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## New Method for the Mathematical Determination of Drying Rates of Fig Fruits Depending on Empirical Data under Conditions Suiting Solar Drying

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### Abstract

Thin-layer drying rates of fig fruits were determined experimentally under different conditions of the drying air temperature, relative humidity and velocity, and under different initial moisture content of the fruits. Twenty-four drying tests were run by an experimental dryer, locally designed and fabricated for thin-layer drying. The results showed that the drying air temperature, the fig fruits initial and final moisture content had the greatest effect on the drying rate of fig fruits, followed by the drying air relative humidity. Air velocity had the smallest effect.

The objectives of this research work could be summarized as: expressing the loss of moisture during the drying process of the fruit or the vegetable, as a function of the affecting factors of the drying process, determination of the fruit or the vegetable drying rate as a function of all the affecting factors, determination of the needed time through each stage of the drying process, and how to benefit from the findings of this research work.

This work was planned for mathematically expressing the loss in fig fruits moisture along the drying process as a function of the affecting factors by applying multiple linear regression analysis. The derived mathematical equations which relate the results of the drying process with the affecting factors could be used in the determination of the instantaneous moisture content of the fruits at successive time intervals. These equations are especially useful for solar drying under which the drying air properties are under continuous changes along the time of the day and along the days of the year.

The derived mathematical equations covered all the stages of the drying process, i.e, the stage of the primary increasing drying rate, the stage of the constant drying rate and the stage of the falling drying rate.

**Keywords:** Drying, drying rate, fig fruit and mathematical, thin layer