

BIODIVERSITY IN THE FOOD SYSTEM

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BIODIVERSITY, or biological diversity, is the variety of living things in the world or in a particular ecosystem, including agroecosystems such as farms and fisheries. Within the food system, biodiversity includes all of the plants, animals, and microorganisms at the genetic, species, and landscape levels where our food is procured and produced¹.

AGROBIODIVERSITY is the biodiversity associated with agriculture.

KEY POINTS

- I. **BIODIVERSITY IS CRITICAL** for healthy ecosystems that support life on earth.
- II. **AGRICULTURE IS A MAJOR DRIVER** of biodiversity loss globally.
- III. **AGROBIODIVERSITY SUPPORTS FOOD SECURITY** by providing diverse foods and buffering unexpected shocks.
- IV. **AGROBIODIVERSITY CAN BE ENCOURAGED** through practices such as agroforestry, cover crops, intercropping, and managing different types of land use (land-use mosaics).



WHY BIODIVERSITY IN THE FOOD SYSTEM IS IMPORTANT

Biodiversity is crucial for our food supply and supports food security as well as the sustainability and resilience of food systems^{2,3}. Of the approximately 2 million species on earth, 7,000 edible plant species have been cultivated in human history, and approximately 150 plant species are consumed by humans today^{1,4}. Increased agrobiodiversity enhances the ability of farms to provide ecosystem services that support life including pollination, water purification, sequestering carbon, providing food, and improving soil health. For example, managing soil for enhanced biodiversity of organisms that live in it such as bacteria, fungi, and earthworms help enhance soil quality for growing high-quality crops, while lowering needs for synthetic inputs such as manufactured fertilizers⁵.

Cultivating a diverse variety of crops and animals on farms helps enhance resilience as some species or varieties may respond better than others to disease, economic shocks, and natural disasters, including those linked to climate change. Such a variety of crops also supports food security and dietary diversity⁶. Biodiversity is also associated with social and spiritual values, with traditional ecological knowledge

used to manage and conserve biodiversity in many communities around the world⁷.

While biodiversity can be conserved and even enhanced in agroecosystems, our food production practices can also have detrimental impacts on biodiversity⁸. Agriculture is a major driver of biodiversity loss globally, replacing species-rich ecosystems with monocultures characterized by a single species cultivated for food. For example, many thriving prairie ecosystems in the United States characterized by numerous species of grasses, shrubs, flowers, insects, and mammals, have been converted to monocultures of corn. The loss of native plants in these habitats has resulted in a loss of insects and other animals, which have further been exterminated by insecticides and herbicides.



Since the 1900s, approximately 75% of crop genetic diversity has been lost globally with a transition from cultivating multiple crop varieties for high-yielding and genetically uniform varieties⁹. While there are over 7,000 edible plant species, our food systems rely on just three crops for more than 50% of our plant-derived calories: rice, wheat, and corn^{1,4}.

HOW TO MEASURE BIODIVERSITY

At the species level, biodiversity is measured by *counting the number of species* and the *number of individuals of each species* (or species abundance) present in a given area, such as on a farm. For large areas or those with high biodiversity, researchers may only measure a part of the area, such as a plot of a pre-determined size (ex: 20 feet x 20 feet). The values for the number and abundance of species are then used to calculate various biodiversity index values such as the Shannon-Wiener Diversity Index and the Simpson's Diversity Index¹⁰. Researchers can apply these methods to compare the biodiversity of agroecosystems under different management practices.

PRACTICES TO SUPPORT AGROBIODIVERSITY

1. **AT THE GENETIC AND SPECIES LEVELS**, agrobiodiversity can be enhanced by cultivating multiple crop landraces, varieties, and species and, by raising multiple breeds of livestock.
2. **AT THE SPECIES LEVEL**, agrobiodiversity can be enhanced by agroecological practices that mimic healthy ecosystems and creating habitat through practices such as crop rotations, cover crops, intercropping, pollinator strips, and hedgerows.
3. **AT THE LANDSCAPE LEVEL**, agrobiodiversity can be promoted by managing different types of land use (land-use mosaics), promoting clean watersheds through inclusion of buffer strips supporting healthy aquatic ecosystems, and by connecting natural areas of farms with surrounding ecosystems.

CONSUMER PRACTICES TO SUPPORT BIODIVERSITY IN THE FOOD SYSTEM

1. **PROCURE A DIVERSE RANGE OF FOODS** from varied sources including wild food environments.
2. **SUPPORT DIVERSIFIED FARMS THROUGH YOUR FOOD CHOICES.** Choose to buy from farmers who cultivate many varieties of crops and animals, who maintain uncultivated and conservation areas, and who encourage wildlife and pollinator habitat.
3. **LOOK OUT FOR LABELS** that encourage biodiversity such as shade grown and pollinator friendly.

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