UNIVERSITI TEKNOLOGI MARA

DRYING INDIGENOUS AGRICULTURE PRODUCT BY USING FLUIDIZED BED DRYER

SITI AZEEYATUL AKMAR BT KEMAT

Thesis submitted in fulfillment
of the requirements for the degree of
Master of Science

Faculty of Chemical Engineering

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AUTHOR'S DECLARATION

I declare that the work in this thesis/dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of Student	:	Siti Azeeyatul Akmar bt Kemat
Student I.D No	:	2007239472
Programme	:	Master of Science
Faculty	:	Chemical Engineering
Thesis Title	:	Drying Indigenous agriculture product by using fluidized bed dryer.
Signature of student	:	.....
Date	:	April 2014

ABSTRACT

Herbal plants such as lemon grass, ginger and laksa leaf have been commonly used as condiments in food industry and also used traditionally as medicinal product. In the processing of herbal products, drying has been used to preserve the plants. In this study, drying of lemon grass, ginger and laksa leaf has been carried out in a Fluidized bed dryer at 30^0C to 100^0C with hot air velocities of 1.09 m/s, 0.98 m/s and 0.87 m/s. Different bed height of 1cm, 2 cm and 4 cm have been filled up with the herbs in the fluidized bed. From the microstructures of the herbal plants which were obtained from Scanning Electron Microscope, higher temperature and hot air velocity that have been used to dry the plant do affect their microstructures. The boundaries between the cells disappear, distorted and rupture. However, shorter drying time maintained the cell boundaries. Laksa leave produces the least destruction of the microstructure compared to lemon grass and ginger. Quality of the dried herbal plants has been determined through color changes and in terms of green and yellow color, ginger has the highest value. The result also showed that temperature and bed depth of sample have insignificant influence in the color degradation of the sample. Drying the herbal plants in the fluidized bed dryer maintained all the chemical constituents such as citral, neral and geraniol in lemon grass, gingerol in ginger and decanal and dodecanal in laksa leaf. From Response Surface Method (RSM), the optimum drying condition for lemon grass and ginger was at bed height of 2 cm, 80^0C and hot air velocity of 1.00m/s. Meanwhile, for laksa leave, the optimum drying condition was at 2 cm, 51^0C and 0.94 m/s. This study has also shown that drying rate of the three herbal plants increased as the temperature of the air increased. It has been observed that drying process took place in the falling rate period. Suitable models to describe the drying behavior of lemon grass, ginger and laksa leaf have been evaluated. It was found that for lemon grass, ginger and laksa leaf, the suitable models were Midilli and Kucuk (Midilli and Kucuk, 2003) and Modified Henderson and Pabis (Karathanos and Belessiotis, 1999).

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