CHAPTER VI

CONCLUSION

This study of the thin-layer drying of chili using continuous fluidized bed technique under 6 conditions of drying temperature of 50, 60, 70, 80, 90 and 100°C and 3 levels of hot air velocity were 4, 5 and 6 m/s can be concluded as following:

1. Drying characteristics of chili

1.1 Drying temperature was the significant factor of the chili moisture content reduction and the effect on the physical characteristics of the pepper, which, when drying temperature increased the drying time is shortened, respectively.

1.2 The drying air velocity affected the move of chili particles. Drying was continued until chili were drifted or continuously moved from drying chamber under continuous fluidized-bed drying process.

1.3 Bed thickness affects the reduction of moisture content and drying time whereas the increasing of bed thickness resulted in the drying time increased.

1.4 The suitable condition result of this study was drying temperature of 90°C, drying air velocity of 5 m/s and drying time of 3 h because of the best physical characteristic of dried chili—smooth surface, red color and the shorten drying time. Most importantly, there is a low moisture content than the standard moisture content.

1.5 The increasing of drying temperature affects the change of concentration in Capsaicin substance--the amount of substance is Capsaicin, which is higher in the temperature range 50-60 °C with drying time of 26 to 6 hours. If the temperature is increased, the quantity of the substance in Capsaicin will be reduced. This results similarity the research of S. Kalleemulah and R. Kailappan(2005)—the experiment using a rotary dryer found that pepper is capsaicin concentration in large quantities at the drying temperature of 50-60 °C with drying time of 32 to 23 hours. It also found that fresh chili have the spicy substance less than dried chili.

2. Development empirical mathematical model of thin-layer drying

Mathematical model of a thin layer drying was developed in this study—to be used to describe changes of the moisture content in chili. The use of statistical analysis using the coefficient determination(R^2) , adjust coefficient determination (adj.R^2) and sum of square error(SSE) and analyzed by non-linear regression. The model developed by Henderson's model and Aghabaslo et al.'s model as shown following:

$$MR = ae^{(\frac{-kt}{1+bt})}$$

The model can clearly explain the changes of moisture ratio in the chili through the drying process and the trend in the changes of diverting the energy to the drying process with sufficient accuracy. And simulated results obtained from a developed mathematical model were in good agreement with the experimental results.

3. Rate of energy consumption

Rate of total energy consumption in drying decrease with the drying temperature increase because the drying time reduced. As a results of the simulation program, found that tended of the rate of energy consumption with the experimental results as the same direction. But during the drying temperature is low—rate of energy consumption has more than the high temperature drying. Therefore, concluded that this model can explain the trends in energy use from the experiment with sufficient accuracy.

4. Suggestion for the future work

4.1 For the further research, payback in the construction both in terms of capacity and energy consumption should be concerned and studied.

4.2 Models for explaining the moisture reduction during the moisture content of chili drops below 13% on wet basis should be studied more, which haven't been described in this study. As shown in the graph that the line of the model is different from the experimental results.