EVALUATION OF WEATHER DATA FOR DRYING AND STORAGE OF COPRA

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ABSTRACT

Weather data such as mean daily temperature, relative humidity, wind velocity, sunshine hours and rainfall per meteorological week at Kasaragod (HT MSL – 10.7 m 12 .30'N Latitude and 75°E Longtiude) were evaluated for predicting suitable drying period and safe storage period. Equilibrium moisture content of copra at all meteorological weeks was determined. The time required for drying was calculated per week from the energy associated with ambient air. The copra can be dried from 40th week to 20th week within 8 days. Drying can be achieved within 6 days if dried during 13th to 19th week. Drying can be achieved even during 40th to 48th week and 21st to 22nd week if solar cabinet drier is used, because during this period precipitation over 25 mm/week is expected. During the predicted suitable drying period solar radiation available is in the order of 5000 k Cal/m /day and hence drying process can be accelerated by trapping this energy by use of solar drier. Copra can be stored safely in well ventilated storage structures except in 25th to 39th week, relative humidity being below 80%. If proper ventilation is not maintained it may deteriorate even from 22nd week. From 22nd to 41st week the relative humidity ranges between 80–90% and equilibrium moisture content of copra above 4% which attracts fungus *Penicillium frequentas*. To avoid this, supplemental heat aeration (5°C above ambient) or use of industrial dessicants may be practised in storage structure.

INTRODUCTION

Copra is the dried kernel of coconut. Good quality copra shall has a moisture content of around 6%. The initial moisture content of kernel being 45–50% (w.b.), sundrying is usually practised and mechanical drying is opted only when indispensible. The time required for sundrying mainly depends on ambient air conditions. It takes about 5–7 days if drying is carried out on bright sunny days. If drying is slow as in humid weather the

spoilage by microbial infection is more pronounced. If after cutting open the nut, the drying is delayed, even by few hours spoilage sets in affecting the quality of oil (Grimwood, 1974).

India produces about 5800 million nuts per year and copra production is about 327000 tonnes (Nair and Mathan, 1971). The energy needed for preparing the above quantity of copra would be about 176580 x 10^6KCal. Fortunately, being in tropics there is plentiful supply of solar energy by diffusion as well as radiation. So it is upto processors to use the naturally available energy to the fullest extent.

Coconut kernel is an excellent substrate for the growth of fungi and bacteria. The infestation can occur at all levels of moisture content, unless proper preventive measures are not adopted. Copra was observed to be infested even at 4 percent moisture content when humid condition above 85% relative humidity prevail (Henderson, 1952).

This shows that both the drying and storage of copra are closely related to ambient conditions. Knowledge of prevailing ambient conditions at any given time of the year will enable to pre assess the moisture content upto which copra can be dried, the time required for drying and the extent of supplimental aeration needed for safe storage. Such information will help in appropriate drying and storage systems, design and planning.

Material and Methods

Weather data for 11 years (1969–1979) viz. temperature, relative humidity, wind velocity, sunshine hours and rainfall were collected from the agricultural meteorological observatory at CPCRI Kasaragod situated 10.7 m above mean sea level, 12.5°N latitude and 75°E longitude. The average values of all these parameters over 11 years were calculated for every meterological work. The material constants C and N in Henderson's Equation (Equation No. 1) for equilibrium moisture curve were calculated from the data after Brustillos and Banzon (1949) (Table 1).

$$1 - RH = C - CTMe^n \quad - (1)$$

where,

RH = relative humidity indecinal

Me = equilibrium moisture content percent, dry basis

T = absolute temperature in °K, C and N are material constants

Table 1. Equilibrium Moisture Content of Copra at Room Temperature (30° + 3.5°C) (After Brustillos and Banzon, 1949).

RH	EMC
10	0.32
20	0.65
25	0.80
30	0.96
35	1.10
40	1.30
45	1.55
50	1.80
55	2.05
60	2.31
65	2.61
70	2.96
75	3.32
80	3.73
85	4.30

Values of C and N for Copra: $C = 1.22 \times 10^{-3}$, $N = 1.10$