FOOD & BIODIVERSITY

Training Material for Advisors|Certifiers|Product and quality managers

Frequently asked questions

Content

1. Biodiversity – Why should farmers support and protect habitats and species?

Biodiversity comprises more than habitats and species: The variety and variability of animals, plants and micro-organisms that are used directly or indirectly for food and agriculture, including crops, livestock, forestry and fisheries. It comprises the diversity of genetic resources (varieties, breeds) and species used for food, fodder, fibre, fuel and pharmaceuticals. It also includes the diversity of non-harvested species that support production (soil micro-organisms, predators, pollinators), and those in the wider environment that support agro-ecosystems (agricultural, pastoral, forest and aquatic) as well as the diversity of the agro-ecosystems (FAO, 1999a).

2. Why is intact soil biodiversity so important?

Soil is a mysterious world and the tasks and interrelations of soil biodiversity are still not very much studied. Soil biodiversity reflects the variability among organisms living in the soil, ranging from micro-organisms (e.g. bacteria, fungi, protozoa and nematodes) to larger meso-fauna (e.g. acari and springtails), and the better known macro-fauna (e.g. earthworms and termites). Soil biodiversity includes decomposers – including 35 beneficial species on Acari: Oribatida. And includes predators such as 32 beneficial species of Acari: Gamasida. Plant roots can also be considered as soil organisms in view of their symbiotic relationships and interactions with other soil components.

These diverse organisms interact with one another and with the various plants and animals that contribute to the provision of essential ecosystem services. They contribute to plant nutrition, favour root aeration, improve water availability and quality and regulate vegetal growth and development. Soils with active and diverse microbial life make it difficult for pathogen microorganisms to thrive and infect their hosts.

This phenomenon is called soil suppressivity and is mainly based on three mechanisms

- Ecological competition for nutrients and resources
- Chemical warfare between competing microbes: secretion of antibiotics
- Induction of resistances in the vegetal host

Unsound soil management and fertilization practices disturb this complex ecosystem, resulting in a loss of biodiversity. Therefore, the protection of soil biodiversity is an essential aspect of sustainable agriculture.

3. Why is intensive agriculture identified as a main driver of loss of biodiversity?

The fast-growing world population has increased the need for higher food production and distribution. In addition, consumption patterns in industrialized countries and emerging economies are intensifying leading to an even more globalized food market. These trends have led to the vast exploitation of agricultural land and highly intensive production systems. The consequences of changed societal trends are dramatic for biodiversity: changes in land-use and destruction of primary ecosystems, over-exploitation and pollution of water and soils as well as the introduction of non-native invasive species. Intensive production systems result in genetic erosion of agricultural biodiversity. The genetic diversity of crops and livestock are currently decreasing in general and within species. Within the world's progressive homogenization of production methods, regional and site-specific breeds and cultivars are increasingly replaced and crossed out in favour of market-compliant ones that produce higher yields. Only 30 plant species are used to produce 95 % of vegetable calories globally1. Wheat, rice and corn alone account for more than 50 % of all plant calories produced globally
(source: www.bfn.de/0313_agrobiodiv.html).

In the FAO Food Wastage Food Print, agriculture is defined as one of the main influencing factors that threaten biodiversity worldwide. "Farming, including conversion of wild lands and intensification, is a major threat for biodiversity worldwide. Threats to biodiversity are considerably higher in developing countries than in developed countries: on average, crops are responsible for 44 percent of all species threats in developed countries, compared with 72 percent in developing countries (www.fao.org/docrep/018/i3347e/i3347e.pdf).

4. Agriculture as a supporting driver for biodiversity?

Yes - the relationship between European agriculture and biodiversity has two sides. On one hand, agriculture is important for the conservation of biodiversity because the presence of many species and habitats is closely linked to agricultural land-use. With over 47% or 210 million hectares of arable and grassland areas, almost half of the surface in Europe (EU-27) is used for agriculture. Approximately 50% of European species are dependent on agricultural habitats. From an ecological perspective, the changes in farming practices are therefore of great importance to flora and fauna in agricultural areas and their adjacent habitats. In the past, agriculture significantly contributed to increasing the diversity of landscapes and species in Europe. Originally, the European continent was dominated by forest, but because of agricultural use, fields, pastures, orchards and cultivated landscapes (such as meadows) were created.

