Abstract

The feasibility of using an infrared thermal imaging system to identify the fungal infection in stored wheat was studied. Thermal images of bulk wheat grains infected by *Aspergillus glaucus* group, *Aspergillus niger* van Tieghem and *Penicillium* spp. were obtained using an un-cooled focal planar array type infrared thermal camera after heating grain for 180 s with a plate heater placed 10 mm above the grain and maintained at 90 °C, and then cooling in ambient air for 30 s. In total, twelve temperature features were derived from heated and cooled wheat and four-way and pair-wise classification models were developed by linear and quadratic discriminant analyses (LDA and QDA). Leave-one-out and bootstrapping methods were used to validate the developed classification models. Pair-wise LDA and QDA classification models gave a maximum accuracy of 100% for healthy samples and more than 97% and 96% for infected samples, respectively. Four-way LDA and QDA classification models yielded relatively low classification accuracies for fungus-infected samples due to the non-significant changes in the temperature features between grain samples infected with different species of fungi.