

QUALITY OF COPRA MANUFACTURED FROM SUB-STANDARD NUTS

By

S B. Ratnayake' *

ABSTRACT

It is well known that copra manufactured from substandard nuts are invariably of poor quality. The reasons that lead to or poor quality are varied, depending on the nature of the defect of the raw material. However, a better understanding of the parameters that cause poor quality can lead to attainment of considerable advantages, through minimization of losses arising from deterioration of quality of the product. Though the copra manufactured out of substandard raw material may not strictly meet with the standards of up-market grades such as "Edible " or the "Milling Superior" (See Sri Lankan Standards for Copra) the losses associated with the conventionally practiced systems are evidently possible to be reduced by using appropriate drying techniques. The trials carried out indicate some variations in preparation of raw material and the drying regimes, suitable for substandard nuts depending on the defect of raw material.

INTRODUCTION

Copra cannot be flash dried as in the case of comminuted kernel as the rate of drying, depends on the migration of water inside the tissues.' Thus even in the improved kiln dried process of the Philippines, the maximum temperature used is about 60°C This is not different from the conditions of drying recommended by the Coconut Research Institute of Sri Lanka. ³ The drying rapid at the initial stages.- However, in the traditional methods of drying copra, slow process of sun drying is carried out during the first 24 to 48 hours, followed by kiln drying at a relatively higher temperature in the subsequent stages.`` This is likely to be plausible within limits in the case of healthy mature coconuts, where the cellular barriers are well formed. Any attempt to dry intact well formed tissues at higher temperatures from the inception is likely to cause case hardening.

Methods and material

Convection oven, precision + or - 2 degrees C Thermometer
Kitchen grater
Sartorius I.R. moisture balance

Studies were conducted by laboratory scale processing of copra from coconuts of marginal standard, based on the superficial appearance of nuts. The nuts include those with whitish patches on the surface around the eyes, partial germination and those gathered from fallen nuts. Fifty nuts were cracked open as given below:

- a) 25 nuts selected at random were split in halves horizontally
- b) 25 nuts selected at random were split in halves longitudinally.

Nuts were graded visually and moisture contents determined in samples of each grade.

* Director Quality Control & Quality, Assurance, Coconut Development Authority, Colombo, Sri Lanka

Determination of moisture

Pieces were cut from each visual grade and pooled. Pieces of kernel was grated with a kitchen grater to obtain 5g of sample. The moisture of each sample was determined using the moisture balance of 95° C.

Three moisture determinations were carried out from the samples of each grade. The average value is given as the result.

Trial Manufacture of Copra

One half of each nut was dried in the sun on a concrete barbecue under a transparent clear polythene held about 10 cm above the material for two days. The shells were then removed and the kernel was dried in the oven at 58°C.

The balance halves were dried in the oven at 58°C for one hour followed by two days of sun drying after removal of shells as above.

The copra produced were subjected to sensory evaluation for quality.

Results

Results of Moisture content

Immature nuts	-	59.3%
Germinated nuts	-	49.8%
Germinated immature nuts	-	54.6%

Result of Drying Trials

MODE OF DRYING (Sun >> Over)			MODE OF DRYING (Oven >>sun)		
(Type of defect indicated giving frequency as a fraction)					
	Halves	Boats*	Halves	Boats*	Type of Raw Material
Moist	2/8	0/10	4/8	1/10	Immature Nuts
Warped	8/8	10/10	8/8	10/10	
Mold	0/8	0/10	0/8	0/10	
Burnt	0/8	0/10	0/8	0/10	
Moist	0/11	0/8	0/11	1/8	Germinated Nuts
Warped	0/11	0/8	0/11	0/8	
Mold	8/11	5/8	1/11	0/8	
Burnt	5/11	6/8	0/11	0/8	
Moist	0/6	0/7	1/6	0/7	Germinated Immature nuts
Warped	6/6	7/7	6/6	7/7	
Mold	4/6	2/7	1/6	0/7	
Burnt	5/6	7	0/6	0/7	

Discussion

Using immature nuts it is difficult to obtain a perfect product with whatever the drying regimes used. Among these, the results indicate that low temperature treatment followed by oven drying at 58°C is more effective in driving away the moisture. The wrinkled appearance on the testa surface that was evident is likely to be caused by unequal

loss of moisture through the surface under the shell, where formation of the layer of testa is not uniform at the juvenile stage of maturity.

In germinated nuts the mold growth is expected to be effectively minimized by an initial 58°C treatment. The partly digested material adhering to the inner surface of terminated kernel is reported to serve as a medium for growth of fungi during the initial stages of sun drying. When subjected to dry heat of 58°C the material is likely to dry up before the moulds set in. Once the surface is dried up, very little opportunity is offered to the fungi to germinate during the final stages of sun drying due to the drying effects at the initial stages.

High to low temperature regime also minimized burning in germinated material as shown by the results. It is likely that the burnt colour in copra is due to non-enzymic browning induced by heat. The precursors for the chain reaction are likely to be generated during the initial stages of slow drying, resulted by the activity of enzymes associated with germination as well as microbial metabolism.

By examining the germinated longitudinal (boat shaped) halves it was observed that quality in the region away from the eyes is generally satisfactory as against the region adjacent to the embryo activity. Boat shaped halves also were found to dry rapidly in all instances generally yielding a better product from sub-standard raw material under the utilized drying regimes. This is likely to be a result of the area of exposure to radiant heat being higher in the case of longitudinally split kernel.

CONCLUSIONS

Sub-standard nuts could be converted to copra of satisfactory level of moisture for preservation in three days by using solar drying in combination with oven treatment.

For immature nuts, the best results are obtained by splitting the nuts longitudinally. For germinated nuts, it was best to use the higher temperature treatment at initial stages followed by sun drying.

It may be generally observed that deshelling of the coconut was eased by longitudinal splitting, which itself accelerates the process of drying;.

Considering the traditional method of drying copra as the standard practice, the results of the trial shows that it is better to adopt different techniques for different grades of raw material v.i.z. germinated, immature, etc. This is practicable only if nuts are sorted prior to the manufacture of copra.

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