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d'AGROPOLIS
INTERNATIONAL

Expertise of the scientific community



Agronomy
Crops and cropping systems

Diagnostic methods to improve tropical tree crop productivity



▲ Tall mature palm trees (12 m and taller): skilled labour required for pole use (Ecuador).

In humid tropical areas, the expansion of oil palm, natural rubber, coffee and cocoa cropping to meet growing world demand raises environmental issues. It is thus essential to enhance the productivity of established plantations by targeting higher sustainable crop yields using environment-friendly cropping practices.

Researchers of the UPR Performance of Tree Crop-Based Systems are developing decision support tools to analyse crop plots and enhance their technical management. 'Diagnostic foliaire' is a tool for close management of fertilization in palm orchards on the basis of leaf analyses. 'Diagnostic sol' is used to calculate manure requirements in coffee and cocoa plantations on the basis of soil analyses. 'Diagnostic latex' is used to manage latex tapping in natural rubber trees on the basis of latex analyses.

Once developed, these tools are tested, tailored to local situations and gradually improved. 'Diagnostic foliaire' has thus been used for a few decades on hundreds of thousands of hectares of commercial palm plantations worldwide to determine optimal fertilizer quantities to apply. It will now be combined with a second tool, i.e. 'Diagnostic rachis'. It has also been adapted for the purposes of enhancing technical advice for oil-palm smallholders in Cameroon. 'Diagnostic sol' has just been used to draw up a cocoa fertilization advice map for Ghana on the basis of a soil map. 'Diagnostic latex' which can improve the sustainable management of natural rubber plantations, is being applied in Asia (Indonesia, Malaysia, Thailand, Vietnam, China, India), Africa (Côte d'Ivoire, Ghana, Nigeria, Cameroon) and Latin America (Brazil, Guatemala). This tool is currently being developed to facilitate the selection of clones best suited for growing in marginal ecoclimatic conditions.

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The unit's work is supported by research and technical platforms (biochemical analysis and molecular biology laboratories, culture rooms, insectary, greenhouses, tunnels and experimental orchards based at the *Domaine St Paul-Avignon* and the *Gotheron* integrated research unit). PSH has developed the *Totomatix* automaton to manage plant mineral nutrition on an hourly scale under controlled conditions.

A workshop zone spans an area of 70 km² in *Basse Vallée de la Durance*, and serves as a base for many *in situ* research studies, especially for the analysis of farmers' practices and the spatiotemporal dynamics of pest populations in relation with their natural enemies and landscape components. Finally, modelling is pivotal to the unit's research activities.

Major collaborations are under way with French and international research teams. Many studies are conducted in partnership with technical and agricultural development institutes.

Annual crops: alternative cropping strategies for developing countries

The internal research unit (UPR) *Annual Cropping Systems* (SCA, CIRAD) conducts research on smallholder farming in developing countries. These regions are characterized by high population growth, limited land access and high dependency on increasingly irregular rainfall, fragile erosion-prone soils, difficult and volatile socioeconomic conditions and, especially, limited access to markets and credit.

The unit aims to develop cropping systems that preserve, while making sustainable use of, natural resources in tropical farming systems that boost their productivity and reduce the environmental impacts of farming. Besides the well-being of the rural people involved, the recent hunger riots highlighted the fact that local produce is crucial for feeding constantly-growing urban populations.

Research teams

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30 scientists

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► Presentation page 34