An integrated approach for mango production and quality management

(Mangifera indica cv Cogshall)

Our general hypothesis, on the low yield and the low quality of mangoes, is that mango production and fruit quality are managed mainly by carbohydrates fluxes, at the branch and tree levels. And we considered that tree ecophysiology is a key point to orchard and fruit quality management and that modelling is the adapeted tool to formalize and test our hypotheses. This global approach aims at explaining the effects of interactions between environmental and technical factors within the framework of a global synthetic model.

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Material and methods

Aproach conducted in the experimental station of Cirad Flhor (Saint Pierre, Reunion Island)

Mainly on mango trees, cv. "Cogshall" grafted onto "Maison Rouge"

Adapted biotechnical models from

- **Farquhar biochimical model for photosynthesis**
- **cashoo peach model" for carbohydrates and water fluxes in the fruit:**
- **Fisherman and Génard for biophysical fruit growth**

Factors applied

- **Leaf to fruit ratio**
- **Key phenological stages**
- **Irrigation**
- **Light**
- **Modified atmospheres for the fruit**

Integration of

- **Phenology**
- **Growing conditions (practices)**
- **Environmental factors**
- **Interactions at different scales**

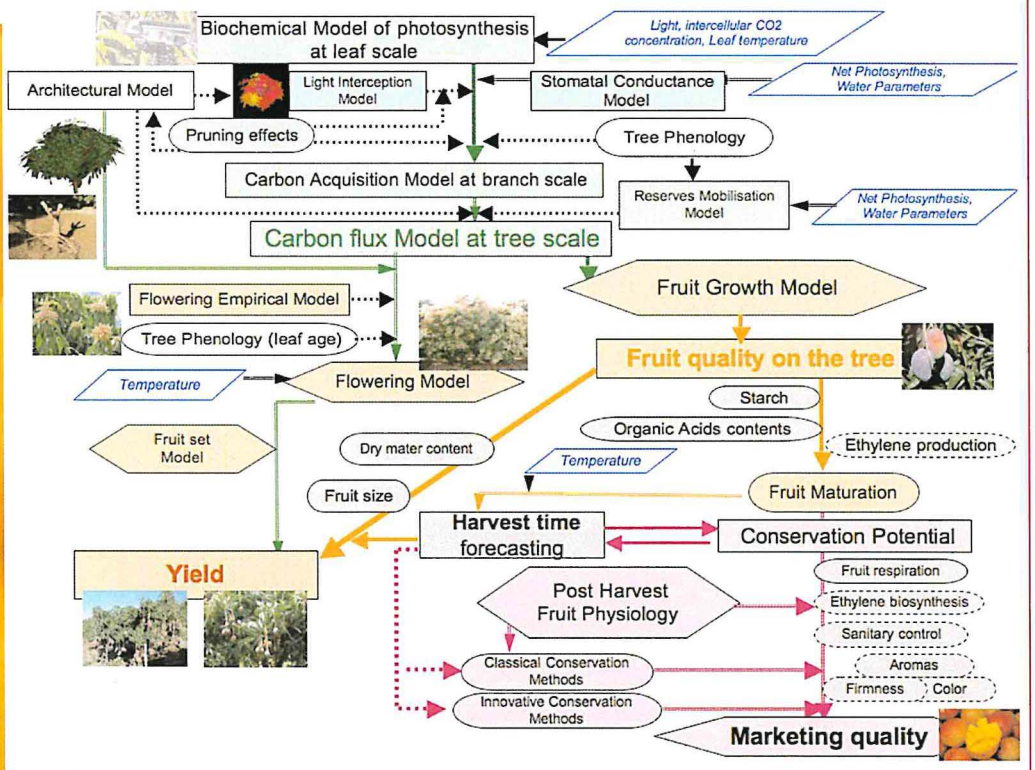
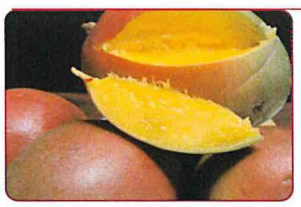


Figure 1. Conceptual model of the relationships between mango tree architecture and physiology, and yield and fruit quality, developed at Cirad Réunion Island. Physiological functions taken in account : Carbon assimilation, Carbohydrates repartition, storage and mobilization,Vegetative growth, Flowering, Fruit growth, Elaboration of fruit quality, Post harvest behaviour



Results

Our global approach is synthesized in Figure 1

- Good simulation of carbon gain at leave scale, integrating the effect of flowering
- No evidence of growth units' succesion leading to flowering and fruiting but interactive effects of fruit load on vegetative growth
- Prediction of fruit quality straits at harvest
  - Fruit fresh mass
  - Dry matter content
  - Major non structural compounds
- Clear relashionship between field quality elaboration and post harvest behaviour

Conclusion

This integrative scheme formalizes the mango tree fuinctionning in the context of tropical humid area.

Next step will consist to integrate the effect and influence of pests and diseases.

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