

**ANALISIS MATEMATIS PENGARUH KANDUNGAN BAHAN
DOMINAN PADA BUAH DAN SUHU RUANG TERHADAP PERUBAHAN
FISIK BUAH SELAMA DALAM PROSES PENYIMPANAN**

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INTISARI

Model matematika dan analisis statistika diperoleh untuk memprediksi pengaruh suhu ruang simpan dan kandungan gizi dominan dalam buah terhadap perubahan susut bobot, kadar air, suhu buah, warna (L^*, a^*, b^*), dan laju respirasi. Sampel (jambu biji, alpukat, dan pisang) disimpan pada suhu 5°C, 15°C, dan 28°C. Percobaan ini menggunakan desain rancangan acak lengkap dengan tiga kali pengulangan. Pengaruh suhu dijelaskan dengan persamaan Arrhenius. Pengukuran laju respirasi menggunakan sistem tertutup. Pemodelan laju respirasi dipelajari dengan menggunakan kinetika enzim Michaelis Menten. Konstanta Michaelis Menten diperoleh dengan analisis regresi ganda.

Hasil menunjukkan bahwa suhu ruang simpan dan kandungan gizi dominan dalam buah secara signifikan mempengaruhi perubahan susut bobot, kadar air, suhu buah, warna (L^*, a^*, b^*), dan laju respirasi. Analisis statistika menunjukkan kesesuaian antara kurva observasi dan prediksi. Suhu penyimpanan terbaik untuk jambu biji adalah 5°C, dan untuk alpukat dan pisang adalah 15°C. Pisang sebagai buah dengan kandungan karbohidrat tertinggi memiliki laju respirasi yang lebih tinggi daripada jambu biji dan alpukat. Validasi dilakukan dengan memplotkan data observasi terhadap model matematis dan model yang paling dapat menggambarkan laju respirasi buah selama dalam penyimpanan adalah Michaelis Menten tipe sederhana atau tanpa inhibisi.

Kata kunci : Jambu biji, Alpukat, Pisang, Penyimpanan dingin, Kinetika, Respirasi

MATHEMATICS ANALYSIS THE EFFECT OF DOMINANT NUTRIENT CONTENT OF FRUIT AND STORAGE TEMPERATURE ON KINETICS OF FRUIT PHYSICAL CHARACTERISTICS DURING STORAGE

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ABSTRACT

Mathematics model and statistical analysis were obtained to predict the effect of storage temperature (T) and dominant nutrient content of fruit on the kinetics of weight reduction (W), water content (db), fruit temperature (T), color (L^*, a^*, b^*), and respiration rate. Samples (guava, avocado, banana) were stored at temperatures of 5°C, 15°C, and 28°C. This experiment using completely randomized design with three repetition. The effect of temperature were described by an Arrhenius equation. The measurement of respiration rate using the closed system method. Modelling of respiration rate was studied by using Michaelis Menten's enzyme kinetics. Michaelis Menten's constants were obtained by multiple regression analysis.

Results show that the storage temperature and dominant nutrient content of fruit significantly affect the kinetics of weight reduction, water content, fruit temperature, color (L^*, a^*, b^*), and respiration rate. Statistical analysis shows the excellent agreement between experimental and predicted curves. The best storage temperature for guava is 5°C, and for avocado and banana is 15°C. Banana as the fruit with the highest carbohydrate content has the higher respiration rate than guava and avocado. Validation were determined by fitting the experimental data to mathematical models and the models that showed a good agreement to describe the respiration rate of fruit during storage is Michaelis Menten's simple model or without inhibition.

Keyword: Guava, Avocado, Banana, Cold storage, Kinetics, Respiration