Above-Ground Biodiversity

Introduction

Biodiversity, short for *biological diversity*, is the variety among living things from all sources, including terrestrial, aquatic, and all other ecosystems that exist. This includes variability within and between ecosystems and species (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services or IPBES, 2018).

Biodiversity is crucial for maintaining the health of ecosystems, which are critical for sustainable agriculture. It influences crucial processes such as nutrient cycling, genetic diversity, and pollination, all of which enhance the resilience of farms.

This fact sheet explains what above-ground biodiversity is, ways to influence it, and assessment methods for farms.

Three areas of above-ground biodiversity

Above-ground biodiversity contains three subcategories relevant to agriculture: species richness/abundance, landscape factors, and habitat potential (Figure 1).

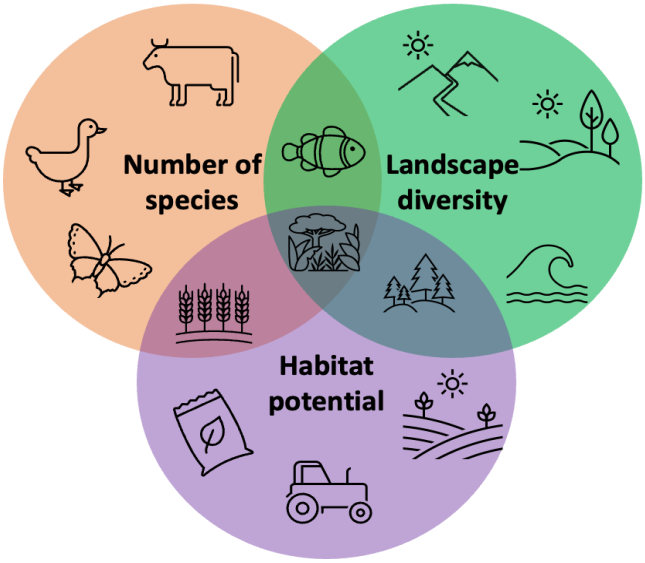

Figure 1: A Venn diagram depicting the three areas of above-ground biodiversity and their overlap.

Species richness and abundance refer to the number of species present within a defined area, and species abundance refers to the number of members of a species in a defined area. Species richness is a direct measure of biodiversity. A higher species richness count generally indicates greater biodiversity.

Landscape factors, within the context of above-ground biodiversity, are elements of an environment that are not living but can alter the physical environment. Environmental elements can consist of climate, natural disasters, elevation, type of forest, water features, and the extent of habitat fragmentation in an area. These factors can affect the number and distribution of species.

Habitat potential refers to the efforts of a farm or other land-owning organization in using biodiversity-friendly management practices. Some examples of management practices influencing habitat potential include reduced pesticide use, creation of buffer zones and hedgerows, maintaining cover crops, or keeping areas of native vegetation protected.

Biodiversity on-farm

Biodiversity can be found anywhere there is life present. It can be found in ponds, productive fields, field edges, hedgerows, riparian buffers, ditches, barns, soils, and even within the variety of crops and livestock raised.

Biodiversity-friendly practices

Many management practices that farmers already implement can influence above-ground biodiversity. Examples are:

- Application of manure: Manure use can offset inorganic fertilizer use and provide habitat for beneficial invertebrates like dung beetles.
- Cover cropping: Cover crops (like clover or rye) protect soil from erosion and improve soil structure. They can also increase plant diversity and provide habitat for pollinators and pest predators.
- Adoption of Integrated Pest Management (IPM) practices: IPM reduces the risks of pests by integrating biological control, crop rotation, habitat management, and sound judgement when using selected pesticides.

This helps to protect non-target species and maintains ecological balance.
- Grass waterways: Implementing grass waterways can aid in preventing soil erosion, protecting water quality, and providing habitat.
- Piles of rocks, stones, and organic matter: Leaving areas and piles of such matter creates microhabitats for insects, amphibians, and invertebrates. Such refuges are essential for species that contribute to pest control, pollination, and nutrient cycling.
- Hedgerows and riparian buffers: Trees and shrubs provide corridors for wildlife, reduce soil loss, filter excess nutrients, and support a wide range of plant and animal species. They connect habitats and enhance landscape-level biodiversity.

Biodiversity assessments

Above-ground biodiversity is mostly assessed in two ways: directly and indirectly. It can be directly assessed via species counts, where farmers or ecologists identify and count the number of different species present on-farm using different sampling methods. Indirect assessments include web-based biodiversity assessment surveys, which evaluate farm practices and habitat features that support biodiversity without the need for species counts.

Currently, existing biodiversity assessment tools focus on determining the potential of a farm to increase biodiversity (habitat potential). Indicators commonly used for such surveys include:

- Crop management practices (such as use of cover crops, pesticides).
- Area of non-tilled and non-productive acres (such as hedgerows, ponds, buffer strips).
- Diversity of crops and livestock (such as multiple crop varieties, different livestock breeds).

Examples of biodiversity and sustainability assessment tools include:

- The Cool Farm Alliance biodiversity assessment, a global, whole-farm level tool used to assess the impact of farm management practices on biodiversity.
- The Biodiversity Performance Tool (BPT), a Europe focused, whole-farm level tool used to assess the impacts of farm management practices on biodiversity.
- The Field to Market biodiversity metric, a U.S. focused sustainability tool with a biodiversity metric assessing field-level and crop-level biodiversity.

Other tools exist that focus on the impacts of specific farming practices. One example is the Environmental Impact Quotient (EIQ), a tool developed by Cornell University IPM Program to assess the environmental and health risks associated with pesticide use in agriculture.

In Summary

Above-ground biodiversity is essential for resilient and healthy farm ecosystems and should be preserved to the best of one's ability. Conducting biodiversity assessments will increase farmer understanding and control over the biodiversity habitat potential of their land, and many types of practices can be implemented that are beneficial for above-ground biodiversity. Several tools are available to determine and monitor biodiversity status and identify opportunities for advancing biodiversity on the farm.

Additional Resources

- Cool Farm Alliance Biodiversity Guidance Note: https://coolfarm.org/resources/cool-farm-tool-biodiversity-guidance-note/
- Field to Market Biodiversity Indicator Report: https://fieldtomarket.org/national-indicators-report/biodiversity/
- Biodiversity Performance Tool: https://bpt.biodiversity-performance.eu/
- Environmental Impact Quotient: https://cals.cornell.edu/integrated-pest-management/risk-assessment/eiq/eiq-calculator

Disclaimer

For more information

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