

# Growth unit dimorphism in mango. Consequences for structure-function modelling

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## Introduction

Mango tree is characterised by rhythmic growth and terminal flowering. Thus, flowering depends on, and in turn influences, vegetative growth. Close relationships between reproductive and vegetative developments are consequently suspected and should be integrated in a structural-functional model of mango tree. Our objective was then to identify and organize into a hierarchy some key parameters related to tree and shoot architecture. In relation with this objective, we investigated on four mango cultivars (namely Cogshall, Irwin, José and Kensington Pride) the effect of growth unit architectural position on its morphological characteristics and its functioning (branching pattern, flowering and fruiting probabilities).

## Materials and Methods

The effect of growth unit position on its morphology was investigated on 10 to 15 current-year shoots sampled randomly on each cultivar in 2004 and in 2006. Several variables were recorded at the growth unit level: stem length and dry mass, stem dry matter content, number of leaves, total leaf area and dry mass, individual leaf area and dry mass, leaf dry matter content and leaf mass per area. The effect of growth unit position on branching pattern, flowering and fruiting was investigated with a dataset resulting from an exhaustive description of growth units, flowering and fruiting of 5 trees per cultivar during two phenological cycles from June 2003 to February 2006. Morphological data were analysed with analysis of variance. Branching pattern, flowering and fruiting were analysed for each year with generalised linear models.

## Results and discussion

The main and original result of this study was that growth unit position had a conspicuous influence on its morphology and functioning in mango. Apical growth units were generally larger and had a 2 to 3 times greater leaf area than lateral growth units. They branched more and had higher flowering and fruiting probabilities. These results were common to the four cultivars, with however cultivar-specific effect. These results are being integrated in a structure-function model which considers mango tree as a meta-population of apical and lateral growth units with their own morphological and functional attributes. Their relative proportion determines the leaf area at the periphery of the tree, and the branching, flowering and fruiting potential of the tree. The relative proportions of apical and lateral growth units vary at each growth or flowering event as a result of their specific branching and flowering behaviour. This modelling approach therefore accounts for the reciprocal relationships between vegetative and reproductive development on a mango tree. Further investigations are nevertheless necessary to identify other relevant factors (e.g., fruit load) affecting shoot morphology and/or functioning and to integrate their effects in the model.