Laser-induced backscattering imaging for classification of seeded and seedless watermelons

ABSTRACT

This paper evaluates the feasibility of laser-induced backscattering imaging for the classification of seeded and seedless watermelons during storage. Backscattering images were obtained from seeded and seedless watermelon samples through a laser diode emitting at 658 nm using a backscattering imaging system developed for the purpose. The pre-processed datasets extracted from the backscattering images were analysed using principal component analysis (PCA). The datasets were separated into training (75%) and testing (25%) datasets as the inputs in the classification algorithms. Three multivariate pattern recognition algorithms were used including linear discriminant analysis (LDA), quadratic discriminant analysis (QDA), and k-nearest neighbour (kNN). The QDA-based algorithms obtained the highest overall average classification accuracies (100%) for both the seeded and seedless watermelons. The LDA and kNN-based algorithms also obtained quite high classification accuracies with all the accuracies above 90%. The laser-induced backscattering imaging technique is potentially useful for classification of seeded and seedless watermelons.