Coconut Copra Drying Unit

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Abstract- *The challenge for the farmers in drying process at an optimum temperature of 30-40^oC has been dealt in COCONUT COPRA DRYING UNIT. Drying process for coconut oil extraction is very tedious. Mostly olden methods are still under practice. Generally, the copra is dried on bare land and it takes many days for this process. The benefits are acquired by way of high quality along with the drastic reduction in drying time. Sunlight is tracked using special type of lens with the aid of Light Dependent Resistor to detect maximum intensity of sunlight. The rays of sun hits the system with constant temperature where additionally its direction is studied, the panel is turned based on the readings of LDR. Maximum heat is absorbed by implementing this technique. During cold seasons, sunlight alone cannot be used for drying. Thus, there exists high temperature inside the module; air is forced out to cool the Copra. In case of rain, blower is used to circulate hot air for drying. The copra is dried in all climatic conditions to meet out the demand. The rain water cover is settled up using the polyethylene sheet which is UV ionized. This sheet absorbs and maintains the heat inside the system. This type of drying process can increase the production of coconut oil ensured with good quality.*

I. INTRODUCTION

Generally, using traditional methods for drying Copra with the help of Sun results in lowering the quality of Copra. In this present scenario agriculture and respective products need more attention and care. Agriculture being the backbone of India, improving it increases the economical status of the country. With the aid of Copra unit efficiency of drying can be incited. Due to the presence of high saturated fatty acid in Coconut, it is very slow to oxidise. This can be major cause for the drying process that takes large area and time to undergo. This Copra is fully exposed to environment where quality of the oil is ensured. Good climatic conditions with optimum solar temperature makes industry ready output with satisfactory product. Somehow it affects the quality of the oil. It is important to reduce the water content by drying to about 6% (Coconut fruit has a water content of about 50%).So, to ensure this Temperature sensor is used. It has been estimated that Copra can be dried using this project by reducing it to one third of its conventional time. It is primarily designed to reduce the process tie for the drying.It also a major factor for good quality of Coconut oil. Finally, to reduce the time of drying process and make it available for Coconut oil in all seasons.

II.LITERATURE SURVEY

A. Existing Method

Many Coconut oil industries produce Coconut oil in large scale. The drying of Copra takes the longer time for the whole process to attain final stage. Here climate changes make as challenging one for the total process time. The Copra is produced by drying the Coconut kernel. The Copra quality is strongly dependant on the drying techniques. Inadequate drying gives rise to the growth of alfatoxins and affects the amount of Coconut oil that can be derived from a nut. Proper post-harvesting methods including drying and storage can increase the oil yield per nut by about 20%). It is important to reduce the water content by drying to about 6% (Coconut fruit has a water content of about 50%).To achieve this, husking and drying of the Copra should take place within 48 hours of harvesting. The solar drying is traditional process which is inexpensive, but can only be done during dry days. This process is suitable for small quantities of nuts. The conventional Copra drying method on bare land is depicted in Fig. 1.

B. Proposed Method

The proposed method is making the sun to focus on the system. It consists of a tunnel type semi-cylindrical drying chamber provided with windows to allow the sunlight to enter the dryer. The dryer is covered with special polymer film sheet called Ultra Violet UV sheet. Its characteristics of absorbing heat from solar and to maintain the warmness inside the dryer for effective drying. The solar tracking circuit is designed where LDR traps the solar energy, is provided to the Programmable Logic Controller (PLC). It controls the motor attached to the glass for tracking based on the input acquired from the LDR. This method is effective method for drying of Copra. They can provide a hand for reducing total process time for Coconut oil production. It is assumed as drying process of seven days can be attained to three days of total drying process.

C. Case Study

With reference to C.K.Sankat (1990), "The Performance of Natural Convection Solar Dryers" where 3 natural convection solar dryers that require external power source. The consumption of power is the greatest challenge for the sustainability and for the durability of the project. On the other hand in this project sunlight is just tracked to obtain efficient drying and no other external source of energy is involved. The drying can be achieved but the energy saving makes its future scope for further development.

Taking into consideration of V.Sreenarayanan (2008) Vol222 a heat pump which would solve the problem of large industry has been dealt with in "Performance of a Heat Pump Drier for Copra Drying". In this technique, the artificial blower of heat energy from external supply. The optimum temperature for drying for the Copra can be done effectively. The drawback of this prototype is the supply of external energy source into the setup makes its main drawback for this deployment for commercial usage. The updated setup for drying makes the effective drying of Copra in short span of time.

III. METHODOLOGY OF COCONUTCOPRA DRYING UNIT

The Block diagram of Coconut Copra drying unit is shown in the following Fig.1. It comprises of LDR, focusing lens, PLC, Relay, blower and power supply unit.

