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d'AGROPOLIS
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Agronomy
Crops and cropping systems

Much higher production with agroforestry systems in temperate regions



▲ A newly planted agroforestry plot with walnut trees and cereal crops.

control cereal aphids. Several thousands of hectares of agroforestry plots are now planted yearly in France and in around 10 other European countries.

A hectare of agroforestry plot stores around 2 t more carbon a year than a standard crop plot. Due to the annual mortality of fine tree roots, a significant share of this involves long-term carbon storage. Agroforestry systems are a typical example of ecological intensification, whereby productivity is maintained while generating environmental services to benefit everyone.

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For further information: www.agroforesterie.fr & http://umr-system.cirad.fr/programmes_finalises/systemes_sylvo_arables

A 100 ha agroforestry plot can yield as much as a standard 140 ha crop field. In agroforestry systems, trees and crops are grown together in agricultural plots. Current experiments, supplemented by computer simulations, have confirmed the high productivity potential of temperate agroforestry systems. Mixed poplar–cereal crop plots produce 40% more than plots of the same area in which trees and crops are grown separately. The complementary needs of trees and crops is one of the keys to this success—late deciduous trees such as walnut, associated with early winter crops, such as wheat, are ideal combinations, with light, water, nitrogen being more efficiently used than in pure crop systems.

This boosted productivity could also be explained by other more subtle mechanisms. The plasticity of tree root systems can overcome competition with the crop by growing deeper, thus also enhancing their resistance to summer water stress. Trees also provide climatic protection for crops, therefore reducing heat stress, which is increasing with global warming. Other interactions between trees and crops involve the biodiversity that the trees reintroduce in the plot. Wild flowers that grow under the tree rows attract beneficial organisms that, in turn, help

Changing relationships between sugarcane growers and industrial stakeholders to improve sugarcane quality

Agroindustrial subsectors represent a significant income source for farmers in both developed and developing countries. Farmers and agroindustrial processing units interact in supply areas to manage physical flows of agricultural raw materials, information flows and incentive instruments implemented to regulate and pay for deliveries in quantitative and qualitative terms. Their relationships depend on the physical and biological characteristics of the raw material, the degree of supplier atomization and value sharing strategies between stakeholders involved in the supply chain.

CIRAD is helping industrial operators and sugarcane growers in South Africa and Réunion explore new types of relationships with the aim of increasing the total value produced within sugarcane supply areas. This support is based on the development and use of two simulation tools (MAGI® and PEMPA®). These tools, which are implemented on a supply area scale, are used to compare different strategies for managing cane flow between growers and sugar mills, and quality-based cane payment schemes. These scenarios fuel discussions between growers and industrial operators on decision making with respect to flow logistic organization, investment in production, haulage and processing capacities throughout the chain, and sharing the excess value generated by the most promising innovations.

The approach can also be used to investigate new organization strategies, including new payment systems tailored to changes in industrial products (energy production, green chemistry).



The principles could be transferred to a broad range of subsectors in which agricultural raw materials are processed (milk, oil crops, wine, etc.).

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MAGI® and PEMPA® simulation tools downloadable at:
<http://agri-logistique.cirad.fr>

▲ Manual sugarcane harvesting in South Africa.