Studies on the keeping quality of ripe coconuts in storage

3. Effect of repeated paraffin wax coatings, shell thickness and of using shellac preparations on the driage of nut water in fully husked coconuts.

By

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INTRODUCTION

In an earlier communication, Muliyar and Krishna Marar (1959) had presented results of investigations conducted by them on the behaviour in storage of fully husked nuts. It was shown therein that nuts which had been given a uniform coating of paraffin wax could be stored without driage of nut water for periods as long as eight months, whereas untreated (control) nuts got dried up within barely two months.

The above studies were continued subsequently to investigate more facets of the same problem such as the effect on storage life of fully husked nuts of (1) applying repeated coatings of paraffin, (2) the thickness of coconut shell and (3) using shellac preparations for coating the nuts instead of paraffin. The results which have been presented from time to time in the Annual Progress Reports of the Central Coconut Research Station, Kasaragod are summarised in this paper.

Experiment I.

Storage life of husked nuts in relation to thickness of coating of paraffin:

In order to find out whether the paraffin coating in different thickness has got differential effect on the storage life of nuts a trial with four treatments - 3 different thicknesses of paraffin and a control - was carried out. The thickness was sought to be increased by dipping the nuts in molten paraffin more number of times. The treatments were as follows: (i) control, (ii) coconuts waxed by dipping once in molten paraffin for a few seconds, (iii) and (iv) dipping of fruits twice and thrice respectively. Each treatment had eight nuts allotted to it at random. Where only one coating was given, the quantity of paraffin consumed per nut was on the average about 6 gms. Successive coatings required 3.0 gm. each of additional paraffin. Thus a nut coated thrice with paraffin consumed about 12.0 gm. of paraffin. As usual the

treated nuts were stored in well-ventilated receptacles at room temperature and their rate of loss in weight and rate of driage periodically observed and recorded. The results are presented in Table 1, Appendix.

All the nuts under the control treatment were found dried up within a period of 45 days. It required 3 to 4 months of storage for 50 per cent of the nuts with one coating of paraffin and between 5 to 6 months for nuts with two coats, to dry up completely. Driage was complete in both the groups in a period of 210 days. In the lot of nuts given three coatings of paraffin the first incidence of driage was noted only after seven months of storage and it was complete only in 270 days of storage. The percentage loss in weight was minimum for nuts with three coats of paraffin; it was only 11.5 per cent after 270 days of storage. The trend of loss in weight in the differently treated lots over a period of 300 days for which observations were continued is graphically represented in Fig. 1. The paraffin coated nuts were cut open as and when they got dried up and the kernel examined. It was found to be in perfectly good condition and tasted fresh.

Experiment II.

Storage behaviour of nuts in relation to shell thickness:

The effect of paraffin coating in relation to the thickness of the shell of nuts was investigated in this experiment. Nuts with thin (2.0–2.4 mm) and thick (3.4–4 0 mm) shells were coated with paraffin and observations on loss of weight and driage of nut water during storage were continued for a period of 300 days.

The summary of results is presented in Table 2, Appendix.

Though the loss in weight in the initial 90 days of storage is almost the same for both the types of nut the indication is that the rate of loss is somewhat more for the thin-shelled nuts (Fig. 2) at all subsequent stages of storage, with the result that the gulf between the two lines tended to widen with progress in storage Thus at the end of 300 days the difference in the loss in weight in the two groups of nuts was 4 per cent. All the nuts in the thin-shelled group got dried up completely within 210 days. It took 300 days for the thick-shelled nuts to dry out completely. The maximum loss in weight observed in the case of thin and thick-shelled lots at the time of complete driage of nut water was 16.4 and 20.4 per cent respectively. The paraffin coated nuts were cut open as and when they got dried up and the kernel examined. It was found in perfectly good condition and tasted fresh.

Experiment III.

Effect of shellac coatings on storage behaviour of nuts:

At the suggestion of the Agricultural Commissioner to the Government of India, shellac preparations were tried instead of paraffin for giving a surface coating to the nuts under storage studies. Two shellac preparations were kindly made available for the purpose by the Director, Lac Research Institute, Ranchi.

