

**QUALITATIVE STUDY ON DETECTING INTERNAL CAVITIES OF TREE LOGS USING INFRARED THERMOGRAPHY**

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Trees' structural stability and overall health are at risk due to internal cavities that often go unnoticed through conventional visual inspections. While effective invasive techniques are currently effective, they can cause irreversible damage to trees. The literature suggests that the temperature of a defect tends to be lower than that of the surrounding sound matter. This study addressed the challenge of early identification of internal cavities in trees using non-destructive infrared thermography, a safe, non-contact technique that provides real-time thermal imaging of the entire tree. The primary objective was to qualitatively identify hidden cavities in tree trunks by comparing the surface temperatures of healthy and unhealthy sections. Tree logs were used as models to evaluate the feasibility and the factors affecting the accuracy of using infrared thermography. Due to the differences in thermal profiles between live trees and logs, an active approach was used. Controlled cooling with water at 10-15 °C, followed by a 10-20 min. waiting phase enhanced the thermal profiles and allowed for clear thermogram capture in logs. Factors such as the size and distance from the bark were systematically considered during sampling. The results conclude that this method is effective in detecting the cavities and estimating their size and depth from the bark. Increasing the distance between the camera and the surface enhanced image contrast by capturing a wider field of view. Additionally, materials with low density produce thermographs with a broader temperature distribution in defects. Larger cavity sizes and shorter distances from the bark to the cavity were found to increase the probability of successful detection of cavities. Considering the volatility of influencing factors, the case-by-case nature of the analyses was acknowledged. Overall, this study contributes to the advancement of a non-destructive method for maintaining the long-term stability and health of tree populations, especially in regions like Sri Lanka where such investigations are limited.

**Keywords:** Infrared Thermography, Internal cavities, Thermogram, Tree logs