les dossiers
d'AGROPOLIS
INTERNATIONAL
Expertise of the scientific community

Agronomy
Crops and cropping systems

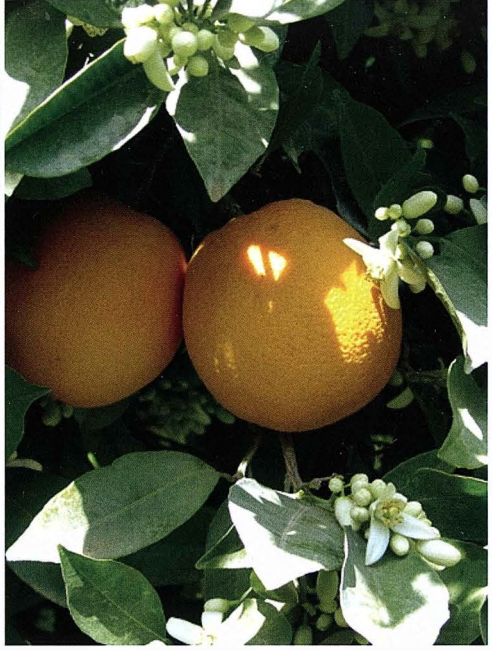
Number 12

A. Verwilghen © CIRAD

▲ *Oil palm fruit harvest.*

▶ *Valencia Late oranges, Morocco.*

Ensuring top quality, *high quantity production*



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The intensive agriculture model, based on massive use of pesticides, chemical fertilizers, water and fossil fuels, widely contributed to the dramatic increase of productivity in industrialised countries. But it is currently challenged. After several decades of implementation, the impacts on the environment, human health and biodiversity are representative of the shortcomings of this production strategy in terms of sustainability.

In developing countries, which have long been familiar with intensive agriculture techniques, crop yields remain low and increased production has usually gone hand in hand with the increase in cultivated areas, to the detriment of forest and grassland ecosystems. Tropical agriculture research, like that focused on temperate areas, is being tapped to come up with 'other ways of producing' so as to be able to fulfil the demand of a steadily growing world population.

In natural ecosystems, biodiversity has many functions that have gradually been lost over the past decades, in connection with the drastic simplification of landscapes in industrialized countries, and the alteration of primary productivity of environments in developing countries. In both cases, the remobilization of functional biodiversity in cropping systems is unavoidable.

Cover crops or agroforestry systems, for instance, influence and activate core processes such as soil biological activity, habitat provision for beneficial insects, and local climate and water flow regulation. This is the pathway being investigated by the group of Agropolis International agronomists, with the aim of reducing the use of pesticides, fertilizers and tillage, while not overlooking the fact that cultivated systems are designed and managed for the purposes of exportation, which fundamentally distinguishes them from natural systems.

Agronomy is substantially focused on the issue of reducing environmental impacts, while systematically seeking a tradeoff with the quantitative and qualitative aspects of production, which in turn are usually the basis of economic sustainability. In this setting, studies are based on the assumption that production is the result of managing a complex biophysical system, i.e. a crop field, in which plant, pathogen and pest populations interact and share resources (water, light, habitat, etc.). It is also considered as a commercial trade item subjected to quality standards and criteria required by the industry and markets—the research challenge is thus to come up with new production strategies.

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