

X-ray allows the automated detection of beetle damage in wood

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In December 2009, exit holes and the larvae of Asian long horned beetles (*Anoplophora chinensis*) were discovered in Boskoop, The Netherlands. This beetle appears on the EU list of quarantine organisms. As a result, the Plant Protection Service of the Netherlands (PD) immediately took measures: all deciduous trees within a range of 100 m were removed and destroyed. Furthermore, European legislation requires that a buffer zone with a range of 2 kilometres had to be applied. The Asian longhorned beetle is native to China and other nearby Pacific Rim countries. They were probably introduced in The Netherlands through import of wood material from one of these countries. After import, such suspicious wood material should be monitored for the presence of beetle damage to reduce the incidence of beetle infestation. X-ray provides an important contribution to current research related to early and non-invasive detection of wood damage. Work on this line was carried out by Fisher and Tasker (1945) who used X-ray photographs to manually detect insect infested timber. The objective of this research was to evaluate the use of X-ray for the automated detection of beetle damage in wood. An X-ray setup, designed for inspection of flowers was used to produce high resolution X-ray images of long horned beetle damaged wood pieces. In addition, X-ray im-

ages were produced of artificially damaged wood pieces to quantify results. Preliminary results demonstrate that long horned beetle damage in wood is detectable by X-ray Holes having a diameter of at least 2 mm were not only detected but also automatically quantified using image analysis. These results suggest that X-ray allows the automated detection of beetle damage in wood. Future work should include the improvement of yet-existing X-ray equipment, and the development of handheld X-ray instruments for onsite inspection. Furthermore, the effect of other types of wood damage on X-ray results should be studied. This work has been initiated by the PD and is part of a research project which focuses on non-invasive inspection methods for agricultural products.

Reference

Fischer RC & Tasker HS (1945) The detection of wood-boring insects by means of X-rays. *Annals of Applied Biology* 27,92-100