

# International Journal of Innovative Research in Science, Engineering and Technology

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## Drying Kinetics of Curry Leaves under Thin Layer Tray Drying

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**ABSTRACT:** Curry leaves are most widely used as a food adjunct, especially for the preparation of Indian dishes as well as for herbal home remedies. Fresh curry leaves are added to food preparation to enhance its acceptability. Dried curry leaves may also be added to food preparations without much loss in aroma. The curry leaves may be sun dried or may be by using mechanical drying methods. Hot air tray drying is the most popular method for drying of such type of agricultural produce. A study was conducted to investigate the effect of drying temperature on the drying kinetics of curry leaves. Initial moisture content of fresh curry leaves was 161.7 % (db). The curry leaves were dried at 50°C, 55°C, and 60°C temperature at 1 m/s air velocity in a hot air tray dryer. The drying was carried out till no appreciable change in weight was recorded with increment in the drying time. The final moisture content of dried curry leaves ranged from 2.1 to 2.7 % (db). The results indicated that the increase of drying temperature reduces the total drying time. The time required for drying of curry leaves at 50°C, 55°C and 60°C was 90, 135 and 180 min, respectively under thin layer tray drying.

**KEYWORDS:** Curry leaves, Hot air tray drying, Drying time, Moisture content

### I. INTRODUCTION

Curry leaves, scientifically known as *Murraya koenigii Spreng*, belong to the *Rutaceae* family. The plant is grown in tropical and subtropical regions. It is known to Indian by the name of 'sweet neem'. Curry leaves are natural flavouring agents with a number of health benefits. It makes food both healthy and tasty along with pleasing aroma. Curry leaves have anti-diabetic, antioxidant, antimicrobial, anti-inflammatory, anti-carcinogenic and hepato-protective (capability to protect liver from damage) properties. The main nutrients found in curry leaves are carbohydrates (18.7gm), energy (108 Kcal), fiber (6.4gm), protein (6.1 gm), fat (1gm), calcium (830mg) and minerals (4 gm). Curry leaves can be used in either fresh or dried form as an ingredient in the food. (<http://www.medindia.net/amp/patients/lifestyleandwellness/curry-leaves-health-benefits.html>).

Drying is a process of moisture removal accompanied by simultaneous heat and mass transfer (Ertekin and Yaldiz, 2004). Though there are many ways in which drying of agricultural produce can be achieved, but the choice of method depends on the material and the hygienic level required. The knowledge of drying behavior of curry leaves is of critical importance for preserving the nutritional and aromatic qualities. The main objective of the present work is to study the effects of drying conditions on the drying behavior of curry leaves.

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## II. MATERIALS AND METHODS

### Materials

Fresh, healthy and matured curry leaves were collected in bulk from the local market. Collected leaves were washed in running tap water to ensure the removal of adhered dirt and dust. After this leaves were soaked in 1% saline solution (NaCl) for 5 minutes to reduce the microbial load. Leaves are further washed with distilled water. The excess water was removed by spreading the leaves in sunlight for a brief period till the removal of surface moisture. The depetioled leaves were subjected to drying experiment.

### Moisture content

Moisture content was measured by the method recommended by Ranganna (1986). A hot air oven was used for moisture content determination. 50 g leaf sample was dried at 105°C for 24 h to determine initial and final moisture content.

### Drying method

Curry leaves were dried in a hot air tray dryer at 50, 55, and 60°C. The experimental dryer (tray dryer) consists of three basic sections viz. an air blowing section, air heating section and a drying chamber. The drying compartment was composed of trays, placed perpendicularly to the airflow. Heated air was forced with the help of an axial blower and the air velocity was measured by means of an anemometer. A set of electrical resistances was installed to produce heated air. Thermometer was used to measure dry bulb temperature of the air flowing through drying trays. Once the operating conditions had been established, the curry leaves were placed in a single layer over the tray and were inserted into the dryer cabinet. The loaded trays were removed from the dryer and weighed at a regularly intervals of 10 min to determine the weight loss during the drying period. Experiment was carried out till no further reduction in the weight of sample was observed with the increment in drying time.

