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THE SHELF LIFE OF CASSAVA ROOT
TUBERS COATED WITH LIME SUSPENSION

Report of Group B Storage Project on Rootcrops

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SUMMARY

Cassava root tubers (Ankra Variety) were coated with 20, 30, and 40 per cent concentrations of lime suspension and stored at ambient temperature. On the ninth day of storage, the control sample and the treated tubers were found to have deteriorated. No significant changes were observed in the moisture, and starch contents but there was an increase in the reducing sugar level whilst the acidity fell at the end of the storage trial.

INTRODUCTION

In Ghana cassava is one of the staple foods consumed when cooked raw or in the dried processed state. However, cassava deteriorates within a few days after uprooting with a post-harvest loss of about 19 percent (Killick, 1966) .

Various researches have been carried out to prolong the storage life of cassava. High cost systems such as refrigeration and waxing (Singh and Mathue, 1953; IIT, 1975) of the roots have been reported. The post-harvest deterioration of cassava has been studied by burying the tubers in field clamps (Booth, 1975) or in moist saw-dust contained in boxes (Booth and Coursey, 1974).

The tubers may be stored by traditional methods such as reburial, immersion in water and application of any lime, hot water and wood ash. These storage techniques have not been scientifically studied and this article evaluates the storage life of cassava root tubers coated with lime suspension.

EXPERIMENTAL

Materials

About 100kg. of cassava (Ankra variety) were purchased directly from a farm near Legon at Accra. The fresh tubers were washed to remove soil bacteria and were arranged into seven lots of about 40 tubers. The groups were coated with lime suspension in duplicates at levels of 20, 30, and 40 per cent. The seventh group was the control sample which was the fresh untreated cassava. The tubers were then spread on a laboratory bench at ambient temperature (about 30°) and at relative humidity of 90% for observation.

The Dunnia quick line used in the experiment was bought in Accra. Concentrations of 20, 30 and 40 per cent were prepared and left to stand over night before use.

Methods

Analyses of Cassava

The control sample and the treated samples were analysed after 2, 6 and 9 days in storage. The samples were ground into mash and analysed as follows: A method of the A.O.A.C. (1965) was used in determining the moisture content. 5g - portion of the mashed sample was dried in an oven at 105 °C to a constant weight. The difference between the wet and dry samples gave the moisture content. Acidity was measured by mixing 10g sample with water and making it up to 100ml. The mixture was filtered and the supernatant titrated with 0.1N-NaOH.

Starch was determined by Linter's Method as described in Pearson (1970). 5g-portion of sample was added to 20ml. water and 40ml. HCL. The mixture was washed into 200ml. flask with 12% HCL and 10ml of 5% phosphotungstic acid to precipitate protein. The volume was made up to 200ml with 12% HCL. After shaking the mixture was filtered and the optical rotation was measured in a 200-m tube. The mean specific rotation of cassava was taken as + 195.4.

The reducing sugars were determined by the Lane and Eynon method described in Pearson (1970). 50g mash sample was mixed with water and made up to 250ml. The filtrate was titrated against 10ml Fehling's solution using methylene blue as indicator.

The percent sucrose was calculated as the product of 0.95 and the difference between the invert sugar levels before and after inversion. The total sugars content was the sum of the invert sugar value before inversion and the percent sucrose value.

Line Characterisation

Moisture was determined on 10g-portion of the quick line according to the method of the A.O.A.C. (1965). The supernatant from the line suspension was analysed for pH and alkalinity. The pH was measured on the EEL pH meter. The alkalinity was measured by titrating 25ml of supernatant with IN-HCL.

Results and Discussion

The analytical results on the control sample and the treated samples on the second, sixth and ninth day of storage are presented in Table I. No appreciable changes were observed in the moisture and starch levels but the reducing sugars increased whilst the acidity level fell by the ninth day of storage.

On the third day of storage primary deterioration was observed with the roots becoming internally discoloured with fine blue-black vascular streaks which were more pronounced in the bruised tubers than in the undamaged ones. The treated samples also lost their fresh appearance compared with the control.

After nine days of storage, secondary deterioration set in with the appearance of moulds recognised as *Aspergillus*, *Penicillium* and *Rhizopus* accompanied by softening of the roots and strong smell of fermentation. The presence of *Aspergillus* confirmed the observation of Caurie and Clerk (1968) who isolated this fungus from cassava root tuber.

TABLE I: CHEMICAL DETERMINATIONS ON STORED CASSAVA TUBERS COATED
WITH LIME SUSPENSION

Days in Storage	0					6				9			
Concentration of Lime (%)	Control	Control	20	30	40	Control	20	30	40	Control	20	30	40
Moisture Content (%)	57.35	60.44	59.41	61.16	60.16	60.47	59.40	57.79	62.16	60.03	62.01	61.70	61.30
Acidity (ml 0.1N NaOH)	1.2	2.1	1.9	2.1	1.6	2.1	2.2	2.2	1.9	1.8	1.1	1.4	1.2
Dry Starch (%)	77.48	76.03	76.30	77.23	78.04	74.19	78.30	-	-	76.77	69.25	74.36	75.03
Net Starch (%)	32.30	30.06	30.96	29.87	29.65	30.56	31.35	36.89	27.64	30.68	26.32	28.80	28.35
Total Sugars (%)	2.06	2.07	1.84	1.88	2.18	3.70	2.79	2.89	3.22	2.55	2.07	3.42	2.75
Reducing Sugars (%)	0.43	0.41	0.48	0.45	0.69	2.96	1.58	2.34	2.50	1.66	1.70	2.55	1.92
Sucrose (%)	1.63	1.13	1.36	1.43	1.50	0.74	1.21	0.56	0.73	0.89	0.37	0.78	0.84

TABLE II. Characterisation of Line Mixture

Concentration of Line (%)	pH	Titre for 25ml Supernatant (ml IN-HCl)
20	12.4	1.3
30	12.4	1.5
40	12.4	1.6

Moisture Content of line = 0.32%

It was expected that the alkaline medium of the line suspension with pH 12.4 shown in Table II might inhibit the proliferation of micro-organism on the tubers and so prolong the shelf life. But the results of this experiment has shown otherwise as there was no marked visible difference between the rate of spoilage of the control sample and the coated with 20, 30, and 40 per cent line suspension.

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