

# *les dossiers* d'**AGROPOLIS** INTERNATIONAL

*Expertise of the scientific community  
in the Languedoc-Roussillon region (France)*



## Family farming



## Co-designing low-input citrus cropping systems in Guadeloupe

Agricultural and rural development stakeholders must address the sustainable development issue by designing (or redesigning) and assessing cropping systems to ensure their sustainability. Prototyping can be an effective design method, but by this strategy researchers are often the sole designers. However, successful innovation transfer depends highly on the involvement of other stakeholders in the different design and assessment phases regarding these new systems. Participatory approaches are used to an increasing extent to cope with this transfer issue, and multicriteria assessments provide an opportunity to effectively evaluate the sustainability of cropping systems.

UPR HortSys has formalized the re-Design and assessment of Innovative Sustainable Cropping Systems (DISCS) method whereby cropping systems are redesigned through a participatory approach and multicriteria assessment tools specific to each involved stakeholder category are developed.



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The DISCS method is in line with the prototyping strategy but is distinguished by an iterative approach applied at three study levels (experimental plot, farm and territory) to ensure that the innovations and assessment criteria fulfil stakeholders' expectations. This method was used to study citrus production in Guadeloupe, where family farming systems are common and characterized by highly diversified cropping systems in small areas (less than 3 ha). This study led to the development of weed management prototypes designed to reduce applications of herbicides, the main source of environmental pollution associated with citrus cropping systems. This method also created real momentum for the development of a sustainable cropping system, particularly through the mobilization of all stakeholders in this sector; but also through the formalization of their local know-how.

This redesign process, which began in 2007, is ongoing and takes new constraints (policies and pests) affecting the citrus sector into account, while prioritizing new redesign objectives that the profession is now supporting.

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### ▲ A recent orange orchard in Guadeloupe.

The steep slopes prevent mechanical weed control, which is why herbicide treatments are systematically carried out.

## Horticultural systems and agroecological innovations

Horticulture is now considered an essential component in the global food balance and security. Horticultural systems are also a major source of income and employment for the poorest people living in tropical areas.

Horticultural crops are, however, very susceptible to pests and pest control methods usually rely on pesticides, resulting in risks to human health and the environment. The global challenge is to reconcile horticultural production of high enough quality and quantity to meet the growing global demand, while promoting the economic and social development of farmers in developing countries and limiting risks to human health and ecosystems.

**The internal research unit *Agro-ecological Functioning and Performances of Horticultural Cropping Systems* (UPR HortSys, CIRAD)** aims to develop innovative horticultural cropping systems based on agroecological functioning.

It conducts research at stations based in Montpellier, French overseas departments (Martinique, Réunion) and different African countries (Benin, Kenya, Madagascar, Senegal). Family farming is the focus of agroecological innovations currently being tested and disseminated in horticultural cropping systems to

enhance their agricultural, sanitary, environmental, economic and social performances and to design innovative horticultural cropping systems favouring agroecological functioning and regulations.

The research unit's scientific investigations are focused in two strategic areas:

- agroecological functioning of horticultural cropping systems
- assessment and design of horticultural cropping systems that address new economic, ecological and health challenges.

Family farming is approached as a space consisting of different compartments and types of biodiversity system (plant, animal and microbial biodiversity; above-ground and soilborne biodiversity; resource biodiversity; destructive biodiversity), as well as cropping techniques used by farmers.

The unit develops active national and international partnerships (international research institutes and organizations) for developing country oriented research. ...

### Main teams

**UMR INTREPID**  
Integrated and Ecological Intensification  
for Sustainable Fish Farming  
(CIRAD/IFREMER)  
14 scientists

**UMR LSTM**  
Laboratory of Tropical  
and Mediterranean Symbioses  
(CIRAD/INRA/IRD/Montpellier SupAgro/UM2)  
24 scientists

**UMR QUALISUD**  
Integrated Approach to Food Quality  
(CIRAD/Montpellier SupAgro/UM1/UM2)  
66 scientists

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