

Preliminary studies on the storage of Copra in plastic-lined gunny bags

by

M. M. Krishna Marar & V. Padmanabhan
Central Coconut Research Station, Kasaragod

THE most valuable product of commercial importance of the coconut palm is copra or the dried coconut kernel. It has recently been estimated that annually about 46 per cent. of India's production of 4,151 million nuts is being utilised for conversion into copra yielding nearly 2,80,000 tons. Of this quantity 79 per cent. is reported to be used for milling purposes i. e., for the extraction of coconut oil.

The Kerala State holds practically the monopoly for the production of milling copra since it accounts for as much as 98 per cent. of the total production in the country.

This quality of copra is largely made in the form of cups from fresh nuts or from nuts stored for a short period. The most common method of making cup copra is by drying the split nuts in the sun, but kiln drying is also resorted to on a very small scale especially during rainy months when facilities for sun-drying are not available. The best grades of copra are obtained by drying the cups in the sun for 6 to 8 days or in the kiln till the moisture content is brought down to round about 5 per cent. However, the growers and middlemen very often stop with 2 to 3 days drying and dispose of the partly dried copra which consequently

deteriorates rapidly in storage from mould and insect attack.

Moisture - the cause of copra deterioration

The most important single factor that governs the initiation and progress of deterioration of copra is moisture content, since only under optimum conditions of moisture could bacterial fermentation, fungal action and insect actively take place. To promote better keeping quality of copra it is, therefore, necessary to see that its moisture content does not go beyond the critical figure of 5 per cent. at any time. This can be assured, firstly by properly drying the copra to the desired moisture level and secondly by storing the material in such a way as would prevent it from absorbing moisture during storage from the atmosphere.

Both copra making and copra storage during rainy months pose difficult problems on the West Coast. Heavy and continuous rains and absence of bright sunny days which are characteristic of the period from June to October make it practically impossible to manufacture copra by sun-drying during that period. This makes it incumbent on the large scale consumers of copra such as oil millers to stock copra for their requirements during the lean period, though they do realise that copra stored under the highly humid conditions will rapidly deteriorate. The monthly average daily humidity ranges from 92 to 95 per cent. it being over 90 per cent. on about 85 per cent. of the days. Therefore even though copra might be dried initially to the critical moisture content it will have if stored for a fairly long period, sufficient opportunity to gain moisture from the atmosphere and undergo deterioration consequently. Such absorption is facilitated by the way copra is generally stored viz., in gunny bags or by

simply heaping in bulk on the floor of the store.

Any hygroscopic material such as copra if allowed to be exposed for a sufficiently long time to a particular humidity condition, will be found to attain a moisture percentage in hygroscopic equilibrium with the atmospheric humidity. For a particular type of material this moisture percentage at equilibrium is essentially a function of humidity. The behaviour of a lot under a given set of humidity conditions can be forecasted if the moisture content of the material at the time of storage and the equilibrium moisture content are known. If the amount of moisture is below the equilibrium moisture content, the material will absorb and gain moisture, while if it is above, the material will give up moisture till it attains hygroscopic equilibrium with the humidity. Some studies in this line carried out previously had given the following results with particular reference to the humidity conditions that are generally found to prevail on the West Coast during different periods of the year.

Relative percentage humidity	Moisture content of cup copra at equilibrium
92	7.11%
86	5.58%
79	3.98%
71	3.08%

It is quite clear from the data that well dried copra will remain without any appreciable deterioration during the summer months but that it will gain moisture during storage over the rainy months of June to October and undergo deterioration unless special precautions are taken.

Plastics - a protection

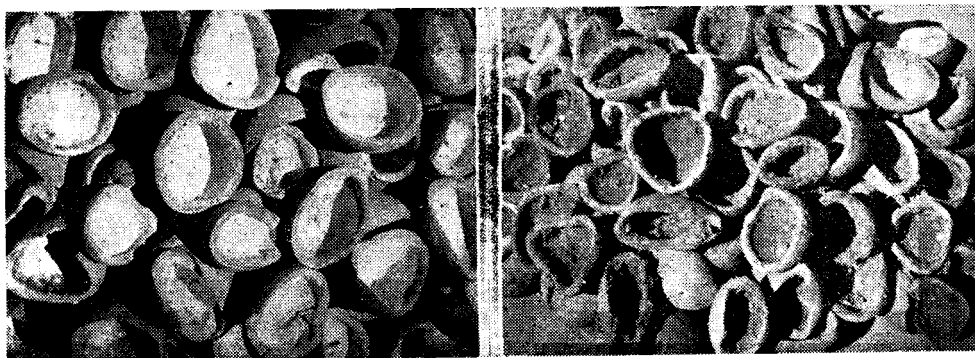
In this age of plastics, jute and hessian bags provided with plastic liners are being

increasingly used for the protection and preservation of a variety of products liable to deterioration in storage. There are different types of plastic materials available in the market which because of their special properties will enable to control the "Weather" in a package. The liner will help to keep out unwanted moisture and prevent contamination by external moulds, insects and foreign matter. Since in storing copra without deterioration during rainy months, the main problem to be tackled is the prevention of moisture uptake, the idea of making use of the favourable properties of plastics in copra storage suggested itself. Accordingly a small scale trial was carried out during 1957.

Small quantities (about 50 lb.) of good quality copra prepared by sun drying during the summer months were stored in an 'Alkathene'* lined gunny bag for a period

of 6 months from June to December, 1957. Another lot of 50 lb. was stored in a new ordinary gunny bag as control. The plastic liner was flexible enough to allow the bag to be tied with a string as easily as the ordinary gunny bag. Both the bags were kept in a well ventilated room so that the atmospheric conditions had full play over the bags. At the end of the storage period, the bags were untied and the contents carefully examined. The copra stored in the ordinary gunny bag had become moist, pliable and completely mouldy and insect attacked. The copra in the 'Alkathene' lined gunny bag was found to remain in good condition, being dry and crisp and free from any insect attack. Some cups did show some slight superficial growth of mould but it had not affected the quality of copra. The visual differences between the two lots will be quite evident from the illustrations.

Condition of good quality copra after 6 months' storage during rainy period



*Left: Stored in 'Alkathene' lined gunny bag — copra still in good condition
Right: Stored in ordinary gunny bag — copra badly damaged*

* Purchased from Kassipur Company Ltd., Calcutta.

The two lots were disposed of in auction and fetched the following prices.

Type of gunny bags used for storage	Amount realised for 42 lb. of copra
Ordinary gunny bag	Rs. 20.16
'Alkathene' lined bag	Rs. 31.38

The better price obtained for the copra stored in the 'Alkathene' lined gunny bag is a true indication of the better quality of copra. Even in one season utilising only above $\frac{1}{3}$ capacity of the bag, the 'Alkathene' bag has paid for itself many times over. The 'Alkathene' lined bag cost only about Rs. 2.00, each, as against Re. 1.00 for the ordinary gunny bag. Thus for an extra

investment of Re. 1.00 the increased return in one season alone would have been to the tune of Rs. 30.00.

In view of the promising results obtained more detailed investigations are now under way. Meanwhile those who have of necessity to store copra during rainy months are advised to try using 'Alkathene' lined gunny bags. The bags can be used repeatedly and deterioration of copra in storage can be considerably reduced. One precaution is however necessary. The bag may not be used for storing copra which is only partly dried and consequently of a higher moisture content. Since there is no possibility for the excess moisture to dry out, incipient deterioration may set in much more quickly than otherwise.