



Micro-organisms and invertebrates

MAGNIFYING HIDDEN BIODIVERSITY

Researchers call this the “hidden” biodiversity, an array of species so numerous it is incalculable. These are the micro-organisms: the yeasts, bacteria and fungi, only visible under microscopes; and the invertebrates: the insects, spiders and earthworms, all of which are invaluable contributors to the ecosystems on which food production depends. They pollinate crops and trees, they recycle nutrients in soils, they ferment bread and cheese, help animals digest otherwise indigestible forage and, with proper management, can provide natural protection against plant pests in farmers’ fields. Micro-organisms and invertebrates also include pathogens and vectors, parasites and pests that attack plants and animals, and carry and spread diseases.

There is no question that micro-organisms and invertebrates are critical for agriculture and food production. Understanding and managing this segment of the world’s biodiversity, and recognizing its contributions are crucial to overall sustainable agricultural development.

Unfortunately, even as scientists are discovering the many roles and values of micro-organisms and invertebrates, this diversity is being eroded or lost. Changes in land-use and resulting habitat loss, the use of pesticides and fertilizers, change in climate and resulting upsurges in invasive alien species, have all upset ecosystem balances, and have interfered with the many valuable ecosystem services provided by micro-organisms and invertebrates.

BUILDING RESPECT FOR ENVIRONMENTAL SERVICES

Up-scaling successful initiatives

Many national and local initiatives have successfully demonstrated that it is possible to enhance food production with the help of micro-organisms and invertebrates. For example, in Colombia farmers have recognized that they can encourage pollinator populations by conserving diverse cropping patterns on their farms. Combining mixed cropping, kitchen gardens and agro-forestry systems provides on-farm habitat for bees and other pollinators. Now, it is crucial to upscale these types of initiatives and to raise awareness of the importance of pollinators and other benefits provided by micro-organisms and invertebrates so that this component of biodiversity does not continue to vanish from agricultural

fields or agro-industries. Identifying and replicating good agricultural management practices and improving national planning and international partnerships will be crucial.

