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A review on "Electric dryer for areca nut".

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Abstract - *An Areca nut is a prominent commercial crop that is cultivated in wide regions. Due to overcast weather, drying of boiling areca nuts is a serious issue throughout the rainy season (less amount of sunlight). Both the naturally drying methods and the contemporary drier have been demonstrated to be unsuccessful owing to the extended drying period, which results in poor quality control. The primary goals are to reduce time while still producing a sanitary, high-quality dry crop. The dry areca nut (Areca catechu) is frequently consumed throughout India as parts of a betel leaves. After simmering the nuts, many areca nut manufacturing enterprises now dry them out in the open sun for 5 to 6 days. All throughout heating process, its moisture content of dried areca nuts is lowered between 40% to 11% to ensure safe storage and food quality. According to the research, the gadget may elevate air temperature by 15-20 degrees Celsius.Furthermore, according with organoleptic test, each areca nut dry inside the electrical dryer device was completely protected against rain, bugs, and dust. The dried up areca nut outperformed the open sundried product in terms of flavour and colour, as well as time saving.*

Key Words: **Need for Electric areca nut drier, Working Principle and construction.**

1. INTRODUCTION

[3] In the processing, shipping, and storage of agricultural goods, drying is a critical step. The goal of drying would be to lower the product's water content to a level that prevents it from degrading within a certain time frame, which is usually referred to as the safe storage term. Contamination, animals, birds, insects, pests, and spoiling are all key drawbacks of open drying systems. A rapid change in meteorological conditions, such as wind or rain, is also a possibility. In the past, the sunlight was the sole source of heat and light for daily activities given the absence of electricity. As the use of fossil fuels and thermal power increases, so does the risk of climate change.

[2] Future generations will have few resources to depend on this if we continue to utilise non renewable resources at the current rate. All of this has made us think about other power sources. The most frequent technique of drying by blowing is convective drying, often known as air drying. Warm air is blasted from the top rather than the bottom, or both, or over the merchandise. The object is warmed by the heated air, which then dissipates the wetness into the surroundings. The two primary types of solar dryers are natural convection solar dryers and forced convection solar dryers. Convective sun dryers generate airflow by buoyant, while forced convective dryers generate airflow through a fan driven by electricity/solar module or fossil fuel. Solar technology is quickly gaining ground in agriculture as a cost-effective energy-saving option. It is preferred above other alternative energy sources such as wind and shale since it is abundant, limitless, yet non-polluting. Sun air heaters are simple devices that heat air by utilising sun energy. They're used in a variety of applications that need temperatures below 80°C, such as crops drying and space warming.

[1] Agricultural products go through three steps, which vary depending on the drying process utilised in time, based on the properties of both the air and the product The temperature of the product and the amount of humidity in the air change dramatically during these stages (Ajibola 1989; Akanbi et ., 2006). The first phase (during which the drying rate increases) is brief and corresponds to the product's temperature rising until it achieves equilibrium, at which point the product gets as much heat from the air as it needs to give the water to evaporate. The drying rate rises as that of the moisture interaction between both the material and the air becomes more efficient when the product is heated. The free evaporation of water on the second phase, which has a constant drying rate, corresponds to the free evaporation of water on first phase. The drying velocity remains constant throughout this phase as long as the qualities of the air and its velocity passing over the product remain consistent. The evaporation of bound water is represented by the third phase (a reduction in drying rate). By the conclusion of the second phase, the free water that had travelled from the substance to be transformed into water vapour has completely disappeared from the inside to the outside.Furthermore, the weakly bonded water evaporates first, making it the simplest to remove (Ajibola 1989; Akanbi et al., 2006).The water that is eliminated during the last drying process becomes increasingly securely bonded to the product, making it more difficult to extract. As the procedure progresses, the rate of drying reduces.

2. COMPONENTS

2.1 DRYING CHAMBER

[4] When an extremely low level of humidity is necessary, such as for keeping food or dehumidifying test materials,

drying chambers are utilised. In addition to drying and storing, modern drying chambers may be used for more complex tasks including modelling ageing processes and general material testing. Unlike typical units, which just enable you to change the temperature (much like an electric oven), drying chambers also provide active humidity regulation. Dehumidification is possible even at +5°C ambient temperature, which is beneficial to electrical components. As a result, drying chamber temperatures generally range from +5°C at the low end to around 300°C at the high end. In fact, there are now gadgets that can go much lower, allowing temperatures to go below 0°C.

2.2 BLOWER UNIT

[4] Blowers are devices or pieces of equipment that increase the velocity of air or gas passing through centrifugal pumps. They're commonly used for air/gas flow applications including exhausting, aspirating, cooling, ventilation, and carrying. A blower is also called as a centrifugal fan in the industry. Blower motors circulate cool (in the summer) or warm (in the winter) air through ducts to the desired location. Because they both use same mechanism, Changing the blower inside an air conditioner is like changing the blower motor in a furnace. Blowers function by increasing the pressure of either air or gas through a rotor's centrifugal action. The blower draws air or gas in through an input valve, which causes the impellers (or rotors) to revolve, creating a centrifugal force that propels the air or gas forward. The air/gas is constantly compressed with a linear rise in pressure while this is going on.

2.3 HEATING CHAMBER

[4] Heating chambers are thermal convection ovens used in laboratories. A heating chamber offers stable temperatures throughout and may be configured in a variety of ways, including clean rooms, forced convection, horizontal circulation, natural convection, horizontal airflow and more natural convection, etc.

3. METHODOLOGY

1) The ready-to-pick areca nut is plucked from tree, then peeled, cooked, and filled into the chamber that holds the shelves with boiled areca nuts.

2) In order for immediately achieve a homogeneous temperature in the chamber, a preheater is utilised.

3) The heat source has fins that extend into the tube to maximise the surface area available for heating the air.

4) The blower is connected to the tube and provides air to the heating chamber, where it is heated.

5) Following trial and error, the appropriate hot air flow rate is tuned using a control valve with each rack holding areca nuts.

6) The furnace blower helps to remove wet air from enclosed chamber and carry it to the dryer, where it will be dehumidified before being replaced with fresh air.

7) Examine the water to see if it has dried, and reduce the amount of time it takes to finish the drying process.

4. CONCLUSIONS

Because the dryer is equipped with regulators, the temperature and air velocity may be adjusted. The concerns related with traditional drying methods and current dryers, such as safety, drying time, quality, and amount of dried items, have been eliminated with this improvement. The redesigned crop drier is both environmentally and user-friendly, and it doesn't require any specific skills to use. The upgraded dryer has a capacity of 20 kg/batch, which means it can dry 20 kg of physic nuts in less time than the previous drier, which can only do 9 kg The drying capacity is 0.73 kg/h and the thermal efficiency of the modified dryer for drying palm kernel has been determined to be 93.14 % at 60.

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