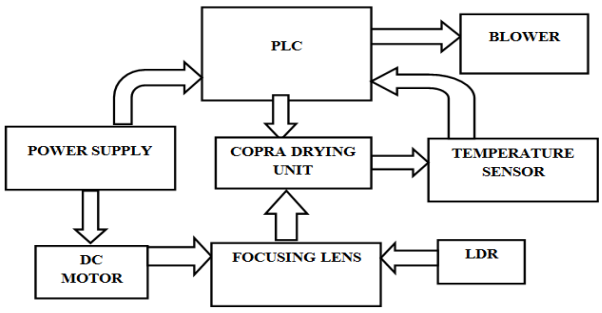

Fig. 1 Block Diagram of Coconut Copra Drying Unit

The Copra drying unit is actively controlled by PLC Programmable Logic Controller. The power supply of 24Vis supplied to both input and output modules of PLC. The Focusing lens, which is movable, is rotated based on the sun ray direction. The LDR is used to sensing the sun ray. They are provided as input to the PLC. The comparator circuit is designed for comparing the voltage from LDR with reference voltage. Based on the output voltage from the circuit is made to actuate the 5VRelay. Focusing lens is rotated using Directing Current DC motor where output module provides enough energy to rotate based on the program embedded in the PLC processor. This acts as a switch for passing 24V DC for the input module of PLC. The Temperature sensor LM35 detects the temperature inside the drying unit. They are controlled by the PLC to energize the blower. Therefore, the optimum temperature is maintained inside the setup of drying unit.

IV. FUNCTIONALITY OF THE INTERNAL CIRCUITS OF COPRA DRYING UNIT

The functionality of each component such as LDR, Relay, comparator circuit, PLC, motor and its characteristics of each states are discussed below.

A.LDR Unit

The main objective of absorbing and attracting the solar energy into the unit for drying the Copra is being achieved using LDR.There are two LDR's being used to observe the direction in which the sunlight is maximum intense. During day time the LDR receives maximum illumination in terms of 1000 LUX.This in turn provides minimum resistance for current and voltage hence the applied voltage is received at the output end.

B.Comparator Unit

The purpose of comparator is to discriminate between the outputs of 2 LDR's.The output of one LDR is compared with reference voltage 9V and the resultant voltage is used to actuate the relay.

D.FLOWCHART FOR LADDER LOGIC PROGRAM

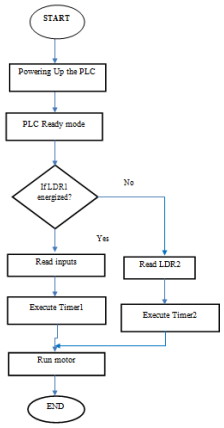

Fig. 2 Flow chart for Ladder Logic Program

V. MODEL DESIGN

A. Signal Conditioning Circuit for Copra Drying

The Designed circuit for actuating Relay using LDR and Comparator is shown in Fig. 8 Here, the LDR uses the light intensity for variable resistance for the terminal 3 and reference or constant voltage of 9VDC in terminal 2. The comparator circuit of OP-AMP is used for comparing the voltages for providing the output of high or low. They are enough to actuate the Relay of 5VDC. The operating voltage of op-amp is up to 13VDC.

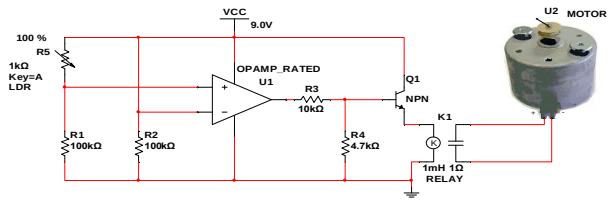

Fig. 3 Signal Conditioning Circuit for Copra Drying

B.Ladder Logic Program for Drying Copra

The RS Logix500 program for focusing of lens actuated by DC motor using PLC. When LDR senses the light, the output of Op-amp becomes high. This makes the Relay to open the path of 24VDC. They execute the program using timer block where the block makes DN of T4:0 to rotate for 5 seconds. LDR 2 is sensed the op-amp becomes true and makes Relay to actuate the second input. Timer T4:1gets energized by 7 seconds to overcome the clockwise direction causing the motor to rotate in anti-clockwise by interchanging the phase and neutral connection.

C. Different Stages of Observation of Copra Drying

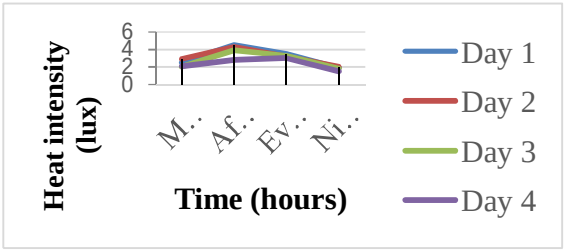

Fig. 4 Observations of Copra Drying

Graphical representation for heat Intensity tracked by Coconut Copra drying unit from one week observation is depicted in Fig. 4. This graph clearly shows the heat energy is trapped in afternoon, whereas they are very low at night. The heat energy is comparatively high in morning and evening. Thus, on a comparative analysis, drying action is effectively done in the afternoon where sun rays are overhead of the drying unit setup.

VI. CONCLUSION AND FUTURE SCOPE

A.CONCLUSION

This Coconut Copra Drying unit is primarily aims for effective drying of Copra and providing reduced process time for Coconut oil production. It reduces the human interruption for monitoring. This drying process is effective one than the traditional way of drying. It can meet oil to customer in all climatic seasons. It can also be widely used in other foods that are to be dried in conventional manner.

B. FUTURE SCOPE

The future scope of this project is to make it available for drying of all kinds of foods where drying process shouldn't be a problem. Agro products such as dried Fig., and also foods like apricots, peaches, Fig. and other foods. Grain consists of wheat, corn, soybean, rice and other grains as sorghum, sunflower seeds, rapeseed or canola, barley, oats, etc. The automation can be improving with automatic drying with updating status of continuous humidity sensing. Adding to the identification of the rotten food to provide better quality.

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