

Title Non-destructive quality determination of pecans using soft X-rays
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Abstract

Use of soft X-ray digital imaging for non-destructive quality evaluation of pecans was explored. Unshelled pecans were imaged at various X-ray tube voltages from 15 to 50 kVp and currents from 0.1 to 1 mA. Pecan images with good contrast image were identified. The cavity inside the pecan shell and the nutmeat portion were segmented manually in the pecan radiographs. Percent nutmeat area, mean pixel intensity, and local intensity variation adequately determined nutmeat quality, non-destructively. Pecan nutmeat weight was estimated with an error of less than 10% from images taken at 35 kVp–0.75 mA, 40 kVp–0.5 mA, and 45 kVp–0.5 mA. Defects and insects were clearly differentiated in X-ray images after applying contrast stretching or high-frequency emphasis techniques.