

4.5% พบว่าการจำลองแบบการอบแห้งสามารถทำนายอัตราการอบแห้งได้ดีมากในช่วงท้ายของการอบแห้ง ส่วนในช่วงแรกมีค่าแตกต่างกันเล็กน้อยระหว่างการอบแห้งจากการจำลองแบบและจากผลการทดลอง

จากการจำลองแบบเพื่อวิเคราะห์หาภาวะการอบแห้งที่เหมาะสมของกล้วยแผ่น พบว่า ภาวะการอบแห้งที่เหมาะสมคือที่อุณหภูมิร้อน 100°C ความเร็วลมร้อน 2 m/s สัดส่วนการนำอากาศกลับมาใช้ใหม่ 90% ซึ่งเป็นภาวะที่ให้ค่าความสิ้นเปลืองพลังงานจำเพาะต่ำ และใช้เวลาอบแห้งน้อย



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Thesis Title Parametric Analysis and Simulations of Appropriate
Conditioning for Drying Sliced Banana

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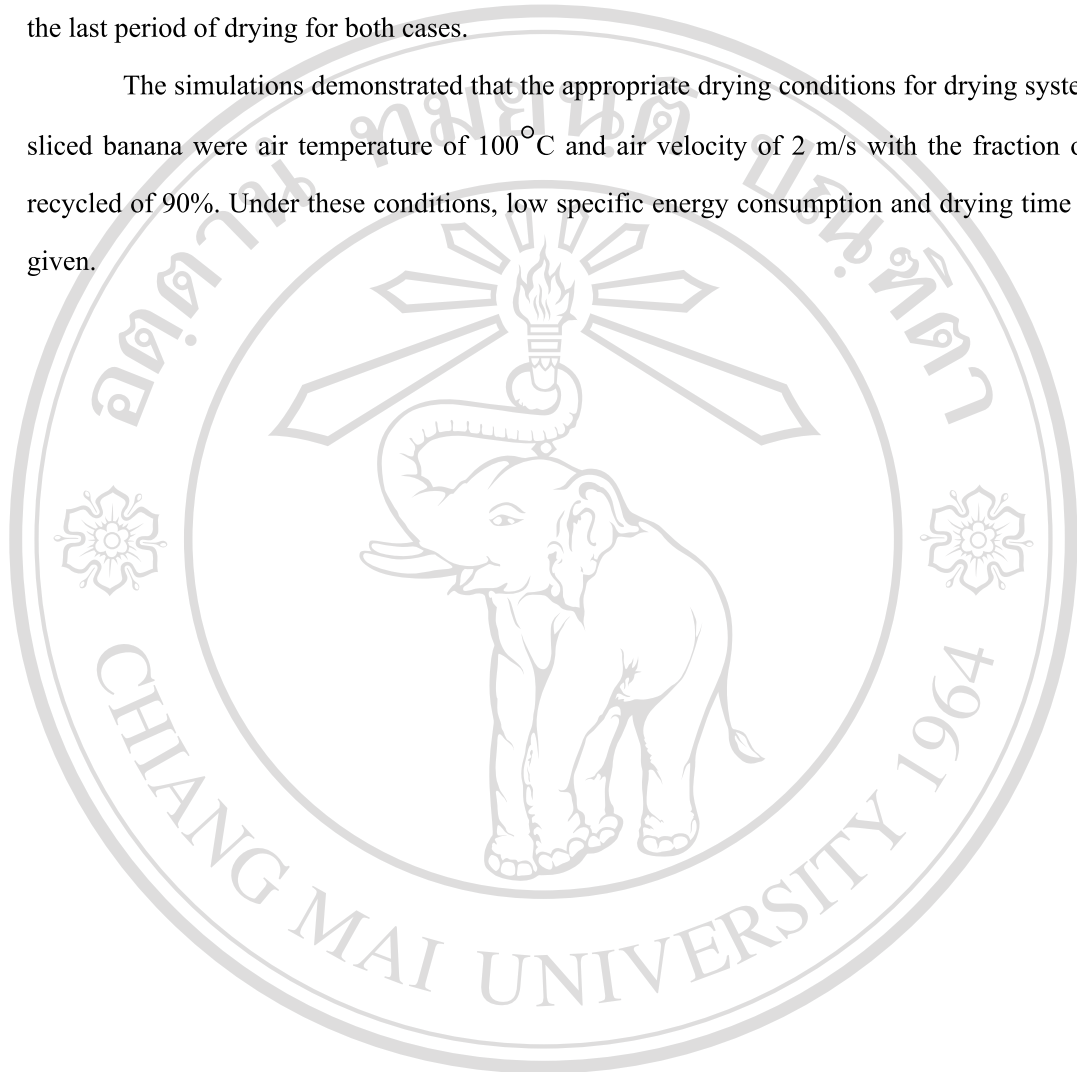
ABSTRACT

The objectives of this study were to analyze the effects of drying parameters (temperature, velocity and relative humidity of hot air) on sliced banana drying, to develop the drying kinetic equation, and to find the appropriate conditions of drying sliced banana by a mathematical simulation. Half ripe peeled banana with 30-35 mm in diameter and the initial moisture content of 200-220% db. was sliced to and size of 3 mm thick. The experiments were carried out in an air conditioning dryer at the drying air temperature in a range of 60-100^oC, air velocity in a range of 0.5-2 m/s and relative humidity (RH) in a range of 2-26%. It was found that drying time decreased with increasing air temperature and air velocity but increased with decreasing relative humidity. For the color of dried banana, the results showed that lightness decreased and dark color lessen with increasing air temperature. Also it was founded that increasing in air temperature and RH (with constant air temperature) caused more color changing in dried banana from yellow to yellow-orange at air temperature of 70-100^oC.

The mathematical models evaluated in the kinetic research included theory and empirical equations. By comparing the experimental moisture data with those estimated by the proposed models, the empirical equation (Page model) provided the best to fit of the data with the highest value of coefficient of determination (R^2) and the lowest value of mean residual square (MRS). After that, two cases of the thick layer drying were considered and compared with the simulation. The experiment at 80^oC and 7% RH with air velocity of 0.5 m/s (first case) and the experiment at

90°C and 4.5% RH with air velocity of 0.5 m/s (second case) were used to compared with simulated results. The model presented satisfactory behavior of drying rate with more accuracy in the last period of drying for both cases.

The simulations demonstrated that the appropriate drying conditions for drying system of sliced banana were air temperature of 100°C and air velocity of 2 m/s with the fraction of air recycled of 90%. Under these conditions, low specific energy consumption and drying time were given.



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