

Quality of copra in relation to the drying methods

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Drying is an important post-harvest operation in the processing of coconut for extraction of coconut oil. Fresh coconut meat which contains 45% to 55% moisture content (M.C.) has to be dried to 5% to 6% moisture level in order to obtain good quality copra. Drying must be carried out within four hours of splitting since coconut meat deteriorates very rapidly due to growth of mould and bacteria (Patil, 1991). Within four hours, microbial activity, in the form of slime formed due to bacterial growth, is seen if temperature is less than 30°C and relative humidity is more than 80%. The surface slime continues to develop and within 48 hours, penetrating mould also makes its appearance. Microbial infection is reported to be more above 20% of the kernel. (Nair, 1984). Fungi were reported to be the principal agents causing deterioration of copra followed by bacteria. Nathanel (1965) found that the loss due to microbial infection varies with moisture content of dried copra. Subrahmanyam (1968) recorded the occurrence of *Staphylococcus aureus*, *Bacillus* sp. and yeast at 20–50 percent moisture content of copra. Thomas *et al.* (1987) reported that deterioration of copra sets in during drying and storage. Bacterial action is initiated during processing and the severity of subsequent mould infection and insect attack depended on the extent to which the cell structure has been broken down by the bacteria. The common practice of getting copra is by sun drying the fresh coconut meat on cement floor or on sand floor for seven to nine days. Unlike other crops, while drying, the endosperm of coconut is exposed and so is susceptible for contamination due to dirt. Prolonged drying also results in microbial infection. The microbial contamination can be reduced if drying is done in suitable dryers. However precaution has to be taken because rapid drying causes case hardening. (Grimwood, 1975). The microbial contamination level, oil % (on extraction) and

oil quality analysis of coconut dried in solar dryer and electrical dryer developed at Central Plantation Crops Research Institute, Kasaragod is reported in this paper.

The CPCRI Solar Cabinet Dryer has a holding capacity of 100 nuts. It is a chamber type dryer having natural air convection arrangements. The drying surface is kept at an inclination of 12.5° equal to the latitude of the place and has provision for manual sun tracking to absorb maximum solar energy. The drying time taken in this case is only 3 days. (Patil, 1984). In order to get good quality copra, the m.c. must be brought down from 45-55% to 30% within the first 24 hours (Grimwood, 1975). Coconut kernel being a very good substrate for micro organisms gets infected if not subjected to drying within four hours after splitting (Thampan, 1981). Solar drying and solar drying is not possible when the sky is cloudy or during rains. For such situations an electrical dryer with provision for hot air circulation and temperature control was developed at CPCRI. This dryer consists of a drying chamber, plenum chamber, an air distribution unit and blower cum heating unit. The blower cum heating unit contains 6 numbers of heaters of 1 KW each and the hot air is blown into the drying chamber using a 0.5 HP, 1440 rpm blower. The dryer is of 1000 nuts capacity and drying time taken in electrical dryer is only 26 hours (Madhavan *et al.*, 1994).

One batch of drying trial was conducted using solar dryer, electrical dryer and open sun drying, during July 1997 (Batch 1). WCT nuts 100 were dried in open sun in a cement floor, 100 WCT nuts in solar dryer and 1000 nuts in electrical dryer. The experiment was repeated during November – December 1997 (Batch 2). Samples of copra were taken for observing microbial contamination, for oil extraction and for quality analysis. The results are given in Tables 1 and 2. The copra

from open sun drying had larger population of bacteria, and lipolytic microorganisms compared to copra from solar dryer and electrical dryer.

Quality of coconut oil in relation to drying methods of copra

Method	Acid value	Free fatty acid as % lauric acid	Peroxide value M eq. peroxide/Kg sample	Oil %
Open sun	1.31	0.17	1.57	67.94
	0.70	0.16	1.58	66.39
Solar dryer	0.63	0.11	1.46	67.9
	0.50	0.11	1.43	66.4
Electrical dryer	0.59	0.11	1.43	67.9
	0.49	0.11	1.40	66.41

Population of copra samples

Batch	Population per gram of copra		
	Fungi (x 100)	Bacteria (x 100)	Lipolytic micro organisms (x 100)
Batch 1	15.25	28.18	11.88
Batch 2	4.85	16.50	4.40
Batch 1	6.25	6.50	3.91
Batch 2	1.80	4.09	1.31
Batch 1	6.35	6.53	3.98
Batch 2	1.80	4.02	1.32

The Batch-1 samples collected from copra dried in rainy season had greater infection by fungi, bacteria and microbes in all drying methods indicating that relative humidity of more than 85% is not ideal for copra drying. Coconut oil produced from copra dried in electrical dryer was of superior quality with less acid value, minimum peroxide value and free fatty acid

content very closely followed by the oil produced from copra prepared using solar dryer. The reason for this could be 1) thermostatic temperature control (available only in electrical dryer), 2) forced air convection and hence uniform hot air distribution resulting in uniform temperature and 3) shorter drying time and 4) lower microbial contamination. There was no significant change in the percentage of oil extracted from copra prepared by these methods. Thus the solar dryer and electrical dryer developed at CPCRI can be used for coconut drying for copra production and oil extraction without any quality deterioration.

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