

# Design and Fabrication of Coir Dryer

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**Abstract :** Coir, a natural fiber from coconut husks, was dried using a microwave dryer. The magnetron in a stainless steel chamber dried coir in 5 different durations. Moisture loss ranged from 81g - 14g, achieving 71% - 11% moisture content. Microwave drying prevented overheating, optimizing energy use. Integration of magnetron microwaves is a significant advancement for the coir industry.

**Keywords :** Coir, microwave, Drying level, Moisture content, Fabrication, Drying, magnetron.

## INDRODUCTION

Coir fiber, extracted from coconut husks, is vital in industries like ropes and mats. Drying coir fiber is crucial to prevent mold growth and ensure quality. Traditional sun drying in India is weather dependent and time consuming. Microwave drying using magnetron technology offers a promising solution. Objectives include designing a coir dryer with magnetron and evaluating its efficiency.

## MATERIALS AND METHODS

In this fabrication process Magnetron, Transformer, capacitor, diode and timer are connected in series within the dryer. The dryer was fabricated by using the stainless steel. Definite moisturized coir was allowed to enter into the chamber. The magnetron emitted a microwave inside the chamber and the coir was dried due to the dielectric process. The determination of moisture content is done by gravimetric method and the drying rate was also calculated. Thus the initial moisture and final moisture were determined.

## RESULTS AND DISCUSSION

### Drying Efficiency:

Microwave drying reduced moisture content by 81% in 5 minutes due to rapid evaporation. During microwave drying, the temperature of the dried material depends on the balance between the energy generated by dipoles in the microwave field and the energy absorbed by water molecules evaporated from the surface of the material (Radoiu and Marilena, 2020)

### Moisture content :

The time required to dry coir sample from initial moisture content (90% -50%) to the final moisture content (20%) is known as drying time. Coir dried to 20% moisture content quickly, affected by microwave power. The results indicate that mass transfer within the sample was more rapid during higher microwave power heating because more heat was generated within the sample creating a large vapour pressure between the centre and the surface of the product due to the characteristic microwave volumetric heating (Soner Celen 2019).

## SUMMARY & CONCLUSION

The experiment entitled "Design and fabrication of coir dryer" was carried out to investigate the drying process of coir through microwave dryer. The results show that the desired moisture level can be attained by coir dryer with the help of microwave, unnecessary heating is prevented and thus energy is used optimally. The capacity of the dryer developed in this project is limited. In conclusion, the integration of magnetron microwave represents as a transformative step forward for coir industry. The results indicated that coir was

dried effectively compared to open sun drying.

## REFERENCE

- [1] Radoiu and Marilena. 2020. Microwave drying process scale-up. **Journal of Chemical Engineering and Processing. Process Intensification**. 155: 88-108.

Soner celen. 2019. Effect of Microwave Drying on the drying characteristics, color, Microstructure and thermal properties of persimmon. **Journal of drying technology in food preservation. 8(2): 84.**