## III. RESULTS AND DISCUSSION

### Effect of drying time for curry leaves on moisture content

The effect of drying temperatures (viz. 50 °C, 55°C and 60 °C) on the moisture content of the curry leaves is depicted in Fig. 1 to 3. The initial moisture content of the curry leaves was 161.7 % (db). The drying of curry leaves in tray dryer and dried curry leaves were showed in plate 1 and 2.

The drying rate of curry leaves increased with an increment in the drying temperature from 50 °C to 60°C. It can be inferred that greater the temperature difference between the drying medium and the curry leaves, the greater is the rate of heat transfer into the leaves, which provides the driving force for moisture removal, thus higher drying rate is obtained.

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The drying curve (Fig. 1) indicates that at the initial stage of drying i.e. (1-10 min), drying of curry leaves was very slow which increased marginally in the next 10 min. During first 10 min of drying, moisture content reduced from 161.7 to 157.0% (db) which further reduced to 148.7% (db) during next 10 min of drying. Moisture content decreased rapidly during 20 to 120 min of drying duration. Moisture content of the curry leaves was 148.7% (db) after 20 min of drying and it reduced to 5.3% (db). The reduction in moisture content of curry leaves from 5.3 to final moisture content (2.7 % db) was very slow taking 60 min of drying time. The drying rate reduced significantly after 80 min of drying. After 180 min of drying no changes in moisture content was recorded.

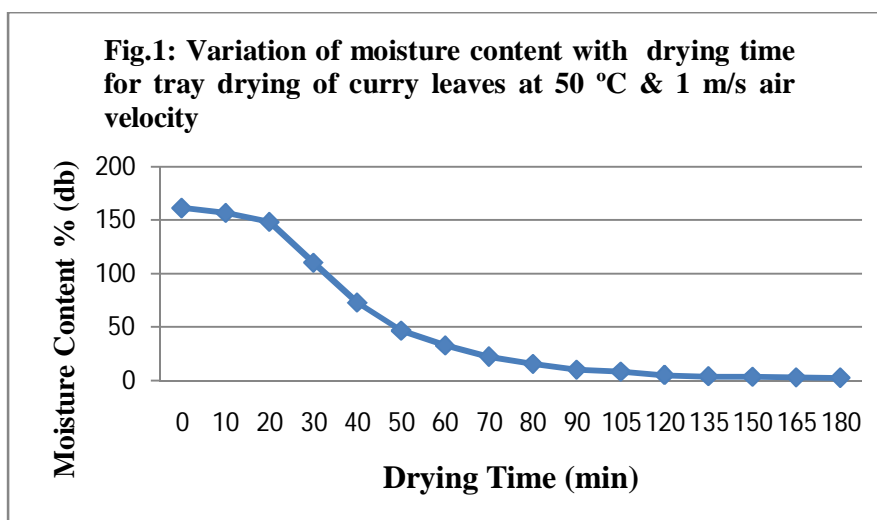


Fig. 2 presents the reduction of moisture content with drying time for curry leaves at 55°C. During 0 to 10 min of drying, rate of moisture removal was slow (i.e. moisture content decreased from 161.7 to 151.2% (db). The

