary cause of deterioration being a disorder causing vascular streaking (Montalido, 1973; Booth, 1973 Booth and Coursey 1974). Vascular streaking usually commence at a site of injury but within a few days spreads longitudinally through the full length of the root making it unacceptable for consumption or industrial use (Booth 1973). Cassava roots have been stored for 8 weeks at tropical ambient conditions by use of a clamp to maintain high humidity and constant temperature (Booth 1973). It has already been indicated (Booth and Coursey, 1974, Booth, personal communication) that storage is also possible in boxes packed with saw dust or similar material and this work was undertaken to develop a packing method suitable for transportation and urban marketing.

METHOD

Cassava roots of 3 varieties, designated 30, 69 and C5 were used. For each storage experiment roots were randomised and weighed within 8 hours of lifting, and packed into fibreboard cartons designed to hold 15kg of produce either without additional packing material (control), or in an unsieved mixture of coir dust and fibre moistened by mixing in an equal weight of water (moist coir). Groups of 3 roots were weighed before and after storage then cut up to assess deterioration. Each root was cut into quarters and vascular streaking assessed on a 0 - 10 scale at each cut surface. Results were expressed both as a percentage of the maximum score obtainable and as the percentage of roots with a score of 2 or more out of 30 (percentage incidence of damage).

In experiment 1, 5 replicates of both packing treatments were stored at ambient temperature (23 - 26°C) and humidity and replicates assessed after, 3, 11, and 28 days. Replicates contained 4 large and 4 small roots of each variety.

In experiment 2 roots were stored at ambient temperature (20 - 25°C), either on a bench top (low humidity) or packed in fibreboard boxes without ventilation holes and wrapped in paper (high humidity). Replicates from both treatments were packed into coir after 0, 1, 2, 4 and 8 days, stored at ambient temperature and assessed 28 days after lifting. Each replicate contained 3 roots of 69 and C5.

In experiment 3, 2 replicates of both packing treatments were stored at ambient temperature (20 - 25°C), at 13°C, and at ambient temperature for 7 days then at 13°C, until assessment. Replicates which contained 4 large and 4 small roots were assessed 14 and 28 days after lifting.

RESULTS

Cassava roots packed in moist coir were in better condition after 28 days storage than roots stored at ambient humidity for 3 days (Table 1). Weight loss in experiment 1 was 3.9% after 3 days and 12.8% after 11 days at ambient humidity against only 1.3% after 28 days in moist coir. Subsequent observations (Table 2 and 3) confirmed that very little damage occurred during 28 days storage in moist coir at ambient temperature. In all experiments rootlets 2 - 8cm long developed during storage in moist coir for 28 days.

In experiment 2, mean weight loss before packing in moist coir was 1.58% per day at low humidity and 66% per day at high humidity. The incidence of vascular streaking after storage increased after 4 days delay at low humidity before packing but not after delays upto 8 days at high humidity. Cassava roots stored at ambient temperature other than those packed in moist coir developed extensive superficial mould in 4 - 8 days.

The incidence and extent of vascular streaking in roots stored at 13°C was much higher than at ambient temperature but this difference was reduced when roots were stored at ambient temperature for 7 days before cooling to 13°C (Table 3). Rootlet formation did not occur in roots stored at 13°C or at ambient temperature for 7 days and then at 13°C for 21 days.

DISCUSSION

Storage in a clamp (Booth, 1973) or packing in moist coir (Table 1) have both provided effective means of storing fresh cassava. Packing in moist coir reduces water loss almost to zero but packing which reduced the rate of water loss by only about 60% also caused a large reduction in the incidence of vascular streaking (Table 2). Rate of water loss appears to be critical to the development of vascular streaking and manipulation of this parameter should provide a means both of investigating the aetiology of this disorder and of controlling it.

After packing in moist coir, changes evidently occurred which protected roots under more adverse conditions at 13°C (Table 3) and Booth (1973) observed that after storage in a clamp roots could be then held at ambient humidity. Vascular streaking is known to be associated with mechanical damage (Booth, 1973) and we have observed wound periderm formation at cut surfaces in stored roots (unpublished data), so this protection against vascular streaking is probably associated with wound healing similar to that which occurs during curing of other starchy roots and tubers. Cold storage of cassava has only been successful at 0 - 5°C and subsequent deterioration at ambient temperature has been very rapid (Ingram & Humphries, 1972, Montaldo, 1973); development of a method of curing may make storage possible over a wide range of temperature.

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Table 1. Vascular streaking in cassava roots at ambient temperature (Experiment 1).

Packing method	Control		Moist Coir		
	Storage period (days)	% Maximum score	% incidence	% Maximum Score	% incidence
	3	14	62b	2	21a
	11	35	83b	3	25a
	28	51	86b	3	13a
Standard error	-		6.3	-	6.3

Figures followed by the same letter were not significantly different.

Table 2. Vascular streaking in cassava roots stored for different periods before packing in moist coir. (Experiment 2)

Humidity before Packing:	Vascular streaking				% weight loss		
	% Maximum score		% incidence		before	packing	
	High	Low	High	Low	High	Low	
Storage period before packing in moist coir (days)							
	0	11	11	17ab	17ab	-	-
	1	0	0	0a	0a	1.0a	2.2ab
	2	0	8	0a	50bc	2.0ab	3.8c
	4	0	53	0a	83c	2.3b	7.0e
	8	5	90	17ab	100c	5.3d	12.3f
Standard error				9.3			0.29

Table 3. Vascular streaking in cassava roots stored at different temperatures. (Experiment 3).

Packing method	Control		Moist Coir		
	Temperature	% maximum score	% incidence	% maximum score	% incidence
	Ambient	48	76c	8	21a
	13°C	36	83c	22	75c
	Ambient (7 days) then 13°C subseq quently	14	47b	10	46b
Standard error		-	7.9%	-	7.9%