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A SOLAR DRYING SYSTEM FOR FISH FEED PRODUCTION IN TARAWA, KIRIBATI

UNDP/FAO FISHERIES PROJECT

TARAWA - KIRIBATI

This report has been prepared by B. R. Onorio, Fisheries Officer, for presentation at the SPC Fisheries Conference. The design, installation and initial operation of the solar drying system was supervised by Mr Richard St George, (V.S.O.) working in the project. The finance for the solar drying system was arranged by the Government of Kiribati through New Zealand Aid Programme. The Project Manager, Dr V. Gopalakrishnan was responsible for the general organization of the programme.

INTRODUCTION

1. Tarawa, the headquarters of the Republic of Kiribati is only ninety miles south of the equator and hence receives on an average day seven hours of direct sunshine. Effective utilisation of a portion of this "free" solar energy is, perhaps, the answer to the drying of fish feed, moist marine products, copra etc.

2. The UNDP/FAO Fisheries project is investigating problem concerning the commercial production of cultured milkfish for food and live bait for pole-and-line skipjack fishery. Supplementary feeding has become necessary for adopting high density stocking strategies, thus getting higher fish production rates. The growing concern against importing expensive fish feed initiated a search for producing a locally available fish feed base. Copra cake was the first choice as it is the major agriculture product in the country. A small oil extraction plant to produce copra cake was installed at the Ambo Fish Farm of the project and has been working satisfactorily. Crushed copra, initially, has appreciable moisture content and needs to be redried before processing.

3. Initial problems for open sun drying crushed copra, due to cloudy condition and sudden rains, led to the search for a more reliable, efficient and hygienic means of drying regardless of normal weather fluctuations. A solar drier, the first of its kind in Kiribati, was constructed for the purpose as a pilot project.

STRUCTURE AND DESIGN

4. The solar drier (16' x 8') is structurally based on a prefabricated aluminium glass house fixed on a blackened concrete base. Ventilation is provided at two sides with adjustable glass louvred panels. Two vents at the base have air blowers with heaters. At the roof apex of the glass house is an adjustable vent. Through the sliding doors four aluminium trolley racks (6' x 3') can be pushed through. Aluminium channelling fixed on the base guide the trolley wheels and prevent contact with the glass. Aluminium frames used throughout are generally suited for the hot, humid, moist and saline conditions inside the glass house.

MODE OF OPERATION

5. Solar radiation passing through the glass house heats up air inside, with the help of a black painted base, and exits via the vent at roof apex. Fresh air is drawn in as a result through the louvred vents at the side, is heated and continues the circulation, thus ensuring a forced circulation system. The material to be dried is kept in tray racks mounted on trolleys and kept in the area of air circulation. The hot air movements reduce humidity inside the glass house, resulting in quicker drying of material.

TEMPERATURE AND HUMIDITY

6. Recent readings on a clear day taken in September when the solar drier was full, showed that while the outside temperature remained at around 85°F to 100°F; the inside temperature rose to 135°F between 1130 to 1630 hrs. It is envisaged that in hotter months inside temperature may go higher.

7. Relative humidity readings indicating the amount of drying have been very encouraging. Generally from 1030 to 1700 hrs, the average relative humidity was down to 35%. A minimum occurred (22%) during noon and stayed at this till 1500. The considerable drop in humidity during this time (1100 to 1500 hours) showed that the hot air current was actually changing the humid atmosphere inside quickly. So far, there has been no need to use the air blower to facilitate drying as no overcast days have been encountered. The blower fans will be useful when drying fish products, where a very high temperature is not required. Earlier work done by Teekabu Tikaai, Fisheries Officer, using a polythene covered enclosure (drier) was not quite successful with fish drying as the temperature developed inside were high for this purpose.

COPRA FEED

8. Crushed copra spread on five trays (about 65 lbs/tray) are usually stacked in one trolley. The system can dry about $\frac{1}{2}$ ton crushed copra for a 12-hour daylight period. This capability has been adequate for the copra cake plant installed at Ambo. Copra moisture changes from 10% to 2% during the drying period. The dry crushed copra goes through an oil expeller which separates out oil, and the copra cake is used as a fish feed or as a base for compounded fish feed. Trials using additives, including fish meal, silage, etc. are in progress. The solar drier has been found to be useful at different stages of fish feed production.

GENERAL

9. Besides crushed copra, small quantities of fish seaweeds (Eucheuma), fish silage and coconuts have been dried and showed encouraging results.

10. The solar drier being the first of its kind in Kiribati represents a step in utilisation of cheap locally available sources of energy in an effective, hygienic and economical way.

11. In the developing South Pacific Islands where we are blessed with adequate solar energy, and in the context of the present global need to conserve fuel, this system deserves serious consideration under various situations and conditions.