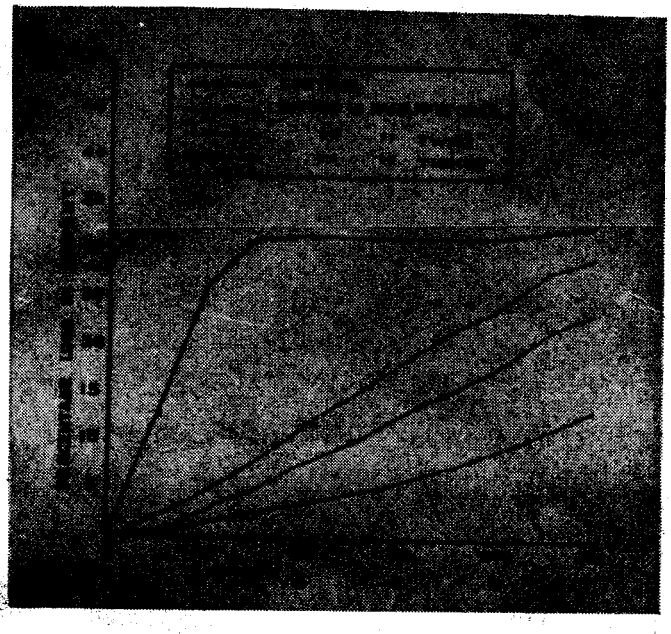

Fig. 1

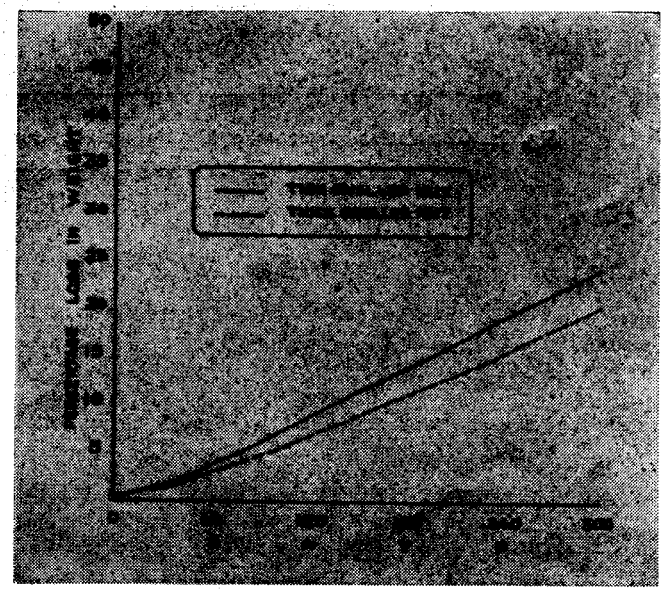

Fig. 2

Fig. 1: Cumulative percentage loss in weight during storage in relation to thickness of paraffin coating

Fig. 2: Cumulative percentage loss in weight during storage in relation to thickness of shell of coconut

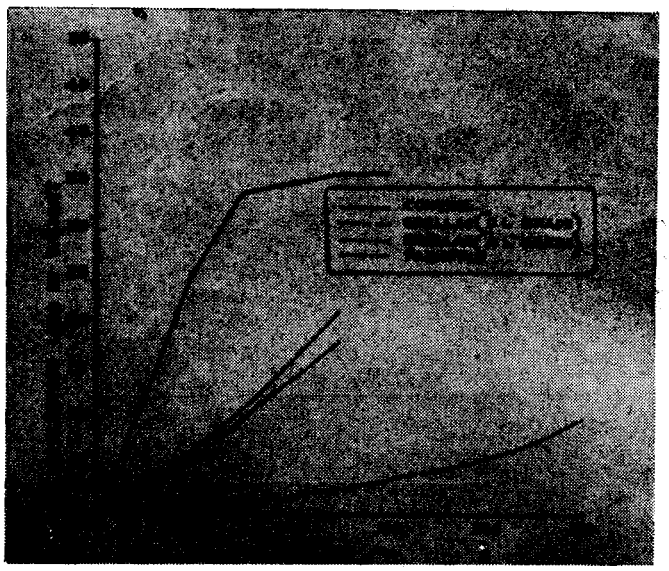

Fig. 3: Cumalative percentage loss in weight during storage in relation to coating by different substances.

The following treatments were included in the trial:—

1. Nuts coated with paraffin.
2. do. shellac "AL" grade.
3. do. shellac "DL" grade.
4. Nuts stored in alkathene film bags.
5. Nuts without any treatment (control).

For giving a surface coating, commercial grade of paraffin wax was used as in the previous experiment. The shellac preparations used were "AL" grade lac containing 2.5 to 3.0 per cent lac wax and "DL' grade containing no wax. Two parts of this lac were dissolved in 5 parts by weight of water (2:5) and the solution heated slightly with constant stirring. After cooling this was applied to the surface of the nuts by means of a brush. Three coatings were given at intervals of an hour. For bag storage, each nut was packed in a separate bag made out of Alkathene film which was then heat sealed.

