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 (AZ1) will be presented. The AZ1 consists of approximately 10 cell layers in the boundary region between the pedicel (P) and mesocarp (M). During early fruit development, AZ1 cells are distinguishable from P and M cells by their smaller size and periclinal cell division orientation. AZ1 cell wall thickness increases earlier during development suggesting cell wall assembly occurs more rapidly in the AZ1 than adjacent P and M cells. AZ2 cells contain numerous intra-AZ1 layer plasmodesmata (PD), but very few inter-AZ1 layer PD, while nuclei are located adjacent to PD and are remarkably aligned within AZ1 layer cells, and remain aligned and intact after abscission. These cellular features allow a high capacity for intra-AZ1 layer signaling that may be important for AZ1 development and function for fruit abscission. A decrease in methylesterified homogalacturonan (the main pectin component of the middle lamella) and the expression of two AZ1 specific polygalacturonases are observed in AZ1 cell layers during abscission. A comprehensive transcriptome analysis of the AZ1, P and M tissues reveal specific AZ2 expression combined with overlapping expression patterns between the AZ1 and adjacent P and M tissues may be important for AZ2 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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