Detection of *Rhyzopertha dominica* Infestation in Stored Wheat Grain Using Near Infrared Hyper-spectral Imaging

G. Mishra*, S. Srivastava, H. N. Mishra

Agricultural and Food Engineering Department, Indian Institute of Technology Kharagpur, West Bengal, India-721302

*gayatri.mishra21@gmail.com

Abstract

Insect infestation in stored wheat grain is a potential hazard to the consumers and also fetching high economical loss to the farmers and food industries. *Rhyzopertha dominica* (lesser grain borer) is one of the most common insect grows over stored wheat grain causes major quantitative loss by feeding on the endosperm and also contaminate the grain by releasing excreta. High demand for zero contamination in food grain leads to advance analytical techniques for detection of insect infestation with high accuracy. Hyperspectral transmission images were acquired from normal and insect-damaged wheat grain over the spectral region between 400 nm and 1000 nm for 100 kernels. Ten statistical image features maximum, minimum, mean, median, standard deviation, and variance) and 10 histogram features were extracted from images. The statistical discriminant classifier namely support vector machine (SVM) was used to detect lesser grain borer infestation. Principal component analysis was used for wavelength selection; two wavelengths 900nm and 1000 nm corresponding to highest factor loading were found to be most significant for classification. SVM analysis correctly classified 93% of healthy and insect infested kernels at 1000nm wavelength region. The study demonstrated hyperspectral imaging can efficiently detect the insect infestation in stored wheat grain and can be used in food industries for rapid and online detection of stored wheat defects.

Keywords: Infestation; transmission; hyperspectral imaging; support vector machine; online detection