Twenty nuts were allotted at random to each of the treatments. All the treated nuts were stored in a well ventilated receptacle and weighed periodically to determine the loss of weight. The period taken for the water to dry up completely was also noted.

The results are summarised in Table 3, Appendix, and also presented graphically in Fig. 3.

The nuts stored in Alkathene film bags got spoiled due to the attack of fungus under the high humidity conditions developed inside the bag shortly after the initiation of the experiment and therefore further observations had to be discontinued.

All the nuts in the control group got dried up within 4 months of storage. Nuts coated with the two grades of shellac also dried up completely within 5 months of storage. In the case of paraffin-coated nuts even after storage for 10 months, 65 per cent of the nuts were still having nut water in them. The improved storage life appears to be directly related to the control effected on the loss of weight. Thus untreated nuts had lost at the time of driage as much as 35 per cent of initial weight whereas in the paraffin coated nuts the loss in weight was only about 11 per cent. The paraffin coated nuts were cut open as and when they got dried up and the kernel examined. It was found in perfectly good condition and tasted fresh.

DISCUSSION

The results summarised in the previous section fully confirm the previous observation that husked nuts could be stored without driage of nut-water for 10 to 12 months or more by giving a surface coating with paraffin. The unsatisfactory performance of shellac coating appears to be due to the difficulty of giving a complete coverage with the material and to the fragile nature of the film.

Since this finding is useful and of great practical importance, it is proposed to try the paraffin treatment on a large scale in order to work out the cost involved. Where very large numbers of nuts have to be treated, the whole procedure can even be possibly mechanised.

SUMMARY

Trials were conducted to make a comparative study of the effect of two shellac preparations, *viz.*, shellac "AL" and "DL" grades and paraffin on the storage life of husked nuts. Paraffin was found to be the best among the materials tried. Even after 300 days only 35 per cent of the nuts stored were found to get dried up. All control nuts dried up within the first 75 days of storage. The "AL" and "DL" grades of lac were found to be only slightly better than the control. There was indication that the period of storage without driage could be increased by increasing the thickness of paraffin coating. Percentage loss in weight was less in the case of thick - shelled nuts.

ACKNOWLEDGEMENT

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REFERENCES

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APPENDIX

TABLE 1

Cumulative percentage loss in weight and driage of nuts (given in the brackets) during storage. — Experiment I

S. No.	Treatment	Per cent after days									
		30	60	90	120	150	180	210	240	270	300
1.	Nuts waxed by dipping in molten paraffin once	1.8 (12.5)	5.0 (12.5)	8.4 (12.5)	12.0 (62.5)	15.4 (75.0)	18.6 (87.5)	21.5 (100.0)	24.4	27.0	29.1
2.	do. twice	0.5	2.7	4.8	7.4 (12.5)	10.3 (25.0)	12.7 (75.0)	15.5 (100.0)	18.3	21.4	24.5
3.	do. thrice	0.2	1.3	2.3	3.3	4.6	6.0	7.5 (37.5)	9.5 (75.0)	11.5 (100.0)	13.7
4.	Control	12.7 (62.5)	25.2 (100.0)	31.0	31.3	31.3	Observations discontinued				

TABLE 2

Cumulative percentage loss in weight and driage of nuts (given in the brackets) during storage. — Experiment II

S. No.	Treatment	Percentage after days									
		30	60	90	120	150	180	210	240	270	300
1.	Thick - shelled	0.8	2.8	4.7	6.8 (37.5)	8.9 (37.5)	11.1 (50.0)	13.2 (62·5)	15.6 (75.0)	18.0 (87.5)	20.4 (100.0)
2.	Thin - shelled	0.8 (12.5)	3.2 (12.5)	5.5 (12.5)	8.3 (12.5)	11.2 (37.5)	13.8 (62.5)	16.4 (100.0)	19.1	21.8	24.4

TABLE 3

Cumulative percentage loss in weight and driage of nuts (given in the bracket) during storage — Experiment III.

S. No.	Treatment	Per cent after days									
		30	60	90	120	150	180	210	240	270	300
1.	Coated with paraffin	nil	0.4	1.1	1.9	2.7	3.5	4.5	5.9	7.7	10.8
						(15)	(20)	(20)	(25)	(30)	(35)
2.	Coated with "AL" lac	2.4	6.3	10.3	14.9	18.6					
			(10)	(45)	(70)	(100)					
3.	Coated with "DL" lac	2.8	7.1	11.3	16.1	21.6					
			(20)	(65)	(90)	(100)					
4.	Bagged in alkathene		0.4	1.8	2.9			Discontinued			
				(10)	(15)						
5.	Control		12.9	26.7	34.0	35.2					
			(20)	(65)	(90)	(100)					