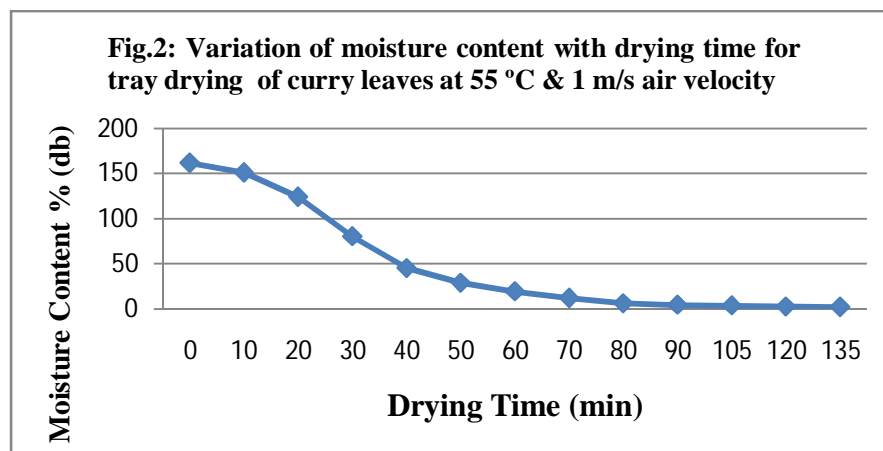
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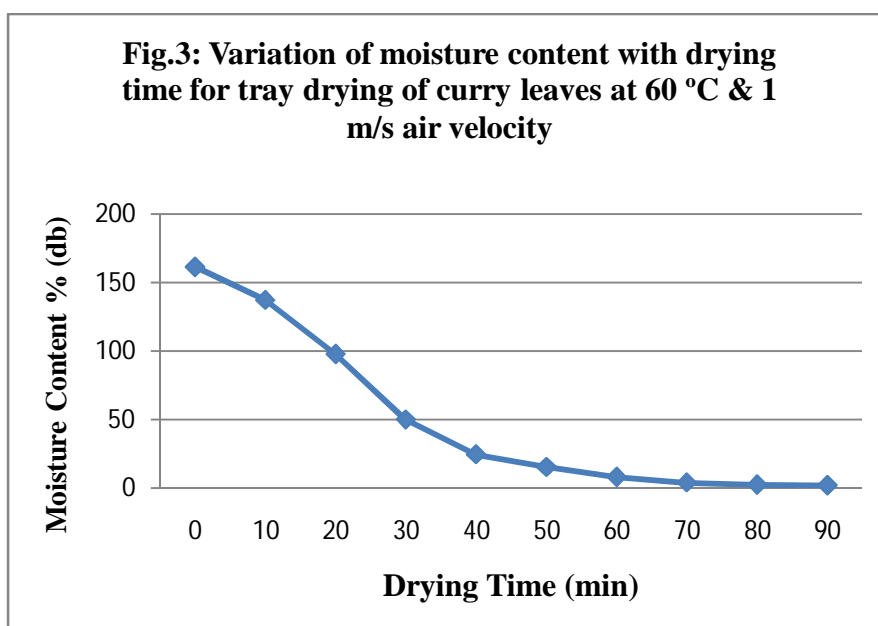
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reduction in moisture content was marginally higher when compared to drying performed at 50°C. During 10- 70 min of drying moisture content decreased rapidly from 151.2 to 12.2 % (db). After that reduction in moisture content (12.2 to 2.4 % db) was found very low taking a drying time of 60 min. The rate of moisture removal 70 to 135 of drying was very low. No change in moisture content was observed after drying time of 135 min.



The rate of moisture removal was higher at all stages when the drying was carried out 60°C as compared to the drying of curry leaves carried at 50° and 55°C. As drying temperature increases higher vapor pressure gradient between air and leaves is created which leads to rapid moisture removal. For same quantity of moisture removal the drying time was 90, 135 and 180 min. when the drying was carried out at 60°, 55° and 50°C respectively.



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## IV. CONCLUSIONS

The effects of hot air temperature on the drying time were investigated for curry leaves. The time required for drying of curry leaves at 50°C, 55°C, 60°C and air velocity of 1 ms<sup>-1</sup> was 90, 135 and 180 min respectively for hot air tray dryer. The drying rate was higher when the drying was carried out at 60°C as compared with drying performed at 50° and 55°C

## REFERENCES

1. Ertekin C and Yaldiz O (2004). Drying of eggplant and selection of a suitable thin layer drying model. *Journal of Food Engineering*, 63: 349-359.
2. <http://www.medindia.net/amp/patients/lifestyleandwellness/curry-leaves-health-benefits.html>
3. Ranganna S. 1986. A handbook of analysis and quality for fruit vegetable products. 21p.