

Sistem pendeteksi memar (bruises) pada buah berbasis citra vis-nir = The system of prediction bruises on the fruits based on vis nir hyperspectral / Ida Ratna Nila

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Abstrak

ABSTRAK

Sistem prediksi kedalaman memar dan distribusi kandungan SSC pada jambu berdasarkan waktu penyimpanan dengan menggunakan sistem citra Vis-NIR pada panjang gelombang 400-1000 nm dapat dikembangkan menjadi sistem non-destruktif. Sehingga informasi tambahan yang di dapat tidak hanya dapat membedakan daerah memar namun juga memberikan informasi kedalaman memar dan kandungan SSC pada daerah memar. Sistem yang diusulkan dievaluasi dengan menggunakan 160 sampel jambu dibagi dalam dua kelompok set data, yaitu set data training $n = 140$ dan set data testing $n = 20$. Proses memar pada jambu dilakukan secara manual dengan dijatuhkan bola besi dari ketinggian 200 dan 500 mm dan kemudian sampel dianalisis dengan rentang waktu 0,3,4,5, dan 6 hari setelah dimemarkan. Sistem citra Vis-NIR yang digunakan terdiri dari satu set perangkat, diantaranya workbench, slider, dua sumber cahaya halogen 150W dan kamera citra Vis-NIR yang terhubung ke PC melalui Camera Link. Perangkat lunak sistem terdiri dari pengukuran profil gambar reflektansi, ekstraksi fitur, pemilihan fitur pada data spektral dan spasial, model prediksi kandungan SSC, dan model prediksi kedalaman memar. Model Partial Least Square Regression PLSR digunakan untuk mengembangkan model prediksi pada data spektral semua panjang gelombang. Model PLSR digunakan untuk mendapatkan prediksi nilai kandungan SSC dan kedalaman memar. Hasil yang diprediksi dibandingkan dengan hasil pengukuran uji lab kandungan SSC yang diperoleh dengan menggunakan refraktometer dan kedalaman memar yang diperoleh dengan menggunakan sifat measurement instrumental. Dari hasil kinerja model prediksi didapatkan nilai RMSE pada data testing 0,06 dan koefisien korelasi dari data testing 0,99. Kata kunci : Memar; PLSR; citra Vis-NIR.

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ABSTRACT

Abstract The prediction system of bruising depth in guava based on storage operation using Visual NIR image in the ranges 400 ndash 1000 nm ranges, which could be developed a nondestructive system to predicted the bruise depth of guava. The additional information gained not only the position of the bruised area but also provides depth bruising information. And then, the objective of the research was to develop a nondestructive method for predicting the profile mapping of soluble solid content on bruises guava. The soluble solids content SSC as the parameter fruits was determined and correlated with the bruises area. The proposed system was evaluated using 160 samples of guava were divided in two groups. All of the samples are prepared for the training $n = 140$ and testing $n = 20$ set data. Bruises were manually induced and samples were analyzed 0, 3rd, 4th, 5th and 6th days after bruising. Individual guavas were then subjected to impact test by a steel ball at one of the levels height of impact test, i.e., 200mm and 500mm. The system used consists of a set such as workbench, controllable slider, two halogen light sources and a Visual NIR imaging camera that is connected to PC via Camera Link. The software of system consists of reflectance image profile measurement, feature extraction, feature selection on spectral and spatial data, soluble solids content

prediction model, and bruise depth prediction model. The partial least squares regression PLSR models was used to develop prediction models on full wavelengths spectral data. The prediction model is used to get value prediction of soluble solids content and bruising depth. The predicted results compared with the reference measurement result of soluble solids content which obtained using a refractometer and bruising depth which obtained using an optical properties. The full spectral data and parameter fruits were analyzed using the Partial Least Square PLS to obtained prediction model of bruising depth and SSC of bruises guava. The performance of prediction model provided value of the root mean square error of testing set of 0.06 and the correlation coefficient of a testing set of 0.99. The results of our work indicate that there is a feasibility of implementing hyperspectral imaging technique on the nondestructive bruise depth prediction of guava and suitable in an industrial sorting system for fruit quality, which would be useful for postharvest handling of fruit. Keywords kelebaman bruising , non destructive, Profitability, hyperspectral image Vis NIR.