

# Agroecology: *another vision of* sustainable agriculture

*The agroecological challenge consists of preventing pest outbreaks rather than controlling or eradicating them, by management of habitats and pests communities, taking into account large scales of space and time. This reasoning integrates multiple disciplines including landscape ecology, landscape management, and conservation biology. The physical and chemical characteristics of the soil also affect the community structure over time. For example, the soil interacts with nematodes and micro-organisms and the flow of organisms through the substrate.*

**A**groecosystems are now the objects of new economic, social and environmental stakes:

- to safely produce quality food in sufficient quantities;
- to prevent health and environmental hazards;
- to restore ecologically degraded landscapes;
- to propose social alternatives to prevalent unsustainable agricultural activities and other landscape uses.

Acute and chronic intoxications, pollution of the environment and the trophic webs, and biodiversity reduction are important secondary consequences of phytosanitary treatments based on toxic active compounds.

Everyone realizes the ambiguity of the situation: the chemical paradigm of crop protection is not satisfactory. Agroecological management aims to enhance animal and plant biodiversity by placing an emphasis on management of the plant settlements, cultivated or not cultivated (form, structure and size; arrangement; composition). The process also aims to preserve populations of natural enemies of pests, which can enhance biological control. For example, the role of biological corridors for beneficial fauna is useful on a local scale as well as on the scale of the landscape.

The agroecological approach includes different processes putting forward the ecological character of management; chemistry is the very last recourse. But agroecology also preserves the objective of durable production.

The approach is thus recommended for intensive agriculture as well as for more traditional systems,

while seeking to develop local knowledge and avoid the negative and unintentional consequences of industrial agriculture.

One agroecological technique that is useful for management of crop pests is the use of favorable associations of complementary plant species. Except for some notable exceptions, monoculture is now regarded as a dead end in the context of reducing the use of agrichemicals. One notes a strong renewed interest for multi-species systems, based on temporal or spatial associations of several harvested species or of one harvested species with one or more species with complementary functions. Associations of plants tend to support the action of beneficial fauna on invasive species, to restore biodiversity and to contribute to a return to an ecological balance.

Lastly, management of plant settlements and populations of invasive species elucidates three major methodological stakes at the scientific level: integration and interdisciplinarity (including ecology, agronomy, crop protection, socio-economics, etc.) ; scale modification, obtaining local data that can be analyzed to facilitate decision-making on a global scale (e.g. watersheds, commons, landscapes, etc.); and recognition of new (and evolving) thresholds, on the landscape scale and with a long-term outlook, taking account at the same time of economic (traditional tolerance thresholds), social (shared and accepted decisions), and environmental criteria (respect of the environment, safeguarding biodiversity, reduction of the risks of pollution, etc)\*. ...

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