AIR RELATIVE HUMIDITY EFFECT ON DRYING KINETICS OF LAMBERTIN APRICOTS

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OBJECTIVES

Study of the effect of air relative humidity (RH) on convective drying kinetics of apricots.

INTRODUCTION

- Air temperature and velocity are the most studied basic parameters that affect drying kinetics (Piotrowski and Lenart, 1999).
- There are few research works about the influence of air relative humidity (RH) on drying kinetics.
- *Literature Review :*

- The effect of air humidity is basically on the final equilibrium moisture content (*McCabe et al., 1993; Madamba et al., 1996*).

- The influence of air humidity on food drying is statistically insignificant (*Madamba et al., 1996; Daudin and Bimbenet, 1985; Kiranoudis et al., 1997*).

- The air humidity is a factor to consider. *Sabarez et al. (1997)* concluded that air humidity highly affects the initial drying rate and drying time of plums, and *Yusheng and Poulsen (1998)* verified that it has a great effect on drying rates, and some effect on activation energy.

MATERIALS & METHODS

- Lambertin apricots (Prunus Armeniaca)
- refrigerated at 4°C and 80% RH
- cut in half and pre-treated with SO_2 5% plunged 5 min in 2L of solution

  → browning prevention

• Pilot plant tray dryer :

- forced air

  → controlled temperature and air velocity

• Recirculation of the air :

- adapted air duct to the dryer inlet and outlet
- ultrasonic humidity generator / water deionizer / humidity probe

  → controlled air humidity

• On-line acquisition of :
- total weight → digital balance
- air temperature and RH → datalogger

Fig. 1 - Pilot plant tray drier (Armfield UOP8).

• **Convective Drying Experiments :**

40ºC temperature
0.60 m/s air velocity

25.3%, 32.6%, 42.1%, 51.6% } mean RH

• **Sorption isotherms :**

water activity measurements

← Rotronic Hygroskop DT
Temperature controlled water bath, 40°C

• water content determination (initial and final)

RESULTS & DISCUSSION

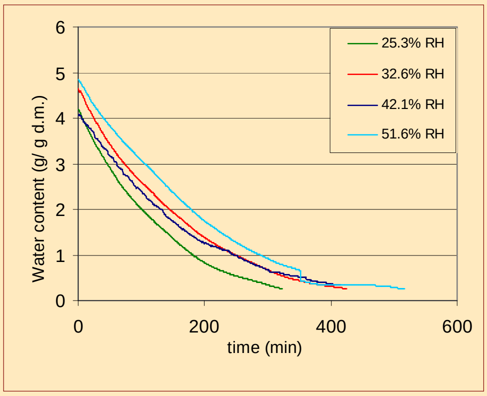

Fig. 2 - Drying curves at different air humidities.

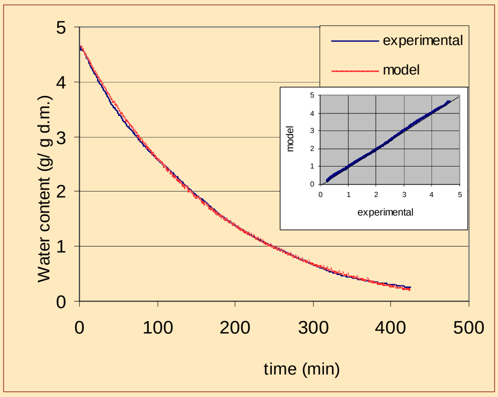

Fig. 3 - Example of experimental data and fit.

- Fit to the Exponential model (Newman et al., 1996):

$$\frac{M - Me}{Mo - Me} = \exp(-K\,t)$$

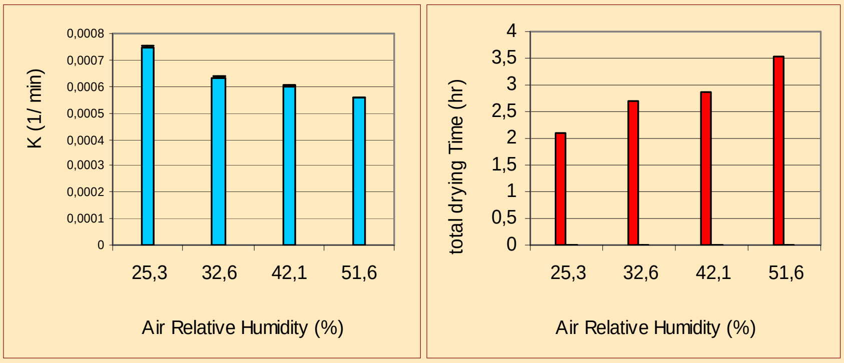

Fig. 4 - Drying rates and total drying times at different air humidities.

$$K \; \alpha \; \frac{1}{RH}$$

CONCLUSIONS

- Besides influencing the final equilibrium moisture content, RH also affects the drying rate constant.
- RH affects drying rate to a lesser extent than air temperature. But, on the other hand, RH has a great influence on total drying time.
- Implication : For instance, in solar drying it is essential to keep low RH in order to accelerate production.
  → Economical aspects

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