



XVIIth World Congress of the International Commission of Agricultural and Biosystems Engineering (CIGR)

Hosted by the Canadian Society for Bioengineering (CSBE/SCGAB)
Québec City, Canada June 13-17, 2010



A NOVEL COMPUTER VISION SYSTEM FOR SPECIFICALLY DETECTING ROTTEN CITRUS

JOSE BLASCO-IVARS¹

¹ J. Blasco-Ivars, Instituto Valenciano de Investigaciones Agrarias, IVIA, Spain, blasco_josiva@gva.es

CSBE100601 – Presented at Section VI: Postharvest Technology and Process Engineering Conference

ABSTRACT In order to guarantee the quality of a production process, automatic detection of blemishes in citrus packing houses is particularly important during postharvest. In the case of rotten fruit, early detection becomes critical since a single rotten fruit can disseminate the infection to others. Currently, the detection of fruit affected by fungal diseases and its removal of rotten fruit is performed manually by trained workers who inspect the fruit under ultraviolet illumination, since incipient rotten areas hardly contrast under standard white visible light at early stages. For this same reason, automated sorting machines based on colour image analysis, have certain limitations in detecting early rotten fruit, because the colour and texture of the damaged skin is very similar to healthy skin. In this work we used a hyperspectral imaging system to capture 57 monochromatic images of fruits affected by rot in different visible and infrared wavelengths. Then, eight data mining methods were applied to reduce redundant information. By combining the results of these eight methods, a wavelength ranking was established. The top three wavelengths were assumed to be the most discriminant ones and were used to build a three-band image analysis system that was compared against a conventional one based on RGB. The results showed that using the proposed systems, success rate of rot detection increased from 51% with a conventional system to 78%, while false detections were significantly reduced. In conclusion, the work demonstrates the possibility of building a non conventional three band computer image analysis system capable of detecting early rot without using dangerous ultraviolet illumination.

Keywords: Citrus fruits; automatic inspection; quality; machine vision; image analysis;