

Year of CfP: 2007

Project No: 07030

Project title: Molecular, developmental and genetic studies on the fruit abscission process of oil palm (<i>Elaeis guineensis</i> Jacq.)
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Unit managing the project: DIADE (Diversity, Adaptation and development of Plants) (IRD, UMII)

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Country involved in the project : Thailand

Research units from the Foundation's scientific network involved: AGAP

Subthematic axes: IPB-1 (Integrative Plant Biology 1: *Genetics and genomics, plant breeding, ecophysiology*)

Objectives:

Fruit development and ripening are unique biological processes of flowering plants in addition to being essential for both human and animal diets. Oil palm (*Elaeis guineensis* Jacq) belongs to the *Arecaceae* family and its fruit is the number one source of edible vegetable oil worldwide. While increases in yields are clearly possible with oil palm, one factor that limits overall yield gains is the loss due to non-synchronized ripening and subsequent shedding of the ripest fruit before harvest. In this context, the current project has the objective of working towards a molecular understanding of the ripening and abscission processes that lead to oil palm fruit shedding, as a basis for achieving higher yielding oil palm plantations.

Advances in the molecular research on abscission have been hampered by both the lack of suitable experimental genetic material (i.e. abscission mutants or genotypes) and the limited quantities of abscission zone (AZ) cells available in model species to do molecular approaches. Research with model plants, such as tomato, has shown that the process of fruit shedding is a highly coordinated developmental process that involves the AZ. The specialization of the AZ that develops in the pedicel of the flower becomes apparent later during fruit development when a subpopulation of these cells functions to respond to signals originating from the ripening fruit. These signals are perceived and lead to AZ specific expression of a number of abscission related genes, some of which encode cell wall modifying enzymes that function to decrease the adhesion between cell walls of adjacent AZ cells. The activity of these enzymes on the cell walls of the AZ leads to adjacent cells being separated along the base of the fruit stalk and the fruit is shed. Oil palm provides an excellent model system in which both genetic materials with different abscission characters are available and AZ tissue samples from developing flowers or ripening fruit can be dissected in large enough quantities for cDNA library construction. Finally, the candidate genes discovered to be associated with the oil palm abscission process can be tested for use in molecular assisted selection programs.

This study will focus on the molecular and cellular characterization of the oil palm abscission zone from its differentiation during flower formation to the cell separation stage during fruit shedding.

Total Agropolis Fondation funding: € 120,000 (doctoral student fellowship, travel expenses, running costs)

Funding categorie(s): Agropolis Fondation doctoral fellowship

Project duration: 2 February 2008 – 30 April 2011

Keywords: oil palm – abscission zone – fruit ripening – shedding – cDNA libraries