

***WATER ACTIVITY MODEL FOR PREDICTION OF BALANCE WATER
CONTENT OF GRAIN VARIETES OF INPARI 32 AND GAMAGORA***

ABSTRACT

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During storage, the moisture content of grain will change until it reaches equilibrium moisture content. The equilibrium moisture content of grain changes with changes in temperature and relative humidity (RH) of the storage space. Research on the equilibrium moisture content of grain is generally limited to determining its value under specific storage conditions, and no research has modeled it using the water sorption isotherm (ISA) curve, specifically for the Gamagora and Inpari 32 varieties.

This study aims to model changes in the equilibrium moisture content of Gamagora and Inpari 32 grain using the ISA curve. A total of 15 grams of unhulled rice of the Gamagora and Inpari 32 varieties were stored in a cupboard at temperatures of 20, 30, and 40°C and humidity variations of 10%, 30%, 45%, 60%, 75%, and 90%. Samples were weighed for ten days, and the sample weight remained constant, indicating that the grain moisture content had reached equilibrium. Grain moisture content was measured using a thermogravimetric method. The obtained data were then used to develop an ISA curve model using six mathematical models: GAB, Oswin, Henderson, BET, Langmuir, and Smith. The effect of temperature and humidity on equilibrium moisture was analyzed using the Arrhenius equation.

The results showed that temperature was negatively correlated with EMC, while RH was positively correlated with EMC. Sorption isotherm modeling demonstrated that several models were able to adequately describe the relationship between EMC and water activity. Analysis using the Arrhenius equation indicated that the model constants were influenced by storage temperature.

Keywords: *grain, environmental conditions, absorption-desorption, equilibrium water content.*

MODEL AKTIVITAS AIR UNTUK PREDIKSI KADAR AIR SETIMBANG GABAH VARIETAS INPARI 32 DAN GAMAGORA

INTISARI

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Selama proses penyimpanan, kadar air gabah akan mengalami perubahan sampai mencapai kadar air setimbang. Kadar air setimbang gabah berubah seiring dengan perubahan suhu dan RH ruang penyimpanan. Penelitian kadar air setimbang gabah umumnya masih terbatas pada penentuan nilainya pada kondisi ruang penyimpanan tertentu dan belum ada penelitian yang melakukan pemodelan menggunakan kurva ISA (isotherm sorpsi air) khususnya gabah varietas Gamagora dan Inpari 32. Penelitian ini bertujuan untuk memodelkan perubahan kadar air setimbang gabah Gamagora dan Inpari 32 menggunakan kurva ISA.

Sebanyak 15 gram gabah varietas Gamagora dan Inpari 32 dalam cawan disimpan dalam ruangan penyimpanan pada suhu 20, 30, dan 40°C dan variasi kelembapan 10%, 30%, 45%, 60%, 75%, dan 90%. Sampel ditimbang selama sepuluh hari dan berat sampel konstan yang menunjukkan kadar air gabah sudah mencapai titik keseimbangan. Kadar air gabah diukur menggunakan metode thermogravimetri. Data yang diperoleh selanjutnya digunakan untuk mengembangkan model kurva ISA menggunakan enam model matematis: GAB, Oswin, Henderson, BET, Langmuir, dan Smith. Pengaruh suhu dan kelembapan terhadap air setimbang dianalisis dengan persamaan Arrhenius.

Hasil penelitian menunjukkan bahwa suhu berkorelasi negatif terhadap EMC, sedangkan RH berkorelasi positif terhadap EMC. Pemodelan isotherm sorpsi menunjukkan bahwa beberapa model mampu menggambarkan hubungan antara EMC dan aktivitas air dengan baik. Analisis menggunakan persamaan Arrhenius menunjukkan bahwa konstanta model dipengaruhi oleh suhu penyimpanan.

Kata kunci: gabah, kondisi lingkungan, absorpsi-desorpsi, kadar air setimbang.