

Title Fluorescence imaging as a non-destructive method for pre-harvest detection of bitter pit in apple fruit
(*Malus domestica* Borkh.)

Author Elmi Lötze, Christy Huybrechts, Annalene Sadie, Karen I. Theron and Roland M. Valcke

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Abstract

Bitter pit in apples still causes significant losses, especially in the export markets of 'Golden Delicious' apples from South Africa. Orchard practices to reduce the possibility of bitter pit are followed, as well as destructive methods to predict the probability thereof, but the occurrence of bitter pit is still unacceptably high. Fluorescence imaging is a fast, non-destructive technique, able to evaluate numerous fruit within a short time span. By applying fluorescence imaging on individual fruit before any symptoms of bitter pit were apparent, lower fluorescence was shown to be associated with bitter pit development in apples in selective cases. Our results showed that, using averaged cumulative distribution functions (CDFs) of pitted and non-pitted fruit classes, it was possible to show a difference between these classes with fluorescence imaging. However, the individual distinction between all pitted and non-pitted fruit of our total sample, could not be defined as clearly.

In the majority of cases, on a single fruit basis, separation in groups was not satisfactory (less than 100% accurate) based on industry requirements for a prediction technique. Results of pre-harvest imaging on apples to identify fruit with bitter pit potential at harvest showed that pitted fruit were correctly classified (75–100%). However, misclassification of non-pitted fruit (50% and less) with fluorescence imaging is still too high to be of any commercial use.