5. Do farmers need to know all threatened species/IUCN Red List of Endangered Species?

No – Farmers, advisors and certifiers don´t need to be experts in biodiversity knowing all endangered species in their region. But they should get in contact with the regional nature protection administration, NGO and/or scientific institution and ask for expertise /support regarding relevant biodiversity aspects in the region, such as

- Valuable not officially protected habitats and species
- Endangered /protected habitats
- Endangered /protected species (fauna and flora)
- Management of aquatic ecosystems used as water sources for agriculture
- Planned /realized biotope corridors in the region
- Ongoing biodiversity monitoring activities in the region

The real impact of measures on biodiversity on the farm and in the immediate surroundings can be evaluated by monitoring few but meaningful key indicator species. Specialists can recommend the most appropriate indicator species for a monitoring of biodiversity development on the farm. Besides meaningfulness, indicator species should be also relaitely easy to monitor (= observe and count).

6. What can key indicator species tell us?

Indicator species (IS) are used to monitor environmental changes, assess the efficacy of management, and provide warning signals for impending ecological shifts. Their presence, absence, or relative well-being in a given environment is indicative of the health of its ecosystem as a whole.

Numerous plant and animal species are used as indicator, along with organisms like lichens and fungi, in environmental ranging from mountain tops to the continental shelf.

One difficulty in regard to biodiversity is that (key)indicator species need to be selected on regional level or even on local level. This makes it impossible for international standards or companies with international supply chains to provide lists with indicator species – ready for selection.

Mainly (key)indicator species are selected from the following taxonomic groups:

- vascular plants
- butterflies
- breeding birds

The use of indicator species can be critical, if there is no sound justification behind the choice. Therefore, they should be selected with the support of an expert on local/regional biodiversity and monitoring should be realized by a globally accepted scientific method. There are various guidelines available on the methodology for monitoring, e.g.

www.doc.govt.nz/our-work/biodiversity-inventory-and-monitoring/

eumon.ckff.si/deliverables_public/D30.pdf

7. Beyond the farm gate: Why the surroundings of the farm should be considered?

All standards of the food sector certify the agricultural production practices on the farm; many standards even certify only one product and not the farm as a whole. This does not fit for biodiversity for obvious reasons: contamination of aquatic ecosystems has downstream impacts on ecosystems and species, many animal species (beneficial insects within others) need to move from one habitat to another, runoff of pesticides or nutrients affects valuable ecosystems and species of the surrounding landscape…..

Therefore we strongly recommend to take the landscape surrounding the farm into account while managing biodiversity. Which circle around the farm would be appropriate? It is recommended to look at a circle of 0,5 – 5 km around the farm, depending on the size of the agricultural land cultivated. The farmer should know about the following aspects in the surroundings of his farm:

- Protected areas and their habitats and main species as well as endangered species
- High conservation value areas (HCV) or other biodiversity hotspots
- Authority /body responsible for the management of the protected areas(s)
- Aquatic ecosystems – especially those providing water for irrigation to the farm
- Authority /body responsible for management of aquatic ecosystems
- Existing or planned biotope corridors
- Sources of contamination of soil and/or water
- Other negative impacts on biodiversity (e.g. fragmentation of ecosystems, noise, dust)

Taking this information into account in the Biodiversity Action Plan and especially in the monitoring of the BAP, will help to evaluate more precisely the development of biodiversity, to benefit from synergies (e.g. connecting with existing biotope corridors) and to avoid potential negative impacts on habitats and species.

The regional nature conservation administration and/or NGOs can provide recommendations for an appropriate circle and relevant information for the baseline of the surroundings.

8. Island or network of biotopes?

One of the important measures within a sound Biodiversity Action Plan is the creation of biotope corridors (also called ecological corridors) in order to connect patches of habitats on the farm with each other, but also with habitats outside the farm – whenever possible.

Intensely cultivated agricultural land is one of the main reasons for ecosystems destruction and habitat fragmentation. The main goal of ecological corridors is to facilitate movement of individuals, through both dispersal and migration, so that gene flow and diversity are maintained between local populations. By linking populations throughout the landscape, there is a lower chance for extinction and greater support for species richness.

Ecological corridors are the clearest way to increase connectivity, as they provide structural connections between habitats in the landscape. Corridors can exist naturally, such as riparian corridors that link two different populations dependent on isolated wetlands, and they can be constructed through management practices. They are considered to include continuous linear strips of habitat, and a linear arrangement of separate stepping stone habitats, as well as linear features and can vary greatly in size, shape, and composition – but they should be always as wide as possible. Local corridors within sites are likely to be more successful and feasible than regional corridors. Some of the most frequently used elements of habitat corridors in agricultural landscapes in Europe are flowering strips, grass strips, hedges, buffer zones with native vegetation along streams and rivers, agro-forestry strips, linear native tree plantations.