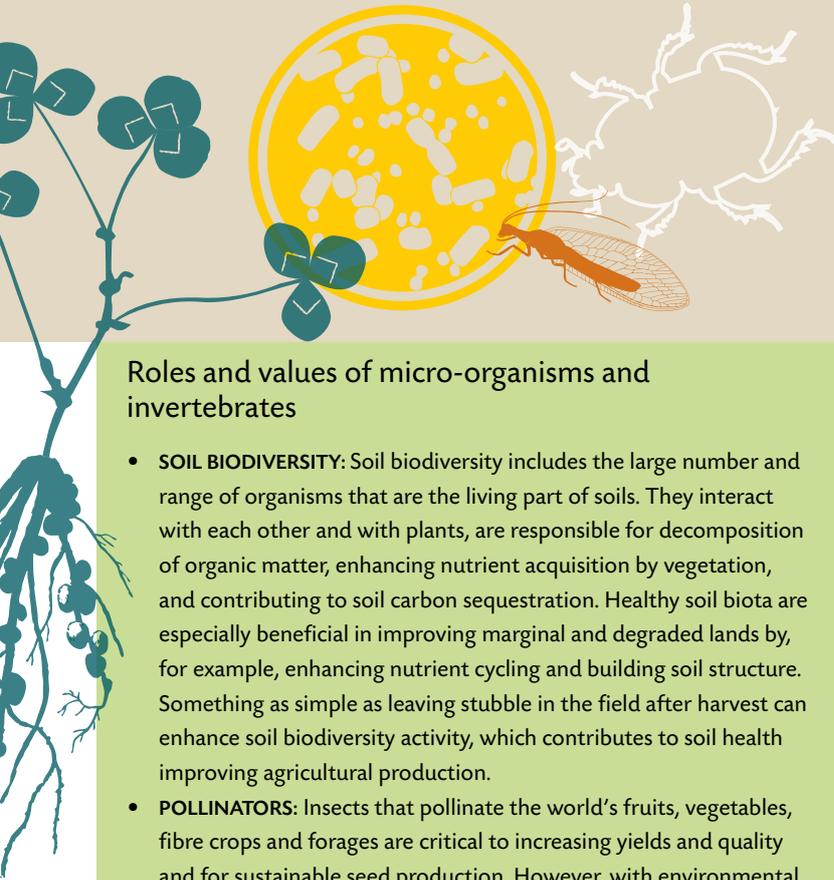
Collecting and storing diversity

Just as national institutes and international organizations have overseen the collection and cataloguing of the genetic diversity of crops in seed banks, so have institutions and researchers created collections of the genetic diversity of micro-organisms – both those that are helpful and those that are harmful to agriculture and food processing. However, these collections have been largely established independently by soil scientists, botanists, animal geneticists and other agricultural or food specialists, to support specific aspects of their work. Most countries do not have system-wide frameworks or approaches for collaborative collecting, cataloguing and storing the genetic material, or for assessing and valuing its cumulative effects throughout the food chain. Greater collaborative collecting and strategic planning to address gaps and needs are required to ensure the long-term conservation and availability of micro-organisms.

THE COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

An increased focus on FAO’s work on micro-organisms and invertebrates

FAO has a long tradition of technical work that has demonstrated the importance of micro-organisms and invertebrates for food and agriculture, such as biological



Roles and values of micro-organisms and invertebrates

- **SOIL BIODIVERSITY:** Soil biodiversity includes the large number and range of organisms that are the living part of soils. They interact with each other and with plants, are responsible for decomposition of organic matter, enhancing nutrient acquisition by vegetation, and contributing to soil carbon sequestration. Healthy soil biota are especially beneficial in improving marginal and degraded lands by, for example, enhancing nutrient cycling and building soil structure. Something as simple as leaving stubble in the field after harvest can enhance soil biodiversity activity, which contributes to soil health improving agricultural production.
- **POLLINATORS:** Insects that pollinate the world's fruits, vegetables, fibre crops and forages are critical to increasing yields and quality and for sustainable seed production. However, with environmental pressures reducing pollinator populations, the scientific community is becoming increasingly involved in improving their conservation and management.
- **PEST CONTROL:** The concept of using biodiversity for biological control requires identifying and harnessing those invertebrates and microbes, parasites or pathogens that are natural enemies of agricultural pests. Once harnessed, farmers have potential to produce food with less use of chemical plant protection products.
- **AGRO-INDUSTRY:** Micro-organisms are used on a large scale by agro-industry where they are used for fermentation and food preservation. Yet these indispensable components of food production face genetic erosion. With the standardization of food products, there is a tendency to concentrate on a reduced number of selected cultures used in most commercial products, rather than maintaining genetic diversity.

control through integrated pest management. FAO also facilitates and coordinates two global initiatives of the Convention on Biological Diversity which have been established in recognition of the essential services provided by micro-organisms and invertebrates across all production systems: the International Initiative for the Conservation and Sustainable Use of Pollinators; and the International Initiative for the Conservation and Sustainable Use of Soil Biodiversity. Many partner organizations collaborate with FAO on these important initiatives.

With the support of the Commission on Genetic Resources for Food and Agriculture, FAO is putting together an overall strategic plan for the sustainable management of micro-organisms and invertebrates, building upon existing initiatives. As part of the Commission's Multi-Year Programme of Work (MYPOW), concerted efforts will focus first on pulling together a

Adding up impact in contributions and costs

POLLINATORS

The economic value of pollination worldwide is more than USD 200 billion annually, representing 9.5% of global human food agricultural production (2005).

INTEGRATED PEST MANAGEMENT

The Indonesian government reduced its annual pesticide subsidy from USD 140 million to zero when farmers adopted methods that employ predator insects to rid their fields of pests.

more comprehensive picture of the variety of functions and services micro-organisms and invertebrates provide to sustainable agriculture and quality food production. Not only will this information raise awareness of the values of this neglected segment of biodiversity for agriculture, it will also generate and strengthen partnerships and facilitate the use by countries of tools prepared by FAO and partners to improve development of national policies and plans for micro-organisms and invertebrates.

FOR MORE INFORMATION:

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