Conserved and novel mechanisms underlie oil palm (*Elaeis guineensis Jacq.*) fruit abscission: A model for studying fruit abscission in the palm family (*Arecaceae*).

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Abstract

Recent research on the molecular and cellular mechanisms of fruit abscission of the tropical palm species *Elaeis guineensis* (African oil palm) and the function and original features of the fruit primary abscission zone (AZ^1) will be presented. The AZ^1 consists of approximately 10 cell layers in the boundary region between the pedicel (P) and mesocarp (M). During early fruit development, AZ^1 cells are distinguishable from P and M cells by their smaller size and periclinal cell division orientation. AZ^1 cell wall thickness increases earlier during development suggesting cell wall assembly occurs more rapidly in the AZ^1 than adjacent P and M cells. AZ^1 cells contain numerous intra-AZ^1 layer plasmodesmata (PD), but very few inter-AZ^1 layer PD, while nuclei are located adjacent to PD and are remarkably aligned within AZ^1 layer cells, and remain aligned and intact after abscission. These cellular features allow a high capacity for intra-AZ^1 layer signaling that may be important for AZ^1 development and function for fruit abscission. A decrease in methylesterified homogalacturonan (the main pectin component of the middle lamella) and the expression of two AZ^1 specific polygalacturonases are observed in AZ^1 cell layers during abscission. A comprehensive transcriptome analysis of the AZ^1, P and M tissues reveal specific AZ^1 expression combined with overlapping expression patterns between the AZ^1 and adjacent P and M tissues may be important for AZ^1 functional specificity. These results provide a platform to study fruit abscission within the palm family to understand how this fundamental plant process has diversified during evolution.

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