EVALUASI KESESUAIAN MODEL AKTIVITAS AIR UNTUK PREDIKSI KADAR AIR SETIMBANG PADA BERBAGAI VARIETAS BERAS

INTISARI

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Kadar air setimbang merupakan faktor penting yang mempengaruhi stabilitas dan kualitas beras selama penyimpanan. Berbagai varietas beras dengan kondisi penyimpanan tertentu, seperti suhu dan kelembapan relatif dapat mengubah kadar air setimbang. Penelitian terkait kadar air setimbang umumnya terbatas pada kondisi penyimpanan tertentu dan belum banyak penelitian yang memodelkannya dengan menggunakan kurva isoterm sorpsi, terutama untuk varietas beras di Indonesia. Penelitian ini bertujuan untuk memodelkan perubahan kadar air setimbang beras menggunakan berbagai model aktivitas air dan mengevaluasi stabilitas berbagai model aktivitas air untuk memprediksi kadar air setimbang.

15 gram beras dari varietas Inpari 32, varietas Karanja, dan varietas Mentik Wangi ditempatkan pada suhu 20^{o}C, 30^{o}C, 40^{o}C dengan kelembapan relatif lingkungan 10%; 30%; 45%; 60%; 75%; dan 90%. Sampel beras ditimbang setiap hari hingga beratnya konstan. Kadar air setimbang pada beras diukur menggunakan metode thermogravimetri. Kemudian, data digunakan untuk menggambarkan model kurva ISA menggunakan 10 model aktivitas air: Langmuir, BET, GAB, Henderson, Oswin, Smith, Chung Pfost, Halsey, Peleg, and Iglesias Chirife. Pengaruh perlakuan suhu dan kelembapan relatif terhadap kadar air setimbang dianalisis menggunakan *One Way* ANOVA and *Two Way* ANOVA. Selain itu, ketergantungan parameter model terhadap suhu dijelaskan menggunakan persamaan Arrhenius yang memungkinkan prediksi kadar air setimbang dalam berbagai rentang suhu penyimpanan yang lebih luas.

Kadar air setimbang beras dipengaruhi oleh suhu dan kelembapan relatif. Hasil penelitian menunjukkan bahwa model Peleg menjadi model yang dapat menggambarkan kadar air setimbang pada berbagai suhu penyimpanan. Selanjutnya, model lain seperti Chung Pfost, GAB, dan Oswin dapat menggambarkan kadar air setimbang pada suhu 20^{o}C-40^{o}C. Penerapan persamaan Arrhenius lebih lanjut mampu meningkatkan prediksi kadar air setimbang pada suhu yang lebih luas.

Kata kunci: Beras, kondisi lingkungan, isoterm sorpsi, kadar air setimbang

EVALUATION OF WATER ACTIVITY MODELS FOR PREDICTING EQUILIBRIUM MOISTURE CONTENT IN DIFFERENT RICE VARIETIES

ABSTRACT

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Equilibrium moisture content is an important factor affecting the stability and quality of rice during storage. Different rice varieties and storage condition, such as temperature and relative humidity can changes equilibrium moisture content. Research on the equilibrium moisture content of generraly limited to determaining is value under specific storage condition, and has been no research that models using the Isoterm water sorption curve, especially varieties rice in Indonesia. This study aims to model changes in the equilibrium moisture content of several rice varieties and evaluate the stability of various water activity models to accurately predict equilibrium moisture content.

Fifteen grams of rice of the Inpari 32 variety, Karanja variety, and Mentik Wangi variety placed in a storage room at temperature of 20^{o}C, 30^{o}C, 40^{o}C and humidity variations 10%; 30%; 45%; 60%; 75%; and 90%. The samples were weighed daily until the sample constant weight. The moisture content of the rice was measured using thermogravimetric method. Then data obtained were then to develop ISA curve model using ten water activity models: Langmuir, BET, GAB, Henderson, Oswin, Smith, Chung Pfost, Halsey, Peleg, and Iglesias Chirife. Effect temperatures and relative humidity on equilibrium moisture content were analysis using One Way ANOVA and Two Way ANOVA. In addition, the temperature dependence of the model parameters described using Arrhenius equation, allowing the prediction of EMC of a wide range of storage temperatures.

The equilibrium moisture content of rice is significantly influenced by temperature and relative humidity. The results of thes study indicated that the Peleg model was able to describe the equilibrium moisture content across various storage temperatures. Furthermore, other models such as Chung Pfost, GAB, and Oswin wa able to describe the equilibrium moisture content at temperatures between 20^{o}C-40^{o}C. The application of the Arrhenius equation further enhanced the predicting to temperatures beyond the experimental range.

Keywords**:** *Rice, environmental conditions, sorption isotherms, equilibrium moisture content*