Plants and animals can use corridors for both dispersal and migration, two key movement patterns for species persistence. The human-dominated habitats surrounding more natural areas present barriers that plants and animals are unable or highly reluctant to move through. These inhospitable places may have higher abundances of predators, lower resource availability, or reduced shelter.

When a corridor is present, however, it provides an unbroken path of suitable habitat that can provide safe passage for animals or plants without being hindered as they travel through agricultural or urban landscapes. This connectivity is key to population persistence, as it promotes gene flow between populations and supports higher species diversity.

Often ecological corridors have reduced potential for plants. Dispersal by livestock and mammals and birds is nevertheless important, especially in grasslands, and emphasis should be on maintaining animal movement within the landscape.

9. Invasive alien species (IAS)

An **alien or non-native species** is an organism which humans have introduced –intentionally or accidentally – outside its previous range. It is deemed '**invasive**' if it has negative effects on its surroundings, for example by outcompeting or predating on native species that have evolved without specific adaptations to cope with them. In such cases populations of native species can be devastated. Evidence shows that in a growing number of cases invasive alien species even cause harm to human health and society.

There are more than 10 000 alien species present in Europe, and the rate of new introductions has accelerated and is still increasing. At least 15 % of these alien species are known to have a negative ecological or economic impact. The most common reason species are introduced elsewhere is for horticulture, while others may be brought into new areas for other reasons including farming, hunting, and fishing, or as pets, the report notes. Transport is not always intentional – for example, zebra mussels have stowed away in the ballast water of ships to proliferate in European lakes.

The destructive consequences of rabbit infestations and the introduction of the American grey squirrel into Europe are well known, but there are many other examples: the Harlequin ladybird, from Asia, poses a deadly threat to native ladybirds and other insects in Europe; coypu, mink and musk rat, brought from America for their fur, are now wild in Europe, damaging canals and flood protections systems and decimating indigenous species such as water voles; Japanese knotweed (Fallopia japonica), which was introduced to Europe from eastern Asia as an ornamental plant in the 19th century, is causing damage to natural plant and insect species across the continent; and there is widespread agreement that the alarming decline in global bee numbers is at least partially attributable to the spread and impact of pests such as the Varroa mite.

The EU experiences annual damages worth EUR 12 billion as a result of IAS effects on human health, damaged infrastructure, and agricultural losses. However, non-native species – for example, some food crops – can also have huge benefits (European Environmental Agency, 2013).

In January 2015, the Regulation (EU) 1143/2014 on the prevention and management of the introduction and spread of invasive alien species came into force. It aims to establish a more consistent approach to tackling those invasive alien species. A core provision of the EU Regulation is a list of invasive alien species of Union concern ('the Union list'), which are species whose potential adverse impacts across the European Union are such that concerted action across Europe is required.

Invasive species are a major cause of crop loss and can adversely affect food security. To date, there has been no evaluation of total invasion threat and its potential cost to agricultural crop production from a global pool of potential invasive species considering all countries at risk. In the United States alone, crop and forest production losses from invasive insects and pathogens have been estimated at almost US$40 billion per year.

Further information:

www.eea.europa.eu/publications/impacts-of-invasive-alien-species

www.eea.europa.eu/publications/streamlining-european-biodiversity-indicators-sebi

Overview of the Project EU LIFE Food & Biodiversity

Food producers and retailers are highly dependent on biodiversity and ecosystem services but also have a huge environmental impact. This is a well-known fact in the food sector. Standards and sourcing requirements can help to reduce this negative impact with effective, transparent and verifiable criteria for the production process and the supply chain. They provide consumers with information about the quality of products, environmental and social footprints, the impact on nature caused by the product.

The LIFE Food & Biodiversity Project "Biodiversity in Standards and Labels for the Food Industry" aims at improving the biodiversity performance of standards and sourcing requirements within the food industry by:

A) Supporting standard-setting organisations to include efficient biodiversity criteria into existing schemes; and encouraging food processing companies and retailers to include biodiversity criteria into respective sourcing guidelines;
B) Training of advisors and certifiers of standards as well as product and quality manager of companies;
C) Implementation of a cross-standard monitoring system on biodiversity;
D) Establishment of a European-wide sector initiative.

Within the EU-LIFE Project Food & Biodiversity, a Knowledge-Pool with background information linked to agriculture and biodiversity is provided. You can access the Knowledge Pool under the following link: www.business-biodiversity.eu/en/knowledge-pool

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