

STUDIES ON THE PRESERVATION OF CASSAVA (TAPIOCA) TUBER

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Tapioca (*Manihot utilissima* Pohl) is extensively cultivated in Kerala for its edible tuber. Unlike the other cultivated tubers it is a highly perishable material. Blue black streaks appear in about 24 hours after harvest and the tuber becomes inedible in two to three days. Softening and rotting set in rapidly and these are known to be caused by organisms like *Penicillium*, *Rhizopus*, *Aspergillus*, yeast and a species of *Bacillus*. The studies made so far relate to the preservation of tubers in cold storage and with non-permissible preservatives like formalin (Singh and Mathur 1953, Majumder *et al* 1956 and Subramaniam and Mathur 1956).

Preliminary trials made to preserve the tubers with permissible preservatives like sulphur di-oxide, hypochlorite, benzoates, acids, alkalies and salts and gas storage under nitrogen, carbon di-oxide, ammonia and acetic acid vapour showed that the storage life of the tuber was not appreciably extended by any of these methods and that a spoiled taste and flavour were imparted to them within 7 days in all the trials. It was however observed that tubers left under soil during harvest were well preserved for several weeks. Hence a study of the conditions which contributed to this effect was made, the results of which are presented in this paper.

Material and Methods

Laterite soil, river sand, fine sand, sawdust and coconut pith were used in these experiments as the preserving media. The tubers were kept buried in the different media in open wooden boxes with a layer of the medium concerned on top. The desired moisture levels were maintained by adding calculated quantities of water to the medium and mixing well. The moisture levels were maintained constant by adding enough water to make good the loss by evaporation which was kept to a minimum by covering the box with wet gunny cloth. Temperature inside the soil media was found to range between

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25 and 27° C. To assess the results, samples of the tubers were drawn every 3rd or 4th day and their weights, quality and chemical constants were determined by standard methods.

To find out the effect of high humidity on the preservation of tubers, they were stored in glazed earthenware pots over a layer of gravel put in the bottom of the pot with water to a level slightly below that of the gravel. The pot was covered with wet gunny cloth.

Results and Discussion

The experiments showed that while laterite soil kept the tubers unspoilied for prolonged periods, clay spoiled them in 4 to 5 days. Table 1 shows that at a moisture content of 20 percent the tubers could be stored for periods upto 75 days or more in laterite soil.

Table I

Periods for which tapioca tubers remained unspoilied in laterite soil with different moisture contents

Moisture content of soil (%)	Preservation period (Days)
30	6
25	7
20	75
15	19
10	4

Media like sand, gravel, sawdust and coconut pith were found to preserve the tubers without spoilage for periods of two months and above provided the moisture content was kept at a suitable level and drying up and water logging were avoided. Rootlets grew out from all the tubers under such storage conditions to a length of about 10 cm within a month. The tubers gained in weight during the initial stages of storage and this increase was about 5 per cent in 20 days.

Table 2

Effect of storage in laterite soil on some physical and chemical properties of tapioca tubers.*

Storage period (days)	Increase in weight %	Peeling loss %	Yield of dry chips %	pH of aqueous extract of flour	Viscosity of flour in seconds	Reducing sugar of flour %	Starch content %
0	nil	4.0	33.9	6.50	44	0.97	87.48
3	2.6	4.0	34.0	6.40	43	1.24	87.36
7	3.1	3.4	34.0	6.45	44	1.49	86.42
10	3.4	3.2	33.6	6.50	40	1.56	84.21
14	4.1	3.0	33.2	6.40	38	1.61	83.14
17	4.7	4.1	33.0	6.30	39	1.79	82.37
21	5.1	3.6	33.2	6.25	39	1.96	82.06
24	5.2	4.1	33.4	6.25	40	2.10	81.10
28	5.4	4.0	33.4	6.25	40	2.28	81.17
30	5.3	3.8	33.2	6.25	39	2.36	81.08

*Average of five estimations of five tubers.

Table 2 gives some physical and chemical features of tapioca tubers stored for various periods. It may be seen that there was a gain in weight as the period of storage advanced. There was a reduction in the viscosity of flour and starch contents; the latter appeared to be due to conversion of starch into sugars as was evidenced by an increase in the latter's contents in the tubers.

Organoleptic tests showed that the cooking quality of the tubers was not affected in the least during the period of preservation.

The tubers stored in the earthenware pots over water also remained unspoiled for two months and rootlets grew out of them.

Summary

Harvested tapioca tubers could be stored for two months and over without spoilage when kept buried in laterite soil, sand or gravel or in saw

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dust or coconut pith provided the moisture was maintained near about 20 percent; higher and lower moisture contents led to the spoilage of the tubers. Tubers kept in earthenware pot with water at bottom and covered with wet gunny bags also remained unspoiled for two months. The tubers on storage showed increase in weight and sugar contents and decrease in starch contents. The cooking quality was not affected during storage and the tubers remained fully alive with roots growing out of them.

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