

**Title** Assessment of soft X-rays for detection of fungal infection in stored wheat  
**Author** Dipali Narvankar  
**Citation** Thesis, Master of Science (Biosystems Engineering), University of Manitoba. 92 pages. 2008.  
**Keywords** *Aspergillus niger; Aspergillus glaucus; Penicillium*

### **Abstract**

Fungal infection is responsible for 5 to 10% of global food losses which can be reduced by early detection of fungal infection. Conventional methods currently being used for fungal detection are time consuming and tedious. Therefore, a fast, reliable, user friendly and easily upgradeable fungal detection method is necessary. In this study, the potential of a soft X-ray method for detection of fungal infection in stored wheat was explored. X-ray images of healthy wheat kernels and wheat kernels infected with *Aspergillus niger*, *Aspergillus glaucus*, and *Penicillium* spp. were acquired at 184  $\mu$ A current and 13.6 kV voltage. A total of 34 features extracted from X-ray images were used to discriminate healthy and fungal-infected kernels. Statistical classifiers (linear, quadratic, and Mahalanobis) were applied to develop two-class, and four-class models. The maximum classification accuracy of 98.9% was obtained by the two-class model. The Mahalanobis discriminant classifier correctly identified on average 94.4% infected kernels. Four-class linear and quadratic classifiers could identify *Penicillium* with accuracy greater than 85%. Conversely, *A. niger*, *A. glaucus*, and healthy kernels were poorly classified by all statistical classifiers.